COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

Chemical Weed and Brush Control for New Mexico Rangelands

Revised by Kert Young and Casey Spackman[1]

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Mesquite brush is a common woody plant found in many parts of New Mexico.

Noxious woody and weedy plants inhabit much of New Mexico's rangelands. Dense stands of brush and weeds use vast quantities of water, reduce forage production, and contribute to erosion. If rangelands are to reach their productive potential, noxious plants need to be managed effectively. Herbicides can be effective, economical, and an efficient method for controlling brush and weeds and improving and maintaining rangelands.

This circular lists current herbicides to control woody and herbaceous weeds on rangelands. Herbicide control is highly variable and is dependent on species. However, seldom is a species eradicated. When developing a woody and herbaceous weed management program, consider all possible rangeland uses. Many woody plants and forbs are a valuable source of food and cover for wildlife and can also be important to livestock operations. A woody and herbaceous weed management program should use control methods that provide optimal benefits to all animal species.

Herbicides are effective and safe when they are used properly (Appendix A). Misuse can result in poor woody and herbaceous weed control, increased expense, and possible hazards from herbicidal drift or residues

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that damage or kill desirable plants. Use the following guidelines for proper herbicide use:

- Correctly identify the plant species and evaluate the need for control.
- Consider the expected benefits and costs of herbicides and alternative control practices, as well as alternative uses of funds.
- Select and purchase the appropriate herbicide for the plant species.
- Provide and require proper safety equipment.
- Calibrate spray equipment to correctly apply the desired rate.
- Mix herbicides in a well-ventilated area, preferably outside.
- Spray under conditions that minimize drift.
- Read and follow instructions on the label.
- Additional restrictions may be listed on the label.
- Use adjuvants appropriate to the situation when recommended on the label.
- Keep a record of the herbicide used, time of application, weather conditions, rate of herbicide applied, date, location, and applicator.

For successful weed control, the correct quantity of herbicide mixture must be applied to a specific area. To calibrate spray equipment, see NMSU Cooperative Extension Service Guide A-613, *Sprayer Calibration* (https://aces.nmsu.edu/pubs/_a/A613.pdf), on calibrating pesticide applicators. For information about procedures for obtaining a pesticide applicator license and other information about applying herbicides properly, contact your county Extension office (https://aces.nmsu.edu/county/).

The following suggestions for using herbicides are based upon their effectiveness under New Mexico conditions. Broadcast and individual plant treatments are presented in Table 1. Individual plant treatments are best suited for controlling thin stands of brush (usually less than 150 plants/acre) and for selective control. Broadcast treatments are useful for dense stands of target weeds.

Suggested herbicides must be registered and labeled for use by the Environmental Protection Agency. Some of the suggested herbicides are restricted-use pesticides and require an applicator's license for purchase and use. **Because the status of herbicide label clearance is subject to change, be certain to use a current label for the herbicide's intended use.**

The user is always responsible for the effects of herbicide residue on livestock and crops, as well as for problems that arise from drift or other herbicide movement from the user's property to the property of others.

The label is a legal document, and violation of it is a federal offense. Always read and follow carefully the instructions on the container label. Especially note any grazing restrictions that apply to the herbicide.

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Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
African rue (*Peganum harmala*)	Arsenal	imazapyr	3 pt (3/4 lb)	1 gal per 100 gal. water (2 lb per 100 gal water)	10–25 gal for ground broadcast	Spray only actively growing (non-stressed) plants	Caution: Arsenal or Velpar L will damage or kill other sprayed or nearby vegetation
	Velpar L	hexazinone		2 ml/plant	Individual plant treatment only	Any time of year	
	Pronone Power Pellets	hexazinone		1 pellet/plant			
Algerita (*Mahonia trifoliolata*)	Velpar L	hexazinone		3 ml/3 ft canopy height	Individual plant treatment only	Any time of year. Optimum is prior to rainy season.	Do not apply to snow-covered or frozen ground
	Pronone Power Pellets	hexazinone		1 pellets/2 ft canopy height			
	Spike 20P	tebuthiuron		1/16 oz pellets/3 ft canopy height			
Bindweed, field (*Convolvulus arvensis*)	Banvel, Clarity	dicamba	1 pt to 1 qt (1/2 to 1 lb)		10–25 gal for ground broadcast application. Use surfactant as per label.	Summer fallow prior to planting and when weeds are actively growing, or in late summer or fall prior to post-bloom or killing frost. Follow-up applications should be made in spring to control seedlings. Spring to fall.	For suppression, refer to label for crop rotation restrictions
	Overdrive	dicamba: diflufenzopyr	4 to 8 oz (5:2 mixture) (1/4 to 1/2 lb)				
	Plateau	imazapic	4 to 8 oz (1/16 to 1/8 lb)				
	Weedmaster	dicamba:2,4-D	1 pt to 1 qt (1:3 mixture) (1/2 to 1 lb)				
	Tordon 22K**	picloram	1 to 2 qt (1/2 to 1 lb)				
	Paramount	quinclorac	5 to 8 oz (1/4 to 3/8 lb)		10–25 gal for ground broadcast. Add 1–2 pints MSO.		
	Roundup*	glyphosate	4 to 5 qt (4 to 5 lb)		10–25 gal for ground broadcast application. Use surfactant as per label.	Full bloom to early seed stage	
	Tank mix Roundup + Banvel, Clarity	glyphosate + dicamba	1 qt + 1/2 pt (1 lb + 1/2 lb)			Mid- to late-bloom	
	Landmaster BW	glyphosate:2,4-D	3 1/5 pt (1:1 mixture) (l lb)			Fallow or post-harvest when bindweed has 10 in. runners	
	2,4-D*	2,4-D	2 to 3 qt (2 to 3 lb)			Bud stage or summer; follow in early August	
Bitter sneezeweed, broomweed (annual or common), buckwheat, camphorweed, cocklebur, horehound, horsemint, knapweed, lakeweed, milkvetch, mustard, nettles, pepperweed, pinque, prairie coneflower, ragweed (common or western), sunflower, thistles, and western bitterweed	2, 4-D*	2, 4-D	1 pt to 1 qt (1/2 to 1 lb)		2–4 gal water for aerial spray; 10–25 gal for ground broadcast application. Add surfactant as needed.	Spring weeds 4–6 in. high, before blooming, good growing conditions	Use 2,4-D amine or low volatile ester. Do not spray near susceptible crops.
	Weedmaster	dicamba:2,4-D	1 pt to 1 qt (1:3 mixture) (1/2 to 1 lb)				
	Tank mix Banvel + 2, 4-D*	dicamba + 2, 4-D	1/4 to 1/2 pt (1/8 to 1/4 lb) + 3/4 to 1 1/2 pt (3/8 to 3/4 lb)				
	Grazon P+D	picloram:2,4-D	1 to 3 pt (1:2 mixture) (3/10 to 9/10 lb)				
	Tank mix Tordon 22K** + 2,4D	picloram + 2,4-D	1/4 to 3/4 pt (1/16 to 3/16 lb) + 1/2 to 1 1/2 pt (1/4 to 3/4 lb)				

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Bitter sneezeweed, broomweed (annual or common), buckwheat, camphorweed, cocklebur, horehound, horsemint, knapweed, lakeweed, milkvetch, mustard, nettles, pepperweed, pinque, prairie coneflower, ragweed (common or western), sunflower, thistles, and western bitterweed (continued)	Chaparral	aminopyralid + metsulfuron	2 1/2 to 3 1/3 oz (1/12 to 1/8 lb)		2–4 gal water for aerial spray; 10–25 gal for ground broadcast application. Add surfactant as needed.	Spring weeds 4–6 in. high, before blooming, good growing conditions	Use 2,4-D amine or low volatile ester. Do not spray near susceptible crops.
	Escort	metsulfuron	5/8 to 4/5 oz (3/8 to 1/2 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	8/10 to 1 oz (6/10 to 8/10 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate I to II (1/4 oz + 1 pt to 1/2 oz + 2 pt)				
	Overdrive	dicamba: diflufenzopyr	4 to 8 oz (5:2 mixture) (1/4 to 1/2 lb)				Add 1/2% nonionic surfactant
	Milestone	aminopyralid	3 to 7 oz (1/20 to 1/10 lb)				
	GrazonNext	aminopyralid:2,4-D	1 1/2 to 2 pt (1/2 to 3/4 lb)				
Black henbane (*Hyoscyamus niger*)	Cimarron Plus	metsulfuron + chlorsulfuron	6/10 oz (1/2 oz)		10–25 gal for ground broadcast application. Use surfactants as per label.	Rosette to bloom	Seedlings should be controlled the following year
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate II (1/2 oz + 2 pt)				
Bluestems, Old World (yellow and Caucasian) (*Bothriochloa* spp.)	Roundup Pro (41%)	glyphosate	3 to 5 qt	2 to 5%	Ground broadcast: 3–40 gal/acre water solution; aerial broadcast: 3–25 gal/acre water solution; individual plant: spray foliage to wet but not dripping	Growing prior to seedhead formation preferably during boot stage; moderate soil moisture. A split application using 3–4 qt/acre can be applied at 5-leaf stage and again 8 weeks later if growing conditions are favorable.	Alternate use of glyphosate and imazapyr to reduce herbicide resistance. Both herbicides are non-selective. At least 3 to several consecutive years of repeated treatments are required. Combinations of mechanical, fire, and cultural practices can be applied in addition to chemical applications when all practices are timed for maximum control and do not reduce herbicide effectiveness.
	Arsenal	imazapyr	1 to 1.5 pt	0.5%	Ground broadcast: 5-20 gal/acre water solution; aerial broadcast: 2-30 gal/acre water solution; individual plant: spray foliage but not to dripping	Growing prior to seedhead formation preferably during boot stage; moderate soil moisture. A split application using 8 oz/acre can be applied at 5-leaf stage and again 8 weeks later if growing conditions are favorable.	Alternate use of glyphosate and imazapyr to reduce herbicide resistance. Both herbicides are non-selective. At least 3 to several consecutive years of repeated treatments are required. Combinations of mechanical, fire, and cultural practices can be applied in addition to chemical applications when all practices are timed for maximum control and do not reduce herbicide effectiveness. Do not exceed 1.5 pt ac/yr on pasture or rangeland.

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	2,4-D*	2,4-D	1 1/2 to 2 qt (1 1/2 to 2 lb)			Without cultivation, spring and fall	Treat after tillage when regrowth is 4–6 in.
	Tordon 22K**	picloram	2 qt (1 lb)			Fully leaved and actively growing	
Bursage, skeletonleaf (*Ambrosia tomentosa*)	Banvel, Clarity	dicamba	1 to 2 qt (1 to 2 lb)		10–25 gal for ground broadcast application	Late summer and fall	
	Escort XP	metsulfuron		3/8 oz (1/4 oz per 100 gal water)	Individual plant treatment. Mix in 100 gal water, add 8 oz silicone surfactant.		
	Arsenal	imazapyr		3/4 to 1 1/2 qt (3/8 to 3/4 lb per 100 gal water)		Actively growing	
Camelthorn (*Alhagi psuedalhagi*)	Milestone	aminopyralid	5 to 7 oz (1/12 to 1/10 lb)			In vegetative state, prior to bloom	Retreatment may be necessary
	Spike 20P	tebuthiuron	3 3/4 to 5 lb pellets (3/4 to 1 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	Use only on coarse-textured soils.
	Tank mix Tordon 22K** + Remedy	picloram + triclopyr	2 pt + 1 pt (1/2 lb + 1/2 lb)		2–4 gal oil-in-water emulsion as aerial spray (1 pt to 1 qt diesel oil in water to make 2–4 gal). 10–25 gal oil-in-water emulsion for ground broadcast (1/2–1 gal diesel oil in water to make 10–25 gal).	When leaves are fully expanded. Good growing conditions.	Do not spray near susceptible crops
	Transline	clopyralid	2/3 pt to 2/3 qt (1/4 to 1/2 lb)				
	Tank mix Transline + Remedy	clopyralid + triclopyr	1/3 to 2/3 pt + 1/4 to 1/2 pt (1/8 to 1/4 lb + 1/8 to 1/4 lb)				
Catclaw mimosa, whitethorn acacia (*Mimosa pigra, Vachellia constricta*)	Spike 20P	tebuthiuron		1/4 to 1/2 oz per 3 ft of canopy diameter or height	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Do not apply to frozen or snow-covered ground. Distribute uniformly under canopy.
	Spike 20P	tebuthiuron	5 to 7 1/2 lb of pellets (1 to 1 1/2 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	Use only on coarse-textured soils
	Tank mix Tordon 22K** + Remedy	picloram + triclopyr	2 pt + 1 pt (1/2 lb + 1/2 lb)		2–4 gal oil-in-water emulsion as aerial spray (1/2–1 gal diesel oil in water to make 2–4 gal). 10–25 gal oil-in-water emulsion for ground broadcast (1/2 to 1 gal diesel oil in water to make 10–25 gal).	When leaves are fully expanded. Good growing conditions	Do not spray near susceptible crops
	Spike 20P	tebuthiuron		1/4 to 1/2 oz per 3 ft of canopy diameter or height	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Do not apply to frozen or snow-covered ground. Distribute uniformly under canopy. Use only on coarse-textured soils.
Catclaw acacia (*Senegalia greggii*)	Velpar L	hexazinone		4 ml per 3 ft of canopy diameter or height			
	2,4-D*	2,4-D		6 qt per 100 gal water (6 lb per 100 gal water)	Spray to wet with handheld equipment	Before cattail heads appear	Reapplications may be necessary. Use surfactant as per label.
	Rodeo	glyphosate		5 3/4 to 7 1/2 pt (2 7/8 to 3 3/4 lb)		Early to full bloom	
	Habitat	imazapyr	2 qt (1 lb)		Broadcast	When plants are actively growing	Use surfactants as per label
Cattail, common (*Typha latifolia*)	Habitat	imazapyr		1 gal (2 lb)	Mix in 100 gal of water, spray to wet. Add surfactant as per label.		

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Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Cattail, common (*Typha latifolia*)	Imox	imazamox	1 to 2 qt	2 to 5%	Minimum of 5 gal/ acre water solution. Better with minimum of 20 gal/acre gal water solution.	After full greenup through killing frost	For foliar application on aquatic sites, use a non-ionic surfactant labeled for aquatic sites at minimum of 0.25% v/v. For terrestrial sites, can use methylated seed oil (MSO) at 1% v/v when tank mixes exceed 30 gal. See label for additional restrictions and application methods.
Cholla, prickly pear, tasajillo (*Cylindropuntia* spp., *Opuntia* spp.)	Tordon 22K**	picloram		4 to 6 ml per 3 ft of plant height (cholla) or plant width (prickly pear)	Individual plant treatment, spot applied	Any time during year. Optimum is prior to rainy season.	Apply at junction of stem and ground (cholla) or within plant area (prickly pear). Do not treat more than 25% of watershed. Herbicide is very slow acting. May take 2–3 years to show effect.
	Tordon 22K**	picloram	1 qt (1/2 lb)		2–4 gal water solution as aerial spray. 10–25 gal water solution as ground broadcast. Individual plant treatment.	Any time air temperature is above 60°F and not 32°F or below during the past 24 hours.	Spray dry pads and stems when soil has moderate moisture. Spray to wet. Do not spray near susceptible crops. Cholla: More effective spring to early summer including bloom stage but before drought stress. Prickly pear and tasajillo: more effective late-summer to fall. Add surfactants as label directs.
	Vista	fluroxypyr		Vista 1 to 2% (1 to 2 gal/100 gal water) (Vista XRT 0.5 – 1% v/v)			
	Surmount	picloram:fluroxypyr (1:1 mixture)	2 qt	1 to 2% (1 to 2 gal/100 gal water)			
	MezaVue	picloram + fluroxypyr + aminopyralid	1 qt	1 to 2% (1 to 2 gal/100 gal water)	Aerial: minimum of 4 gal water solution. Ground broadcast: 10-25 gal water solution.		
	Velpar L (cholla only)	hexazinone		4 to 6 ml per 3 ft of plant height	Individual plant treatment only	Any time during year. Optimum is prior to rainy season.	Apply Velpar L to soil surface at junction of stem and ground
	Pronone Power Pellets (cholla only)	hexazinone		1 pellet per 2 ft. of plant height			
Crazyweed (silky or Lambert's); locoweed, whitepoint or woolly (*Oxytropis* spp., *Astragalus* spp.)	Tordon 22K**	picloram + 2,4-D	1 qt (1/2 lb)		2–4 gal water for aerial spray. 10–25 gal for ground broadcast application. Add surfactant as per label.	When plants are actively growing and before seeds mature	To prevent livestock poisoning, avoid grazing until plants are totally dry
	Tank mix Banvel Clarity + 2,4-D*	dicamba + 2,4-D	1 qt + 1 qt (1 lb + 1 lb)				
	Weedmaster	dicamba:2,4-D	1 to 2 qt (1:3 mixture) (1 to 2 lb)				
	Escort XP	metsulfuron	1/2 oz (3/10 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	6/10 oz (1/2 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate II (1/2 oz + 2 pt)				
	Grazon P+D	picloram:2,4-D	1 to 2 qt (1:4 mixture) (5/8 to 1 1/4 lb)				
	Tank mix Tordon 22K** + 2,4-D	picloram + 2,4-D	1 to 2 qt + 1 1/2 to 3 pt (1/4 to 1/2 lb + 3/4 to 1 1/2 lb 2,4-D)				

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Spike 20P	tebuthiuron	3 3/4 to 5 lb of pellets (3/4 to 1 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	Use 1-lb rate when soils are loam, silt, or sandy clay loam
	Tordon 22K**	picloram		2 to 4 ml per 3 ft of canopy diameter	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Distribute uniformly under canopy. Do not apply to frozen or snow-covered ground. Do not treat more than 25% of watershed.
	Velpar L	hexazinone		2 to 4 ml per 3 ft of canopy diameter			Apply undiluted Velpar L to soil surface within 3 ft of stem base. Use exact delivery handgun applicator. Do not use on clay soil. Do not apply to frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 pellet per 1 ft of canopy diameter	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	
Creosotebush (*Larrea tridentate*)	Spike 20P	tebuthiuron		1/4 to 1/2 oz per 3 ft of canopy diameter			
	Remedy	triclopyr	1 1/3 pt (2/3 lb)		10–25 gal for ground broadcast	Actively growing	Retreatment may be necessary
	Tordon 22K**	picloram	1 to 2 pt (1/4 to 1/2 lb)				
	Grazon P+D, Gunslinger P+D	Picloram + 2,4-D	2 qt		Ground broadcast: 10–40 gal/acre water solution; aerial broadcast: minimum of 2 gal/acre water solution	Emerged to late flowering	Many grasses are tolerant
	Milestone	aminopyralid	4 to 6 oz	3%	Ground broadcast: 10–40 gal/acre water solution; aerial broadcast: minimum of 2 gal/acre water solution better if 5 gal/ac	Prebud	Most grasses are tolerant
Daisy, oxeye (*Leucanthemum vulgare*)	Escort, MSM 60	metsulfuron methyl	0.5 to 1.0 oz	1 gram per gallon	Ground broadcast: 20–50 gal/acre water solution; aerial broadcast: 15–25 gal/acre water solution	Early spring or late fall (at bud/bloom or rosette stages)	Best used during warm, moist conditions. Use 0.25% v/v non-ionic surfactant.
	Aatrex	atrazine	1 to 2 pt (1/2 to 1 lb)		10–25 gal for ground broadcast	When desirable vegetation is dormant	
	Gramoxone	paraquat	26 oz (1/2 lb)		Add 0.25% v/v non-ionic surfactant		2 years successive treatment necessary
	Oust	sulfometuron	1 oz (3/4 oz)			Late fall or winter	See label
	Roundup*	glyphosate	1/2 to 1 pt (1/4 to 1/2 lb)			After emergence and before seedset	
Downy brome, cheatgrass (*Bromus tectorum*)	Plateau, Journey	imazapic, imazapic + glyphosate	9 to 13 oz (1/7 to 1/5 lb)		Add 1 qt/acre MSO		Use low rate for cheatgrass
	2,4-D*	2,4-D	1 1/2 to 2 qt (1 1/2 to 2 lb)		10–25 gal for ground broadcast	Rosette stage	Repeat treatments may be necessary
	Escort XP	metsulfuron	3/4 oz (2/5 oz)		Add 0.25% v/v non-ionic surfactant	Actively growing plants	
	Telar XP	chlorsulfuron	1 oz (3/4 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	9/10 oz (3/4 oz)				
Dyer's woad (*Isatis tinctoria*)	Cimarron Max	metsulfuron + 2,4-D: dicamba	Rate II (1/2 oz to 2 pt)				

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Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Oust	sulfometuron	1 3/10 oz (1 oz)		10–25 gal for ground broadcast application or 2–4 gal for aerial broadcast	Late fall or winter	
	Plateau	imazapic	4 to 6 oz (1/16 to 3/32 lb)			Fall	See label
Goatgrass, jointed (*Aegilops cylindrical*)	Roundup	glyphosate	2 1/2 to 3 pt (1 1/4 to 1 1/2 lb)		Spot treatments	When fully tilled	For spot treatment
Groundsel, thread-leaf, Riddell's (*Senecio* spp.)	2,4-D*	2,4-D	2 to 4 qt (2 to 4 lb)		10–25 gal for ground broadcast or 2–4 gal for aerial broadcast. Add 0.25% v/v non-ionic surfactant.	Actively growing, prior to bloom	
	Weedmaster	dicamba:2,4-D	1 to 2 qt (1:3 mixture) (1 to 2 lb)				
	Tank mix Banvel + 2,4-D*	dicamba + 2,4-D	1/2 to 1 pt + 1 1/2 to 3 pt (1/4 to 1/2 lb + 3/4 to 1 1/2 lb)				
	Banvel	dicamba	1 pt (1/2 lb)				
	Tank mix Tordon 22K** +2,4-D	picloram + 2,4-D	1 to 2 pt + 1 1/2 to 3 pt (1/4 to 1/2 lb + 3/4 to 1 1/2 lb)				
	Grazon P+D, Gunslinger P+D	picloram:2,4-D	1 to 2 qt (1:4 mixture) (5/8 to 1 1/4 lb)				
	Tordon 22K**	picloram	1 qt (1/2 lb)				
	Telar XP	chlorsulfuron	1/2 to 1 oz (3/8 to 3/4 oz)				
	Escort XP	metsulfuron	5/8 to 4/5 oz (3/8 to 1/2 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	8/10 to 1 oz (6/10 to 8/10 oz)				
	Cimarron Max	metsulfuron + 2,4-D: dicamba	Rate II (1/2 oz + 2 pt)				
Gumweed, curlycup (*Grindelia squarrosa*)	Escort XP	metsulfuron	1 oz (3/5 oz)		10–25 gal for ground broadcast or 2–4 gal for aerial broadcast. Add 0.25% v/v non-ionic surfactant.	Early spring	See label
	Cimarron Plus	metsulfuron + chlorsulfuron	1 1/4 oz (1 oz)				
	2,4-D*	2,4-D	2 qt (2 lb)				
	Tordon 22K**	picloram	1 pt (1/4 lb)				
	Grazon P+D	picloram:2,4-D	2 qt (1:2 mixture) (1 1/5 oz)				
	GrazonNext	aminopyralid:2,4-D	1 1/2 to 2 pt (1/2 to 3/4 lb)				
	Tank mix Tordon 22K** + 2,4-D	picloram + 2,4-D	1 pt + 1 qt (1/4 lb + 1 lb)				
Halogeton (*Halogeton glomeratus*)	Escort XP	metsulfuron	1 oz (6/10 oz)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Early spring with good growth	
	Telar XP	chlorsulfuron	1/2 to 1 oz (3/8 to 3/4 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	1 1/4 oz (1 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate II (1/2 oz + 2 pt)				
	2,4-D*	2,4-D	2 qt (2 lb)				
Hemlock, western, water (*Cicuta douglasii*)	2,4-D*	2,4-D	1 to 2 qt (1 to 2 lb)		10–25 gal for ground broadcast	Flower bud stage	See label

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Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Hoarycress, whitetop and related species (*Cardaria* spp.)	2,4-D*	2,4-D	2 qt (2 lb)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Before bud stage	Repeat treatment may be necessary
	Chaparral	aminopyralid + metsulfuron	2 1/2 to 3 1/3 oz (1/12 to 1/8 lb)			Spring or fall	
	Telar XP	chlorsulfuron	1 oz (3/4 oz)			Bud to early bloom	See label
	Escort XP	metsulfuron	1 oz (3/5 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	1 1/4 oz (1 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate III (1 oz + 4 pt)				
	Plateau	imazapic	8 to 12 oz (1/8 to 3/16 lb)				
Horsetail, smooth, scouring rush (*Equisetum* spp.)	Telar XP	chlorsulfuron	1 to 2 oz (3/4 to 1 1/2 oz)		10–25 gal for ground broadcast. Add nonionic surfactant at 1 pt to 1 qt/100 gal spray solution.	Early spring	See label
	Escort XP	metsulfuron	1 to 2 oz (3/5 to 1 1/5 oz)				
	Oust	sulfometuron	1 1/2 oz (1 1/8 oz)				
	MCPA (4EC) Ester	2, 4-D	1 qt (1 lb)			Before cone heads appear	Important to use the isoctylester formulation
Houndstongue (*Cynoglossum officinale*)	2,4-D*	2,4-D	2 qt (2 lb)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Early spring before bloom	
	Escort XP	metsulfuron	1 oz (3/5 oz)			Before bolting	See label
	Plateau	imazapic	13 oz (1/5 lb)		Add MSO at 1 1/2–2 pt/acre	Before bloom	
	Cimarron Plus	metsulfuron + chlorsulfuron	1 1/4 oz (1 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate III (1 oz + 4 pt)				
Iris, Rocky Mountain (*Iris missouriesis*)	2,4-D*	2,4-D	2 qt (2 lb)		10–25 gal for ground broadcast	Early bloom stage	Wet thoroughly
Juniper (cedar) (*Juniperus* spp.)	Spike 20P	tebuthiuron	5 to 10 lb of pellets (1 to 2 lb)		Ground or aerial broadcast	Any time during year. Optimum is prior to rainy season.	Use only on coarse-textured soils
	Velpar L	hexazinone		4 to 6 ml per 3 ft of canopy height	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Apply evenly around trees at dripline. Do not treat more than 25% of watershed. Do not apply to frozen or snow-covered ground. Treat trees under 9 ft.
	Tordon 22K**	picloram		4 to 6 ml per 3 ft of canopy height			
Knapweed, diffuse, spotted (*Centaurea* spp.)	Tordon 22K**	picloram	1 1/2 pt (3/8 lb)		10–25 gal for ground broadcast or 3–4 gal for aerial broadcast. Add 0.25% v/v nonionic surfactant.	Rosette to mid-bolting	
	Grazon P+D	picloram:2,4-D	2 to 3 qt (1:2 mixture) (1 1/4 to 1 7/8 lb)				
	Tank mix Tordon 22K** + 2,4-D	picloram + 2,4-D	2 to 3 pt + 3 to 4 1/2 pt (1/2 to 3/4 lb + 3 to 4 1/2 lb)				
	2,4-D*	2,4-D	2 qt (2 lb)			Early stage of flower stem elongation	
	Chaparral	aminopyralid + metsulfuron	2 1/2 to 3 1/3 oz (1/12 to 1/8 lb)			Spring or fall	
	Tank mix Banvel, Clarity + 2,4-D*	dicamba + 2,4-D	1 pt + 1 qt (1/2 lb + 1 lb 2,4-D)			Rosette stage before bolting	
	Curtail	clopyralid:2,4-D	2 to 3 qt (1:5 mixture) (1 1/15 to 1 4/5 lb)				See label
	Transline	clopyralid	1/3 to 1 1/3 pt (1/8 to 1/2 lb)				
	Milestone	aminopyralid	5 to 7 oz (1/12 to 1/10 lb)				

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Knapweed, Russian (*Acroptilon repens*)	Roundup*	glyphosate	4 4/5 qt (4 4/5 lb)		10–25 gal for ground broadcast	Late bud to early flower	Retreatment may be necessary
	Tordon 22K**	picloram	1 to 2 qt (1/2 to 1 lb)			Early flower to frost	
	Curtail	clopyralid:2,4-D	1 to 2 qt (1:5 mixture) (3/5 to 1 1/5 lb)			Full bloom to frost	See label
	Transline	clopyralid	2/3 to 1 1/3 pt (1/4 to 1/2 lb)			Full bloom to frost	
	Plateau	imazapic	12 oz (3/16 lb)			Fall and winter	Add 1% v/v MSO
	Milestone	aminopyralid	5 to 7 oz (1/12 to 1/10 lb)				
	Telar XP	chlorsulfuron	1 to 3 oz (3/4 to 2 1/4 oz)			Pre-bloom to bloom and fall rosette	
	Chaparral	aminopyralid + metsulfuron	2 1/2 to 3 1/3 oz (1/12 to 1/8 lb)			Spring or fall	
Larkspur, Geyer's (*Delphinium geyeri*)	Escort XP	metsulfuron	1 1/2 oz (9/10 oz)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Rosette	
	Tordon 22K**	picloram	1 1/2 to 2 qt (3/8 to 1/2 lb)			Rapidly growing	
Larkspur, tall or duncecap (*Delphinium* spp.)	Escort XP	metsulfuron	1 1/2 oz (9/10 oz)		10–25 for ground broadcast. Add 0.25% v/v nonionic surfactant.	6 to 8 leaf stage; less than 8 in. tall	
	Tordon 22K**	picloram	2 to 3 qt (1 to 1 1/2 lb)			Bud stage	
Lotebush (*Ziziphus obtusifolia*)	Spike 20P	tebuthiuron		1/4 to 1/2 oz per 3 ft of canopy diameter or height	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Distribute pellets uniformly under canopy.
	Velpar L	hexazinone		2 to 4 ml per 3 ft of plant diameter or height, or 2 to 4 ml per inch of stem diameter			Apply diluted Velpar L to soil surface within 3 ft of stem base. Use exact delivery handgun applicator. Do not use on clay soils. Do not apply to frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 pellet per 2 ft plant diameter or height			
Lovegrass, Lehmann, weeping (*Eragrostis* spp.)	Roundup Pro (41%)	glyphosate	2 to 4 qt	2 to 5%	Ground broadcast: 3–40 gal/acre water solution; aerial broadcast: 3–25 gal/ acre; individual plant: spray foliage to wet but not dripping	Growing prior to seedhead formation, at least 50% green, good growing conditions, spring or fall. To reduce non-target grass damage, spray when lovegrass is mostly green and native grasses are dormant.	At least 2 to several consecutive years of repeated treatments are required. Non-selective herbicide. Combinations of mechanical, fire, and cultural practices can be applied in addition to chemical applications when all practices are timed for maximum control and do not reduce herbicide effectiveness.
	Arsenal	imazapyr	1 to 1.5 pt	1 to 3%	Ground broadcast: 5–20 gal/acre water solution; aerial broadcast: 2–30 gal/ acre water solution; individual plant: spray foliage to wet but not dripping	Growing prior to seedhead formation, at least 50% green, good growing conditions, spring or fall. To reduce non-target grass damage, spray when lovegrass is mostly green and native grasses are dormant.	At least 2 to several consecutive years of repeated treatments are required. Non-selective herbicide. Combinations of mechanical, fire, and cultural practices can be applied in addition to chemical applications when all practices are timed for maximum control and do not reduce herbicide effectiveness. Do not exceed 1.5 pt acre/yr on pasture or rangeland.

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Mesquite, grassland (*Prosopis* spp.)	Remedy (suppression)	triclopyr	1/2 to 1 pt (1/4 to 1/2 lb)		2–4 gal oil-in-water emulsion as aerial spray (1 pt to 1 qt diesel fuel oil and water to make 2–4 gal/acre). 10–25 gal oil-in-water emulsion (1/2 to 1 gal diesel fuel oil and water to make 20–25 gal/acre) as ground broadcast. Add surfactant as needed.	The preferred application time is spring to early summer, 40–90 days after bud break. Spray with minimum soil temperature of 75°F at 12- to 18-inch soil depth. Soil moisture should be adequate for plant growth. In certain early season drought years with late summer rains, there is an opportunity for spraying in July and August. This occurs when summer rains provide sufficient soil moisture that allows mesquite foliage to recover from drought or other damage and develop healthy and robust leaf growth.	Do not spray after major rain (usually at least 1 inch of rain) that causes light-green leaves until all leaves have returned to uniform dark-green (approx. 2–3 weeks). Foliage should be robust, dark-green, and undamaged. Foliage damaged by drought, frost, hail, wind, insects, or browsing should not be sprayed. Sendero + Surmount is for mesquite, cacti, and cholla control.
	Transline	clopyralid	2/3 pt to 2/3 qt (1/4 to 1/2 lb)				
	Tank mix Transline + Remedy	clopyralid + triclopyr	1/3 to 1 pt + 1/4 to 3/4 pt (1/8 to 3/8 lb + 1/8 to 3/8 lb)				
	Sendero	clopyralid + aminopyralid	28 oz	1–2% of total spray solution; the higher rate is for short mesquite in dunes			
	Sendero + Remedy	clopyralid + aminopyralid + triclopyr	28 oz + 8 to 16 oz	1% Sendero + 0.5% Remedy of total spray solution			
	Sendero + Surmount	clopyralid + aminopyralid + picloram + fluroxypyr	28 oz + 1 to 2 qt				
	Remedy Ultra	triclopyr		0.75–1% of total spray solution		Spring to early summer, 40–90 days after bud break	Spray must cover all parts
	Velpar L	hexazinone		4 to 6 ml per 3 ft of plant diameter or height, or 2 to 4 ml per inch of stem diameter			Apply undiluted Velpar L to soil surface within 3 ft of stem base. Use exact delivery handgun applicator. Do not use on frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 pellet per 2 ft of plant diameter or height	Individual plant treatment	Any time of year. Optimum is prior to rainy season.	
Mesquite, mixed brush (catclaw, tarbush, whitehorn, creosotebush, broom snakeweed, wolfberry) (*Prosopis* spp.)	Spike 20P	tebuthiuron	3 3/4 to 7 1/2 lb of pellets (3/4 to 1 1/2 lb)		Aerial broadcast	Any time of year. Optimum is prior to rainy season.	Low rate may be used on sand or loamy sand soils
	Tank mix Banvel + Remedy	dicamba + triclopyr	1/2 to 1 pt + 1/2 to 1 pt (1/4 to 1/2 lb + 1/4 to 1/2 lb)		2–4 gal oil-in-water emulsion as aerial spray (1 pt to 1 qt of diesel fuel oil and water to make 2–4 gal/acre). 10–25 gal oil-in-water emulsion as ground broadcast (1/2 to 1 gal diesel fuel oil to make 20–25 gal/acre). Add surfactant as needed.	Spring to early summer, 40–90 days after bud break	For best results, monthly precipitation should exceed the annual average from January to the spray season. Foliar sprays should be applied only where there are few associated weeds, such as broom snakeweed, shinnery oak, catclaw, etc. These non-target species may dominate a stand after mesquite control and provide undesirable results.
Milkweed, showy and related species (*Asclepias* spp.)	Tordon 22K**	picloram	2 to 3 qt (1 to 1 1/2 lb)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Bud to early bloom	
	Banvel, Clarity	dicamba	2 qt (2 lb)			Emergence to bloom	See label
Perennial pepperweed (*Lepidium latifolium*)	Escort XP	metsulfuron	1 oz (3/5 oz)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Late bud to early flower	See label
	Cimarron Plus	metsulfuron + chlorsulfuron	1 1/4 oz (1 oz)				
	Telar XP	chlorsulfuron	1 oz (7/10 oz)				
	Roundup	glyphosate	3 to 4 qt (3 to 4 lb)		25–40 gal for ground broadcast	Mow plants when bolting bud stage, spray resprouting plants	Wait until all resprouts emerge before applications
	2,4-D*	2,4-D*	2 qt (2 lb)			Late bud to early flower	Retreatments may be necessary

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Poison ivy, poison oak (*Toxicodendron* spp.)	Roundup*	glyphosate	4 to 6 qt (4 to 6 lb)		10–25 gal for ground broadcast	Actively growing.	
	Roundup	glyphosate		2 gal per 100 gal water (8 lb/100 gal water)	2% v/v individual plant treatment		
	Garlon 3A Ultra	triclopyr	1 to 3 gal (3 to 9 lb)		10–25 gal for ground broadcast		
	Garlon 4 Ultra, Remedy	triclopyr	1 to 2 gal (4 to 8 lb)				
	Garlon 3A Ultra	triclopyr		4 qt/100 gal water (3 lb/100 gal water)	Individual plant treatment		
	Garlon 4 Ultra, Remedy			3 qt/100 gal water (3 lb/100 gal water)			Add 0.25% v/v non-ionic surfactant
Poverty sumpweed (*Iva axillaris*)	Banvel, Clarity	dicamba	1 to 2 qt (1 to 2 lb)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Actively growing	
	Tordon 22K**	picloram	2 pt (1/2 lb)				
	2,4-D*	2,4-D	4 to 6 qt (4 to 6 lb)				
Rabbitbrush (*Chrysothamnus* spp.)	Velpar L	hexazinone		4 to 6 ml per 3 ft of plant diameter	Individual plant treatment	Any time of year. Optimum is prior to rainy season.	Apply undiluted Velpar L to soil surface within 3 ft of stem base. Do not use on clay soils. Do not apply to frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 pellet per 2 ft of plant diameter			
	Tordon 22k	picloram	1 to 2 qt	1.5 to 3%	Ground broadcast: minimum of 10 gal/ acre water solution; aerial broadcast: minimum of 2 gal/ acre water solution, better if minimum of 5 gal/acre	Fall, typically late September to October. Best when summer precipitation was above normal.	Green rabbitbrush typically is harder to control than grey rubber rabbitbrush. Late post-flower stage.
	Grazon P+D	picloram + 2,4-D	2 qt	1.5 to 3%	Ground broadcast: 10–40 gal/acre water solution; aerial broadcast: 2 or more gal/acre water solution	Spring, typically late April to May. Best when winter precipitation was above normal and minimum 2.5 inches of new growth (stem/ leaf).	Green rabbitbrush typically is harder to control than grey rubber rabbitbrush. Non-ionic surfactant recommended, see label.
	Surmount	picloram + fluroxypyr	3 to 6 pt	1%	Ground broadcast: minimum of 10 gal/ acre water solution; aerial broadcast: minimum of 5 gal/ acre water solution	Fall, typically late September to October. Best when summer precipitation was above normal.	Green rabbitbrush typically is harder to control than grey rubber rabbitbrush. Late post-flower stage.
Rayless goldenrod (*Isocoma pluriflora*)	Spike 20P	tebuthiuron	5 lb of pellets (1 lb)		Aerial broadcast	Any time of year. Optimum is prior to rainy season.	Do not apply to frozen or snow-covered ground
	Spike 20P	tebuthiuron			Individual plant treatment		Distribute pellets uniformly under canopy. Do not apply to frozen or snow-covered ground.
	Tordon 22K**	picloram	1 qt (1/2 lb)		10–25 gal for ground broadcast, 2–4 gal for aerial broadcast	Fall, after blooming and before frost	Do not spray near susceptible crops
	Escort XP	metsulfuron	4/5 oz (1/2 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	1 oz (8/10 oz)	1/4 to 1/2 oz per 3 ft of canopy diameter			
Russian olive (see also saltcedar) (*Elaeagnus angustifolia*)	Roundup	glyphosate		5 to 7 gal per 100 gal of water	Individual plant treatment	June–July	

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
Sagebrush, big (*Artemisia tridentate*)	Spike 20P	tebuthiuron	2 1/2 lb of pellets (1/2 lb)		Aerial broadcast	Any time of year. Optimum is prior to rainy season.	Select productive sites for treatment
Sagebrush, fringed (*Artemisia frigida*)	2,4-D*	2,4-D	2 qt (2 lb)		10–25 gal for ground broadcast, or 2–4 gal for aerial broadcast	Actively growing	Repeat for two more years as necessary
	Spike 20P	tebuthiuron	2 1/2 to 3 3/4 lb of pellets (1/2 to 3/4 lb)		Aerial or ground broadcast	Any time of year. Optimum is prior to rainy season.	
Sagebrush, sand (*Artemisia filifolia*)	2,4-D* low volatile ester	2,4-D	1 to 2 qt (1 to 2 lb)		2–4 gal water solution for aerial spray, or 10–25 gal water solution for ground broadcast application. Use surfactant as needed.	May 1 to June 15 with good growing conditions	Do not spray when plants are defoliated by late frost, drought, or other unfavorable growing conditions. Do not spray near susceptible crops.
	Spike 20P	tebuthiuron	2 1/2 to 3 3/4 lb of pellets (1/2 to 3/4 lb)		Aerial or ground broadcast	Any time of year. Optimum is prior to rainy season.	
Saltcedar (*Tamarix* spp.)	Arsenal, Habitat	imazapyr		1 gal per 100 gal water (2 lb per 100 gal water with 0.25% surfactant)	Individual plant treatment or ground application	August through September	Spray to wet, especially the terminal ends of all branches. Allow two full growing seasons before follow-up treatment.
	Tank mix Arsenal, Habitat + Roundup*	imazapyr + glyphosate		1/2 to 1 gal + 1/2 to 1 gal (1 to 2 lb + 2 to 4 lb per 100 gal water with 0.25% surfactant)			
	Tank mix Arsenal, Habitat + Rodeo	imazapyr + glyphosate		1/2 to 1 gal + 1/2 to 1 gal (1 to 2 lb + 2 to 4 lb per 100 gal water with 0.25% surfactant)			
	Arsenal, Habitat	imazapyr	1/2 gal (1 lb)		Aerial broadcast. Add 0.25% nonionic surfactant.		10–15 gal per acre total solution. Allow two full growing seasons before follow-up treatment.
	Tank mix Arsenal, Habitat + Roundup*	imazapyr + glyphosate	1 to 1 1/2 qt + 1 to 2 pt (1/2 to 3/4 lb + 1/2 to 1 lb)				
	Tank mix Arsenal, Habitat + Rodeo	imazapyr + glyphosate	1 to 1 1/2 qt + 1 to 1 1/2 pt (1/2 to 3/4 lb + 1/2 to 1 lb)				
	Remedy Ultra, Garlon 4	triclopyr		25% in basal oil	Individual plant	Any time, including winter. Bark needs to be dry.	Basal bark on stems less than 6 inches in diameter with thin bark: spray bottom 12–18 inches of basal stems to wet but not dripping. Cut stump: spray cambium, sides of stumps, and root collar immediately following cutting.
Sand shinnery oak (*Quercus havardii*)	Spike 20P	tebuthiuron	2 1/2 to 5 lb of pellets (1/2 to 1 lb)		Aerial broadcast	Any time of year. Optimum is prior to rainy season.	
	Velpar L	hexazinone		2 to 4 ml per 33 square ft of canopy diameter	Individual plant treatment	Any time of year. Optimum is prior to rainy season.	Apply undiluted Velpar L to soil surface within 3 ft of stem base or in a grid pattern. Use exact delivery handgun applicator. Do not apply to frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 to 2 pellets per 33 square ft of canopy diameter			
	Spike 20P	tebuthiuron		1/2 oz per 22 square ft of canopy diameter when treating a thicket or clump			Distribute uniformly under canopy. Do not apply to frozen or snow-covered ground.

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)							
Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Spike 20P	tebuthiuron	3 3/4 to 7 1/2 lb of pellets (3/4 to 1 1/2 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	Distribute uniformly under canopy. Do not apply to frozen or snow-covered ground.
	Velpar L	hexazinone		2 to 4 ml per 33 square ft of canopy diameter			Apply undiluted Velpar L to soil surface within 3 ft of stem base. Use exact delivery handgun applicator. Do not use on clay soils. Do not apply to frozen or snow-covered ground.
	Pronone Power Pellets	hexazinone		1 to 2 pellets per 33 square ft of canopy diameter	Individual plant treatment	Any time during year. Optimum is prior to rainy season	
	Spike 20P	tebuthiuron		1/4 oz per 22 square ft canopy diameter when treating a clump or thicket	Individual plant treatment	Any time during year. Optimum is prior to rainy season	Distribute uniformly under canopy. Do not apply to frozen or snow- covered ground.
Scrub oak, (wavy leaf, Gambel oak) (*Quercus* spp.)	Arsenal	imazapyr		1 gal per 100 gal water (1 gal per 100 gal water)	Individual plant treatment or ground application	Any time during growing season when growing conditions are good	Spray to wet. Use 0.25% nonionic surfactant.
	Tordon 22K**	picloram	1 pt to 1 qt (1/4 to 1/2 lb)		2–4 gal water for aerial spray; 10–25 gal for ground broadcast application. Add surfactant as needed.	Fall, after full bloom, or spring when growing conditions are good	Use drift control agent and add emulsifier to oil. Foliar sprays are recommended where broom snakeweed is the primary species.
	Tank mix Tordon 22K** + 2,4-D	picloram + 2,4-D	1 pt to 1 qt + 1 qt (1/4 to 1/2 lb + 1 lb)				
	Grazon P+D	picloram:2,4-D	1 to 2 qt (1:4 mixture) (5/8 to 1 1/4 lb)				
	Weedmaster	dicamba:2,4-D	1 1/2 to 2 qt (1:3 mixture) (1 1/2 to 2 lb)				
	Escort XP	metsulfuron	5/8 to 4/5 oz (3/8 to 1/2 oz)				
	Cimarron Plus	metsulfuron + chlorsulfuron	3/5 oz (1/2 oz)				
Snakeweed (broom, threadleaf, perennial broomweed, turpentine weed) (*Gutierrezia* spp.)	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate II (1/2 oz + 2 pt)				
	Spike 20P	tebuthiuron	3 3/4 to 5 lb of pellets (3/4 to 1 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	Use only on coarse-textured soils
	Escort XP	metsulfuron	1 oz (3/5 oz)		10–25 gal for ground broadcast. Use surfactant as per label.	Seedling to early bud	
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate III (1 oz + 4 pt)				
	Overdrive	dicamba: diflufenzopyr	4 oz (1/4 lb)			Rosette	
	Remedy	triclopyr	3 pt (1 1/2 lb)			Spring to early bud	
	2,4-D*	2,4-D	1 qt (1 lb)				
	Arsenal	imazapyr	1 pt (1/4 lb)				
	Tordon 22K**	picloram	1 pt (1/4 lb)				
	Banvel, Clarity	dicamba	1 pt (1 lb)				
	Transline	clopyralid	2/3 pt (1/4 lb)				
	Grazon P+D	picloram:2,4-D	2 qt (1:4 mixture) (1 1/4 lb)				
Starthistle (yellow, malta, and purple) (*Centaurea* spp.)	Milestone	aminopyralid	3 to 5 oz (1/20 to 1/12 lb)				

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Banvel, Clarity	dicamba	2 qt (2 lb)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Spring to early summer	
	Tordon 22K**	picloram	1 to 3 pt (1/2 to 1 1/2 lb)				
	2,4-D*	2,4-D	1 qt (1 lb)				
	Plateau	imazapic	8 to 12 oz (1/8 to 3/16 lb)				
Spurge, leafy (*Euphorbia esula*)	Tank mix Overdrive + Tordon 22K	dicamba: diflufenzopyr + picloram	4 to 6 oz + 8 to 16 oz (1/4 to 3/8 lb + 1/8 to 1/4 lb)		Add 1% v/v MSO	Late summer through fall; spring to early summer	Retreatment is necessary
	Spike 20P	tebuthiuron	3 3/4 to 5 lb of pellets (3/4 to 1 lb)		Aerial ground broadcast	Any time during year. Optimum is prior to rainy season.	Do not apply to frozen or snow-covered ground
Sumac, skunkbush (*Rhus* spp.)	Spike 20P	tebuthiuron		1/4 to 1/2 oz per 3 ft of canopy diameter or height	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Distribute uniformly under canopy
	Spike 20P	tebuthiuron	2 1/2 to 3 3/4 lb of pellets (1/2 to 3/4 lb)		Aerial broadcast	Any time during year. Optimum is prior to rainy season.	
	Tordon 22K**	picloram		2 to 4 ml per 3 ft of canopy diameter	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Apply undiluted Tordon 22K to soil surface within 3 ft of stem base. Use exact delivery handgun applicator. Do not apply to frozen or snow-covered ground.
Tarbush (*Eremphilia glabra*)	Spike 20P	tebuthiuron		1/3 to 1/2 oz per 3 ft of canopy diameter			Distribute uniformly under canopy. Do not apply to frozen or snow-covered ground.
	Escort XP	metsulfuron	1/2 to 1 oz (3/10 to 3/5 oz)		10–25 gal for ground broadcast. Add 0.25% nonionic surfactant.	Rosette	
	Cimarron Plus	metsulfuron + chlorsulfuron	3/5 to 1 1/4 oz (1/2 to 1 oz)				
	Cimarron Max	metsulfuron + 2,4-D:dicamba	Rate II to III (1/2 oz + 2 pt to 1 oz + 4 pt)				
	Telar XP	chlorsulfuron	1/2 to 1 oz (3/8 to 3/4 oz)				
	Tordon 22K**	picloram	1 to 2 pt (1/4 to 1/2 lb)			Before bolting	
	Overdrive	dicamba: diflufenzopyr	4 to 6 oz (1/4 to 3/8 lb)			Rosette to bolting	
	Plateau	imazapic	8 to 12 oz (1/8 to 3/16 lb)			Early spring or fall	
	Curtail	clopyralid:2,4-D	1 to 2 qt (1:5 mixture) (3/5 to 1 1/5 lb)				
Thistle, musk, scotch, Canada, and bull (*Carduus nutans, Onopordum acanthium, Cirsium* spp.)	Tank mix Remedy + 2,4-D	triclopyr + 2,4-D	1 1/3 pt + 1 to 2 qt (2/3 lb + 1 to 2 lb)				
	Milestone	aminopyralid	3 to 7 oz (1/20 to 1/10 lb)				Use higher rates for Canada thistle

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Telar XP	chlorsulfuron	2 oz (1 1/2 oz)		10–25 gal for ground broadcast. Add 0.25% v/v nonionic surfactant.	Actively growing in spring or fall	See label
	Tordon 22K**	picloram	1 to 2 qt (1/2 to 1 lb)			Through full bloom or to fall regrowth	Especially effective after first killing frost
Toadflax, Dalmatian, yellow (*Linaria* spp.)	Picloram 22K + Overdrive	picloram + diflufenzopyr + dicamba	1 to 2 qt + 8 oz		Ground broadcast: minimum of 10 gal/ acre water solution	Flowering, when 75% of shoots have flowered	Add methylated seed oil (MSO) as stated on label
Toadflax, Dalmatian (*Linaria dalmatica*)	Chlorsulfuron 75 + Overdrive	chlorsulfuron + diflufenzopyr + dicamba	2 to 2 2/3 oz + 8 oz (non-agricultural)		Ground broadcast: minimum of 10 gal/ acre water solution	Flowering, when 75% of shoots have flowered	Add methylated seed oil (MSO) as stated on label. Pasture and rangeland: max 1 1/3 oz/ acre Chlorsulfuron 75.
Toadflax, yellow (*Linaria vulgaris*)	Chlorsulfuron 75 + Overdrive	chlorsulfuron + diflufenzopyr + dicamba	1 3/4 oz + 8 oz (non-agricultural)		Ground broadcast: minimum of 10 gal/ acre water solution	Flowering, when 75% of shoots have flowered	Add methylated seed oil (MSO) as stated on label. Pasture and rangeland: max 1 1/3 oz/ acre Chlorsulfuron 75.
	Roundup Pro (41%)	glyphosate	2 to 5 qt	2%	Ground broadcast: 3–40 gal/acre water solution; aerial broadcast: 3–25 gal/ acre water solution; individual plant: spray foliage to wet but not dripping	Growing, fully leafed, late summer to early fall, before leaf color change	Foliar on healthy trees (not drought stressed or defoliated); complete leaf coverage for best results. This is a non-selective herbicide.
	Roundup Pro (41%)	glyphosate		50 to 100%	Individual plant	Growing, fully leafed, late summer to early fall, before leaf color change	Cut stump. Apply to cambium immediately after cutting.
	Arsenal	imazapyr	1 to 1 1/2 pt ground broadcast.	1 to 5%	Ground broadcast: 5–20 gal/acre water solution; aerial broadcast: 2–30 gal/ acre water solution; individual plant: spray foliage but not to dripping	Growing, fully leafed, late summer to early fall, before leaf color change	Foliar on healthy trees (not drought stressed or defoliated); complete leaf coverage for best results. This is a non-selective herbicide.
	Arsenal	imazapyr		3 to 5%	Individual plant	Growing, fully leafed, late summer to early fall, before leaf color change	Cut stump. Apply to cambium immediately after cutting.
Tree of heaven (*Ailanthus altissima*)	Remedy Ultra	triclopyr	2 to 4 pt	1 to 2%	Ground broadcast: minimum 10 gal/ acre; aerial broadcast: minimum 4 gal/acre; individual plant: spray foliage to wet but not dripping	Growing, fully leafed, late summer to early fall, before leaf color change	Foliar on healthy trees (not drought stressed or defoliated). Use oil-water emulsion mix for most consistent results; see label for mixing directions. Broadleaf selective herbicide.

Table 1. Herbicides for Controlling Undesirable Brush and Weeds on Rangelands (continued)

Plant controlled	Trade name example	Herbicide (common chemical name and active ingredient)	Herbicide quantity (active ingredient or acid equivalent in parenthesis)		Spray volume (broadcast per acre or individual plant)	Time of application	Remarks
			Broadcast rate (per acre)	Individual plant/ spot treatment			
	Remedy Ultra, Garlon 4	triclopyr		30% in basal oil	Individual plant	Any time, including winter. Bark needs to be dry.	Basal bark on stems less than 6 inches in diameter with thin bark: spray bottom 12–18 inches of basal stems to wet but not dripping. Cut stump: spray cambium, sides of stumps, and root collar immediately following cutting. Do not exceed maximum basal bark application rate of 2 gal/acre.
Tree of heaven (continued) (*Ailanthus altissima*)	Banvel	dicamba	2 qt	5%	Ground broadcast: minimum of 3 gal/ acre water solution; aerial broadcast: 2–40 gal/acre water solution; individual plant: spray foliage but not to dripping	Growing, fully leafed, late summer to early fall, before leaf color change	Foliar on healthy trees (not drought stressed or defoliated). Primarily for control of broadleaf plants, but some grasses can be injured.
	2,4-D*	2,4-D		2 to 3 qt (2 to 3 lb per 100 gal of water solution)	Individual plant treatment (2 to 3 lb per 100 gal of water solution)	Spring, when leaves are fully expanded. Good growing conditions.	Wet foliage thoroughly. Do not spray when plants are defoliated by late freeze, hail, insects, or other unfavorable conditions.
	Arsenal, Habitat	imazapyr		1 gal (2 lb per 100 gal water + 0.25% surfactant)			
	Tank mix Arsenal + Roundup*	imazapyr + glyphosate		1/2 to 1 gal + 1/2 to 1 gal (1 to 2 lb + 2 1/2 to 5 lb per 100 gal water + 0.25% surfactant)			
Willows (*Salix* spp.)	Tank mix Arsenal, Habitat + Rodeo	imazapyr + glyphosate		1/2 to 1 gal + 1/2 to 1 gal (1 to 2 lb + 2 1/2 to 5 lb per 100 gal water + 0.25% surfactant)	Individual plant treatment	Any time during growing season. Good growing conditions.	
	Velpar L	hexazinone		4 to 7 ml per whorl	Individual plant treatment	Any time during year. Optimum is prior to rainy season.	Apply undiluted Velpar L directly to whorl
	Remedy	triclopyr		3 to 4 ml per whorl	Individual plant treatment	Any time during year	Apply to every whorl. May be mixed with water or diesel.
	Arsenal	imazapyr		2 to 3 ml per whorl			Apply to every whorl. May be mixed with water.
	Cimarron Max + 2,4-D low volatile ester	metsulfuron + dicamba + 2,4-D	Rate II (1/2 oz + 2 pt) + 1 pt to 1 1/2 pt 2,4-D (1/2 lb to 3/4 lb)	Spray each whorl thoroughly. Mix in 100 gal water.			Crop oil concentrate, MSO or MSO/ organosilicone are preferred adjuvants. Second application within two years may be needed; see label.
Yucca (*Yucca* spp.)	Cimarron Plus + 2,4-D low volatile ester	metsulfuron + chlorsulfuron + 2,4-D	5/8 oz + 1 qt (1 lb)		4 gal/acre minimum	Spring through fall	

*Sold under several different trade names and formulations. Check the active ingredient rate on the label to determine the correct product application rate.
**Restricted use product.

Appendix A. Common Chemical and Product Names of Herbicides

The herbicides are identified by the accepted Weed Science Society of America common name or other common designation, the correct chemical names as required on the label, and, where practical, one or more product names. Herbicides marketed under three or more labels have been designated "several manufacturers" rather than attempting to list all the trade formulations.

Herbicide common name	Chemical name	Trade name	Active ingredient (a.i.) or acid equivalent (a.e.)
2,4-D	(2,4-dichlorophenoxy) acetic acid	Several manufacturers	Amine salts and esters, 4 lb/gal, 6 lb/gal, others
Aminopyralid	2-pyridine carboxylic acid, 4 amino-3,6-dichloro-2-pyridinecarboxylic acid	Milestone	2 lb/gal a.e.
Aminopyralid:2,4-D (1:8)	See aminopyralid and 2,4-D	GrazonNext	0.41 lb/gal aminopyralid, 3.33 lb/gal 2,4-D a.e.
Aminopyralid:metsulfuron	See aminopyralid and metsulfuron	Chaparral	0.62 lb aminopyralid a.i. and 0.0945 lb metsulfuron methyl per pound of product
Atrazine	6-chloro-N-ethyl-N'-(1-methylethyl)-1,3,5-triazine-2,4-diamine	Several manufacturers	----
Chlorsulfuron	2-chloro-N-[[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino] carbonyl] benzenesulfonamide	Telar XP, Chlorsulfuron 75	75% a.i.
Clopyralid	3,6-dichloro-2-pyridinecarboxylic acid	Transline, Stinger, Sonora	3 lb/gal a.e.
Clopyralid:2,4-D (1:5)	See clopyralid and 2,4-D	Curtail	0.38 lb/gal clopyralid, 2 lb/gal 2,4-D a.e.
Dicamba	3,6-dichloro-o-anisic acid	Banvel, Clarity	4 lb/gal a.e.
Dicamba:2,4-D (1:3)	See dicamba and 2,4-D	Weedmaster	1 lb/gal dicamba a.e., 2.87 lb/gal 2,4-D a.e.
Diesel fuel oil	Refined petroleum fractions	Several manufacturers	
Diflufenzopyr:dicamba	2-(1-[([3,5-difluorophenylamino]carbonyl) hydrazono]ethyl)-3-pyridinecarboxylic acid, sodium salt; see dicamba	Overdrive	0.2 lb and 0.5 lb per pound of product a.e.
Fluroxypyr	1-methylheptylester:[(4-amino-3,5- dichloro-6-fluoro -2-pyridinyl)oxy] acetic acid	Vista	1.5 lb/gal a.e. (Vista XRT 2.8 lb/gal a.e.)
Glyphosate	N-(phosphonomethyl) glycine	Rodeo	5.4 lb/gal a.i.
Glyphosate*	N-(phosphonomethyl) glycine	Several manufacturers	4 lb/gal a.i., others
Glyphosate:2,4-D (1:1 1/4)	See glyphosate and 2,4-D	Landmaster	Landmaster II 1.2 lb/gal glyphosate a.i., 1 lb/gal 2,4-D a.i. Landmaster BW 1.2 lb/gal glyphosate a.i., 1.9 lb/gal 2,4-D a.i.

Herbicide common name	Chemical name	Trade name	Active ingredient (a.i.) or acid equivalent (a.e.)
Hexazinone	3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4 (1H,3H)-dione	Velpar L	2 lb/gal a.i.
Imazamox	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methoxymethyl)-3-pyridinecarboxylic acid	Clearcast	1.0 lb/gal a.i.
Imazamox	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-5-methoxymethyl)-3-pyridinecarboxylic acid	Imox	1 lb/gal imazamox a.e.
Imazapic	(±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-y1]-5-methyl-3-pyridinecarboxylic acid	Plateau	2 lb/gal a.i.
Imazapic:glyphosate	See imazapic and glyphosate	Journey	0.75 lb/gal of imazapic a.i., 1.5 lb/gal of glyphosate a.i.
Imazapyr	(±)-2-[4,5-dihydro-4 methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid	Arsenal, Habitat	2 lb/gal a.e.
Metsulfuron	methyl 2-[[[[(4-methoxy-6 methyl-1,3,5-triazin-2-yl)-amino] carbonyl] amino] sulfonyl] benzoate	Escort XP, MSM 60	60% a.i.
Metsulfuron:chlorsulfuron (3:1)	See metsulfuron and chlorsulfuron	Cimarron Plus	48% metsulfuron a.i., 15% chlorsulfuron a.i.
Metsulfuron dicamba:2,4-D 1:3	See metsulfuron, dicamba, and 2,4-D	Cimarron Max	0.75% metsulfuron methyl, 12.25% dicamba, and 35.25% 2,4-D a.i.
Paraquat	1,1'-dimethyl-4,4' bipyridiniumiun	Several manufacturers	----
Picloram	4-amino-3,5,6-trichloropicolinic acid	Tordon 22K**	2 lb/gal a.e.
Picloram:2,4-D (1:4)	See Picloram and 2,4-D	Grazon P+D, Gunslinger P+D	0.54 lb/gal picloram a.e., 2 lb/gal 2,4-D a.e.
Picloram: fluroxypyr	See picloram and fluroxypyr	Surmount	1.19 lb/gal picloram a.i., 0.96 lb/gal fluroxypyr a.i.
Picloram:fluroxypyr:aminopyralid	See picloram, fluroxypyr, and aminopyralid	MezaVue	0.97 lb/gal picloram a.i., 1.2 lb/gal fluroxypyr a.i., 0.49 lb/gal aminopyralid a.i.
Quinclorac	3,7-dichloro-8-quinolinecarboxylic acid	Paramount	75% a.i.
Sulfometuron	methyl 2 [[[[(4,6-dimethyl-2-pyrimidinyl) amino] carbonyl] amino] sulfonyl] benzoate]	Oust	75% a.i.
Tebuthiuron	N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N,N'-dimethylurea	Spike 20P	20% or 0.2 lb a.i. per pound of product
Triclopyr	[(3,5,6-trichloro-2-pyridinyl)oxy] acetic acid	Remedy Ultra, Garlon 4 Ultra, Garlon 3A	4 lb/gal a.e., 3 lb/gal a.e.

*Sold under several different trade names and formulations. Check the active ingredient rate on the label to determine the correct product application rate.
**Restricted use product.

PLANT INDEX

Plants requiring the same treatment are grouped together

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