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Chemical Weed and Brush Control

REFERENCE GUIDE FOR RANGELAND

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This publication provides general suggestions for herbicides used to control brush and weeds on Texas rangelands. It also gives information on the levels of control expected. The information is presented in good faith, but no warranty, express or implied, is given. Weed and brush control results may vary tremendously if treatments are applied under less than optimal conditions.

How to use this guide

1. Find the problem weed or brush species in the Index on page i.
2. Click on or touch the page number that corresponds to the plant to go to the page where it is listed. Find the plant name in the first column on those pages.
3. See the second column on those pages for a list of suggested herbicides (these are active ingredients).
4. Choose herbicides based on:
 - a. Whether a broadcast application or treatment of individual plants is needed (third or fourth column).
 - b. Check the effectiveness (VH, H, M, and L), which tells the expected percentage of plants killed with that herbicide and rate. For percent kill ranges, see page 1.
 - c. See the fifth column for the method to use—how to apply the chemical. This could be foliar, stem, cut-stump, aerial, etc.
4. The three columns on the right explain other details such as how much surfactant to use, when to treat the plant, and any exceptions. Be sure to read these before choosing an herbicide.
5. Go to page 2 and match the herbicide chosen for controlling the problem plant with product names that are more likely to be familiar.
6. For tips on measuring and mixing herbicides, see page 3.

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Millions of acres of Texas rangeland are invaded by undesirable wood plants and weeds. Dense stands of brush and weeds use valuable water for growth, reduce grass production, and cause soil erosion. Herbicides are an efficient and effective way to manage these noxious plants, control brush and weeds, improve the condition of rangeland, and maintain its productivity.

This publication lists current suggestions for herbicide use to control brush and weeds on rangeland. Some herbicides provide a high degree of control of certain species; however, seldom is a species eradicated. Consider other potential rangeland uses when developing a brush management program. Many trees, shrubs, and weeds are valuable as food and cover for wildlife and may be an important component in livestock diets. Therefore, a brush management program should engage in control methods that provide optimum benefits to livestock and wildlife.

Herbicide application may increase the palatability of poisonous plants. Thus, they are more likely to be consumed by livestock. To prevent losses to toxic plants, do not graze herbicide-treated areas with poisonous plants present until the toxic plants dry up and lose their palatability.

Properly used herbicides are effective and safe. Misuse can result in poor brush and weed control, herbicidal drift, dangerous residues, or death of desirable plants. Listed below are points to follow for proper herbicide use:

- Identify the weed or brush species and evaluate the need for control.
- Consider the expected benefits, costs, and alternative control practices.
- Buy the suggested herbicide for the weed or brush species.
- Read and follow herbicide label directions for allowable uses, application rates, and special handling or mixing requirements.
- Provide and require the use of proper safety equipment.
- Calibrate spray equipment.
- Mix herbicides in a ventilated area, preferably outside.
- Spray under conditions that prevent drift to susceptible crops.
- Apply the herbicides at the suggested rate and time.
- Keep a record of the herbicide used, the time required to spray, weather conditions, rate of herbicide in the carrier, date, location, and the person using the herbicide.
- Read and follow all label requirements.

The sprayer used must apply the correct quantity of herbicide mixture to a specific area. To calibrate spray equipment, see Extension publication RWFEM-PU-075, *Sprayer Calibration Guide: Safe and Effective Four-step Method to Calibrate Herbicide Sprays*.

Suggestions on the use of herbicides made by the Texas A&M AgriLife Extension Service are based upon research that was conducted in Texas. Effectiveness might vary in other states.

Broadcast and individual plant treatments are presented in Tables 6 and 7. Individual plant treatments are suited for selective control of thin stands of brush and weeds. Broadcast treatments are useful for dense stands of brush and weeds.

Suggested herbicides must be registered with and the labels approved by the Environmental Protection Agency and approved for use in Texas by the Texas Department of Agriculture. *Because the status of herbicide label clearance is subject to change, be certain that the herbicide is currently labeled for the intended use.*

The users are always responsible for the effects of herbicide residue on their livestock and crops, as well as for problems that could arise from drift or movement of the herbicide from their property to that of others. Always read and carefully follow the instructions on the container label.

Treatment control ratings

A control rating, based on the effectiveness of an herbicide treatment in controlling a target plant, has been assigned to each herbicide use suggestion. These ratings were determined from research and result demonstration data and from observations of commercial applications. The rating represents a degree of plant mortality of the target plant species when the treatment is applied properly under optimum conditions.

Table 1. Rating categories for herbicide treatments and degree of target plant mortality after treatment

Control rating	Percent of plants killed
Very high (VH)	76–100
High (H)	56–75
Moderate (M)	36–55
Low (L)	0–35

Table 2. Common, chemical, and product names of herbicides*

Herbicide common name	Chemical name	Product name	Active ingredient or acid equivalent
aminocyclopyrachlor:triclopyr amine (1:2)	6-amino-5-chloro-2-cyclopropyl-4-pyrimidinecarboxylic acid, potassium salt See triclopyr amine	Invora	2 pounds per gallon
aminopyralid	2-pyridine carboxylic acid, 4-amino-3, 6-dichloro-2-pyridine carboxylic acid, triisopropanolammonium salt	—	—
aminopyralid:2,4-D (1:8)	See aminopyralid and 2,4-D	GrazonNext HL, Gunslinger AMP	3.75 pounds per gallon
aminopyralid:clopyralid (1:4.6)	See aminopyralid and clopyralid	Sendero	2.8 pounds per gallon
aminopyralid:metsulfuron methyl (1:6.2)	See aminopyralid and metsulfuron	Chaparral	0.62 pound per gallon
aminopyralid:picloram:fluroxypyr (1:2:2)	See aminopyralid, picloram, and fluroxypyr	MezaVue	2 pounds per gallon
clopyralid	3,6-dichloro-2-pyridinecarboxylic acid	Sonora	3 pounds per gallon
2,4-D	(2,4-dichlorophenoxy) acetic acid	Weedar 64, Broad Range 55, Hi-Dep, Weedone LV4, Esteron 99, Unison, others	amine salts, free acids, and esters of variable concentration
dicamba	3,6-dichloro-2-methoxybenzoic acid	Banvel, Clarity, Vision, Dicamba 4, Opti-DGA	4 pounds per gallon
dicamba:2,4-D (1:3)	See dicamba and 2,4-D	Weedmaster, Grassmaster, Banvel + 2,4-D, RangeStar	4 pounds per gallon
dicamba:2,4-D (1:1.3)	See dicamba and 2,4-D	Latigo, Latigo Bold	4.2 pounds per gallon
diesel fuel oil or kerosene	refined petroleum fractions	Several manufacturers	—
fluroxypyr	1-methylheptyl ester: [(4-amino-3,5-dichloro-6-fluoropyridin-2-yl)oxy]acetic acid	Vista XRT, Flagstaff	2.8 pounds per gallon
glyphosate	N-(phosphonomethyl) glycine	Several, including Rodeo**, Roundup, Roundup Ultradry, Glyphosate 417	isopropylamine salt; concentration varies depending on the product
hexazinone	3-cyclohexyl-6-(dimethylamino)-1-methyl-1,3,5-triazine-2,4(IH, 3H)-dione	Velpar L, Velossa, Pronone Power Pellet	2 pounds per gallon (Velpar L) 2.4 pounds per gallon (Velossa) 75% (Pronone Power Pellet)
imazapyr	2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1H-imidazol-2-yl]-3-pyridinecarboxylic acid	Arsenal, Habitat**, Ecomazapyr 2 SL**, Rotary 2 SL	2 pounds per gallon
metsulfuron methyl	methyl 2[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)amino]carbonyl]amino] sulfonyl] benzoate	Escort, Clean Pasture, MSM 60DF	60%
metsulfuron:chlorosulfuron (3:1)	See metsulfuron methyl + 2-chloro-N-[(4-methoxy-6-methyl-1,3,5-triazin-2-yl)aminocarbonyl] benzenesulfonamide	Cimarron Plus	48% metsulfuron 15% chlorosulfuron
metsulfuron:chlorosulfuron (1:1)	See metsulfuron: chlorosulfuron	Cimarron X-Tra	30% metsulfuron 37.5% chlorosulfuron
metsulfuron methyl dicamba:2,4-D (1:3)	See metsulfuron methyl, dicamba, and 2,4-D	Cimarron Max	60% (Part A) 3.87 pounds per gallon (Part B)
picloram	4-amino-3,5,6-trichloro-2-pyridinecarboxylic acid	Tordon 22K, Triumph 22K	2 pounds per gallon
picloram:fluroxypyr (1:1)	See picloram and fluroxypyr	Surmount, Triumph XRT	1.34 pounds per gallon
picloram:2,4-D (1:4)	See picloram and 2,4-D	Grazon P+D, Gunslinger, Gunslinger P+D, Picloram + D	2.5 pounds per gallon
picloram:2,4-D (1:4)	See picloram and 2,4-D	Grazon PD3	3.8 pounds per gallon
tebuthiuron	N-[5-(1,1-dimethylethyl)-1,3,4-thiadiazol-2-yl]-N'-dimethylurea	Spike 20P, Spike 80 DF	20% (Spike 20P) 80% (Spike 80 DF)
triclopyr amine	3,5,6-trichloro-2-pyridinyloxyacetic acid, triethylamine salt	Garlon 3A, Triclopyr 3	3 pounds per gallon
triclopyr ester	3,5,6-trichloro-2-pyridinyloxyacetic acid, butoxyethyl ester	Clear Pasture, Pathfinder II, Triclopyr RTU, Triclopyr R&P, Remedy Ultra, Remedy, Triclopyr 4	0.75 pound per gallon (Pathfinder II—ready-to-use formulation for stem sprays) 4 pounds per gallon (all others)
triclopyr:fluroxypyr (3:1)	See triclopyr and fluroxypyr	PastureGard HL, ClearGraze	4 pounds per gallon
triclopyr:2,4-D (1:2)	See triclopyr and 2,4-D	Crossbow	3 pounds per gallon

*Herbicides have been identified by the accepted Weed Science Society of America common name, and when practical, one or more product names.

**Aquatic label

Table 3. Common measurement conversions for use with herbicide applications

Liquid		Weight
1 gallon = 4 quarts	1 pint = 16 ounces	1 pound = 16 ounces
1 gallon = 8 pints	1 pint = 473.12 milliliters	1 pound = 453.6 grams
1 gallon = 16 cups	1 cup = 8 ounces	1 ounce = 28.35 grams
1 gallon = 128 ounces	1 ounces = 2 tablespoons	1 kilogram = 2.2 pounds
1 gallon = 3784.96 milliliters	1 ounces = 29.57 milliliters	
1 quart = 2 pints	1 tablespoon = 3 teaspoons	Area
1 quart = 4 cups	1 tablespoon = 0.5 ounces	1 acre = 43,560 square feet
1 quart = 32 ounces	1 tablespoon = 14.79 milliliters	1 hectare = 2.471 acres
1 quart = 946.24 milliliters	1 teaspoon = 4.98 milliliters	
1 pint = 2 cups		

Table 4. Guide to quantity of herbicide formulation for total volume of spray mix

Total spray volume desired	Herbicide concentration desired for individual plant and spot treatment and corresponding quantity of herbicide formulation											
	0.25 %	0.5 %	0.75 %	1%*	1.5%	2%	3%	4%	5%	10%	15%	25%
1 gallon	0.32 ounce	0.64 ounce	1 ounce	1.28 ounces	2 ounces	2.56 ounces	4 ounces	5.12 ounces	6.4 ounces	12.8 ounces	19 ounces	1 quart
3 gallons*	1 ounce	2 ounces	3 ounces	4 ounces*	6 ounces	8 ounces	12 ounces	15.5 ounces	19 ounces	38 ounces	57 ounces	96 ounces
5 gallons	1.67 ounces	3.33 ounce	5 ounces	6.5 ounces	10 ounces	13 ounces	19 ounces	26 ounces	32 ounces	64 ounces	96 ounces	1.25 gallons
10 gallons	3.33 ounces	6.5 ounces	10 ounces	13 ounces	19 ounces	26 ounces	38 ounces	51 ounces	2 quarts	1 gallon	1.5 gallons	2.5 gallons
25 gallons	8 ounces	16 ounces	24 ounces	32 ounces	48 ounces	64 ounces	96 ounces	1 gallon	1.25 gallons	2.5 gallons	3.75 gallons	6.25 gallons
50 gallons	16 ounces	32 ounces	48 ounces	64 ounces	96 ounces	1 gallon	1.5 gallons	2 gallons	2.5 gallons	5 gallons	7.5 gallons	12.5 gallons
100 gallons	32 ounces	64 ounces	96 ounces	1 gallon	1.5 gallons	2 gallons	3 gallons	4 gallons	5 gallons	10 gallons	15 gallons	25 gallons

*Example: To prepare 3 gallons of a spray mixture (herbicide, water, and surfactant) containing 1% herbicide, add 4 ounces of herbicide.

Note: Add 0.25%–0.5% commercial, non-ionic surfactant or crop oil, or methylated seed oil according to the product label for mixtures using only water as the herbicide carrier.

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
African rue	hexazinone liquid	—	VH** 2 milliliters per plant	Use an exact delivery handgun to apply undiluted herbicide to soil surface at the edge of the plant canopy.	Spring–summer	Do not use on heavy clay or caliche soils.
	hexazinone pellet	—	1 pellet per plant	—		
	tebuthiuron 20% pellets	H 7.5 pounds (1.5 pounds)	—	—		
	imazapyr	H 32 ounces (0.5 pound)	VH 0.5%	10–25 gallons per acre for ground broadcast. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Late September–October (to first frost)	Apply to fall regrowth that is in good growing condition. Recommend using individual plant treatment when growing with desirable vegetation to reduce non-target damage. Imazapyr is a non-selective herbicide and will kill or damage desirable vegetation if sprayed.
Berlander lobelia, bitter sneezeweed, buffalobur, camphorweed, cocklebur, croton, horehound, marshelder (sumpweed, sulfaweed), prairie gerardia (see remarks), ragweed, smartweed, sunflower, thistles, western bitterweed (see remarks), western ragweed, others <i>(continued on next page)</i>	2,4-D amine or low-volatile ester	VH** 16–32 ounces (0.5–1 pound) 4 pounds per gallon product	VH 1% (4 pounds per gallon product)	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, weeds 4–6 inches high, good moisture conditions. Spray thistles in rosette stage.	With 2,4-D, use the amine formulation in areas with 25 inches of rainfall or more and the ester formulation in drier areas where no susceptible crops are nearby. For western bitterweed control, use 2,4-D low-volatile ester or amine at 32 ounces per acre before plants flower, temperature above 72° F, and soil moisture favors plant growth. When ¾ of plants are blooming, and/or temperature is less than 60°F, use dicamba:2,4-D (1:3), 2,4-D plus dicamba; picloram:2,4-D (1:4), (3.8 pounds per gallon product), picloram:2,4-D (1:4), (2.5 pounds per gallon product), aminopyralid:2,4-D (1:8) or 2,4-D plus picloram. For prairie gerardia control, use 48 ounces per acre of 2,4-D or the low rate of dicamba:2,4-D (1:3), dicamba plus 2,4-D; picloram:2,4-D (1:4), (3.8 pounds per gallon product), picloram:2,4-D (1:4), (2.5 pounds per gallon product) or picloram plus 2,4-D when plants are 4–6 inches high. Use 20 ounces per acre of picloram:2,4-D (1:4), (3.8 pounds per gallon product); Do not apply more than 80 ounces per acre per year, 32 ounces per acre of picloram:2,4-D (1:4), (2.5 pounds per gallon product) or 8 ounces of 2,4-D per acre when plants are 6–10 inches high before flowering.
	dicamba:2,4-D (1:3)	VH 16–32 ounces (0.5–1 pound)	VH 1%			
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2, 4-D (4 pounds per gallon product)	—			
	dicamba + 2,4-D amine or low-volatile ester	VH 4–8 ounces (0.125–0.75 pound) dicamba + 12–24 ounces (0.375–0.75 pound) 2, 4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75 % 2,4-D (4 pounds per gallon product)			
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 11–16 ounces (0.3–0.5 pound)	VH 0.63%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 16–24 ounces (0.3–0.5 pound)	VH 1%			
	picloram + 2,4-D amine or low-volatile ester	VH 8–24 ounces (0.0625–0.1875 pound) picloram + 8–24 ounces (0.25–0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Berlander lobelia, bitter sneezeweed, buffalobur, camphorweed, cocklebur, croton, horehound, marshelder (sumpweed, sulfaweed), prairie gerardia (see remarks), ragweed, smartweed, sunflower, thistles, western bitterweed (see remarks), western ragweed, others <i>(continued from previous page)</i>	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 1–Rate 2	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, weeds 4–6 inches high, good moisture conditions. Spray thistles in rosette stage.	Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	picloram:fluroxypyr (1:1)	VH 24–32 ounces (0.25–0.33 pound)	VH 1%			Use high end of rate range for camphorweed, marshelder, and smartweed.
	triclopyr:fluroxypyr (3:1)	H 16–24 ounces (0.5–0.75 pound)	VH 0.5%			Use high end of rate range for camphorweed, marshelder, and smartweed. Triclopyr:fluroxypyr (3:1) efficacy on smartweed is marginal.
	aminopyralid:2,4-D (1:8)	VH 24 ounces (0.70 pound)	—			—
	aminopyralid:metsulfuron methyl (1:6.2)	VH 2–3.3 ounces (0.078–0.127 pound)	—			Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
Broomweed (annual or common), plantain (tallowweed), wild carrot <i>(continued on next page)</i>	2,4-D amine or low-volatile ester	VH** 16–32 ounces (0.5–1 pound) 4 pounds per gallon product	VH 1% (4 pounds per gallon product)	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, weeds less than 4 inches tall, good moisture conditions.	Use 2,4-D amine in areas with 25 inches of rainfall or more. Use 2,4-D low-volatile ester in drier areas where no susceptible crops are nearby.
	aminopyralid:2,4-D (1:8)	VH 24 ounces (0.70 pound)	—			Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	aminopyralid:metsulfuron methyl (1:6.2)	VH 2.0–3.3 ounces (0.078–0.127 pound)	—			
	dicamba:2,4-D (1:3)	VH 16–32 ounces (0.5–1 pound)	VH 1%			
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2, 4-D (4 pounds per gallon product)	—			
	dicamba + 2,4-D amine or low-volatile ester	VH 4–8 ounces (0.125–0.25 pound) dicamba + 12–24 ounces (0.375–0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75% 2,4-D (4 pound per gallon product)			
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 11–16 ounces (0.3–0.5 pound)	VH 0.63%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 16–24 ounces (0.3–0.5 pound)	VH 1%			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Broomweed (annual or common), plantain (tallowweed), wild carrot <i>(continued from previous page)</i>	picloram + 2,4-D amine or low-volatile ester	VH 8–24 ounces (0.0625–0.1875 pound) picloram + 8–24 ounces (0.25–0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, weeds less than 4 inches tall, good moisture conditions.	Use 2,4-D amine in areas with 25 inches of rainfall or more. Use 2,4-D low-volatile ester in drier areas where no susceptible crops are nearby. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:fluroxypyr (1:1)	VH 24–32 ounces (0.25–0.33 pound)	VH 1%			
	triclopyr:fluroxypyr (3:1)	H 16–24 ounces (0.5–0.75 pound)	VH 0.5%			
	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 1–Rate 2	—			
	metsulfuron methyl	VH 0.1 ounces	—			Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	metsulfuron: chlorosulfuron (3:1)	VH 0.125 ounces	—			
	metsulfuron: chlorosulfuron (1:1)	VH 0.2 ounces	—			
Broom snakeweed (perennial broomweed) <i>(continued on next page)</i>	picloram	VH 16–32 ounces (0.25–0.5 pound)	VH 0.5%	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	During and after full flower stage in fall when growth conditions are good; or spring during peak plant growth when growth conditions are good.	Use 16 ounces per acre picloram only in the fall. Use 32 ounces per acre picloram in the spring. Poor control may be expected if dicamba:2,4-D (1:3) or dicamba:2,4-D mixture is used when growth conditions are less than ideal. Growth conditions should be optimum if picloram:2,4-D (1:4) or picloram:2,4-D mixture is used in the spring. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 43 ounces (1.25 pounds)	VH 0.63%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 64 ounces (1.25 pounds)	VH 1%			
	picloram:fluroxypyr (1:1)	VH 48–96 ounces (0.5–1 pound)	VH 1%			
	picloram + 2,4-D amine or low-volatile ester	VH 16 ounces (0.25 pound) picloram + 16–32 ounces (0.5–1 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			
	dicamba:2,4-D (1:3)	VH 32 ounces (1 pound)	VH 1%			
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2,4-D (4 pounds per gallon product)	—			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Broom snakeweed (perennial broomweed) <i>(continued from previous page)</i>	dicamba + 2,4-D amine or low-volatile ester	VH 8 ounces (0.25 pound) dicamba + 24 ounces (0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75% 2,4-D (4 pounds per gallon product)	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Add 32–64 ounces surfactant or 2 gallons crop oil per 100 gallons water.	During and after full flower stage in fall when growth conditions are good; or spring during peak plant growth when growth conditions are good.	Use 16 ounces per acre picloram only in the fall. Use 32 ounces per acre picloram in the spring. Poor control may be expected if dicamba:2,4-D (1:3) or dicamba:2,4-D mixture is used when growth conditions are less than ideal. Growth conditions should be optimum if picloram:2,4-D (1:4) or picloram:2,4-D mixture is used in the spring. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	metsulfuron methyl	VH 0.6 ounce	—			
	metsulfuron:chlorosulfuron (3:1)	VH 0.75 ounce	—			
	metsulfuron:chlorosulfuron (1:1)	VH 1.2 ounces	—			
	metsulfuron methyl dicamba:2,4-D (1:3)	H–VH Rate 1–Rate 2	—			
	tebuthiuron 20% pellets	VH 3.75 pounds pellets (0.75 pound active ingredient)	VH 0.57 ounce of pellets (0.033 ounce active ingredient) per 100 square feet of ground area			
Bullnettle, Carolina horsenettle, dogfennel, silverleaf nightshade, upright prairie-coneflower, western horsenettle (treadsalve), yankeeweed (rosin weed) <i>(continued on next page)</i>	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 20–32 ounces (0.6–0.9 pound)	VH 0.63%	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring (see remarks)	Spray bullnettle, Carolina horsenettle, silverleaf nightshade, and western horsenettle when plants begin to flower in the spring. Spray dogfennel and yankeeweed when plants are 8–10 inches tall. Spray upright prairie-coneflower when plants are 2–6 inches tall before flowering. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 32–48 ounces (0.6–0.94 pound)	VH 1%			
	picloram + 2,4-D amine or low-volatile ester	VH 8–12 ounces (0.125–0.1875 pound) picloram + 16–24 ounces (0.5–0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.50% 2,4-D (4 pounds per gallon product)			
	picloram:fluroxypyr (1:1)	VH 24–32 ounces (0.25–0.33 pound)	VH 1%			
	metsulfuron methyl dicamba:2,4-D (1:3)	H–VH Rate 1–Rate 2	—			
	dicamba:2,4-D (1:3)	VH 32 ounces (1 pound)	VH 1%			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Bullnettle, Carolina horsenettle, dogfennel, silverleaf nightshade, upright prairie-coneflower, western horsenettle (treadsalve), yankeeweed (rosin weed) <i>(continued from previous page)</i>	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2, 4-D (4 pounds per gallon product)	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring (see remarks)	Spray bullnettle, Carolina horsenettle, silverleaf nightshade, and western horsenettle when plants begin to flower in the spring. Spray dogfennel and yankeeweed when plants are 8–10 inches tall. Spray upright prairie-coneflower when plants are 2–6 inches tall before flowering. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	dicamba + 2,4-D amine or low-volatile ester	VH 8 ounces (0.25 pound) dicamba + 24 ounces (0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75% 2,4-D (4 pounds per gallon product)			
Bullnettle, silverleaf nightshade, western horsenettle (treadsalve)	aminopyralid:metsulfuron methyl (1:6.2)	VH 2–3.3 ounces (0.078–0.127 pound)	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces of surfactant per 100 gallons water	Spring (see remarks)	Spray bullnettle, silverleaf nightshade, and western horsenettle when plants begin to flower in the spring. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	aminopyralid:2,4-D (1:8)	VH 24 ounces (0.70 pound)	—			
Common goldenweed, Drummond's goldenweed <i>(continued on next page)</i>	2,4-D low-volatile ester	VH** 64 ounces (2 pounds) 4 pounds per gallon product	VH 2% (4 pounds per gallon product)	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, when growth conditions are good.	Picloram:2,4-D (1:4), dicamba:2,4-D (1:3), and mixtures of dicamba:2,4-D and picloram:2,4-D are more effective than 2,4-D alone when growth conditions are less than optimal. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	dicamba:2,4-D (1:3)	VH 48 ounces (1.5 pounds)	VH 2%			
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2, 4-D (4 pounds per gallon product)	—			
	picloram:fluroxypyr (1:1)	VH 32 ounces (0.33 pound)	VH 1%			
	triclopyr:fluroxypyr (3:1)	H 32–48 ounces (0.5–0.75 pound)	VH 1%			
	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 3	—			
	dicamba + 2,4-D amine or low-volatile ester	VH 12 ounces (0.375 pound) dicamba + 36 ounces (1.125 pounds) 2,4-D (4 pounds per gallon product)	VH 0.5% dicamba + 1.5% 2,4-D (4 pounds per gallon product)			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Common goldenweed, Drummond's goldenweed <i>(continued from previous page)</i>	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 32 ounces (0.95 pound)	VH 1.3%	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, when growth conditions are good.	
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 48 ounces (0.94 pound)	VH 2%			
	picloram + 2,4-D amine or low-volatile ester	VH 12 ounces (0.19 pound) picloram + 24 ounces (0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.50% picloram + 1% 2,4-D (4 pounds per gallon product)			
Flathead sedge	dicamba:2,4-D (1:3)	VH 64 ounces (2 pounds)	—	Ground broadcast 20–30 gallons per acre. Add 32–64 ounces surfactant per 100 gallons water.	Spring or fall	Control may be enhanced if the stand is burned and/or shredded and allowed to regrow to a height of 12–15 inches before spraying. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2,4-D (4 pounds per gallon product)	—			
	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 2	—			
Garboncillo, threadleaf groundsel, woolly locoweed <i>(continued on next page)</i>	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 32 ounces (0.95 pound)	VH 1.3%	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Fall, when growing conditions are good.	Herbicide application may increase palatability of these poisonous plants. Therefore, do not graze treated areas until the toxic plants dry up and lose their palatability. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 48 ounces (0.94 pound)	VH 2%			
	picloram + 2,4-D amine or low-volatile ester	VH 12 ounces (0.19 pound) picloram + 24 ounces (0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.5% picloram + 1% 2,4-D (4 pounds per gallon product)			
	picloram:fluroxypyr (1:1)	VH 32 ounces (0.33 pound)	VH 1%			
	triclopyr:fluroxypyr (3:1)	H 32–48 ounces (0.5–0.75 pound)	VH 1%			
	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 2	—			
	dicamba:2,4-D (1:3)	VH** 32 ounces (1 pound)	VH 2%			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Garboncillo, threadleaf groundsel, woolly locoweed <i>(continued from previous page)</i>	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2,4-D (4 pounds per gallon product)	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Fall, when growing conditions are good.	Herbicide application may increase palatability of these poisonous plants. Therefore, do not graze treated areas until the toxic plants dry up and lose their palatability. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	dicamba + 2,4-D amine or low-volatile ester	VH 12 ounces (0.375 pound) dicamba + 36 ounces (1.125 pounds) 2,4-D (4 pounds per gallon product)	VH 0.5% dicamba + 1.5%, 2,4-D (4 pounds per gallon product)			
Gray goldaster, narrowleaf goldaster	2,4-D low-volatile ester	VH 32 ounces (1 pound)	VH 1%	2–4 gallons water as aerial spray. 10–25 gallons water to make 10–25 gallons per acre as ground broadcast. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, during bud stage (pre-bloom)	Bud stage usually occurs mid-May–early June. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 34 ounces (1 pound)	VH 0.63%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 51 ounces (1 pound)	VH 1%			
	picloram + 2,4-D low-volatile ester	VH 13 ounces (0.2 pound) picloram + 26 ounces (0.8 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.50% 2,4-D (4 pounds per gallon product)			
	picloram:fluroxypyr (1:1)	VH 32 ounces (0.33 pound)	VH 1%			
	triclopyr:fluroxypr (3:1)	H 16–24 ounces (0.5–0.75 pound)	VH 0.5%			
	metsulfuron methyl dicamba:2,4-D (1:3)	H–VH Rate 1–Rate 2	—			
	dicamba:2,4-D (1:3)	VH 32 ounces (1 pound)	VH 1%			
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2,4-D (4 pounds per gallon product)	—			
	dicamba + 2,4-D low-volatile ester	VH 8 ounces (0.25 pound) dicamba + 24 ounces (0.75 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75% 2,4-D (4 pounds per gallon product)			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks	
Lespedeza (sericea)	triclopyr	VH 16–32 ounces (0.50–1 pound)	—	Ground broadcast 20–30 gallons per acre with 32–64 ounces surfactant per 100 gallons water.	June–August under good growing conditions.	Plants need to be 12–18 inches tall before spraying. Use the higher rate if plants are large, approaching maturity, or if the infestation level is high.	
	metsulfuron methyl	H 0.5 ounce	—				Begin application at flower bud initiation through full bloom.
	metsulfuron:chlorosulfuron (3:1)	H 0.7 ounce	—				Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	metsulfuron:chlorosulfuron (1:1)	H 1 ounce	—				
	metsulfuron methyl dicamba:2,4-D (1:3)	H Rate 2	—				
	picloram:fluroxypyr (1:1)	VH 24–32 ounces (0.25–0.33 pound)	VH 1%				
	triclopyr:fluroxypyr (3:1)	VH 12–16 ounces (0.38–0.5 pound)	VH 0.5%				
Rayless goldenrod (jimmyweed)	metsulfuron methyl	VH 0.75 ounce	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Add 32 to 64 ounces surfactant per 100 gallons water. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Fall	Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.	
	metsulfuron:chlorosulfuron (3:1)	VH 1 ounce	—				
	metsulfuron:chlorosulfuron (1:1)	VH 1.5 ounces	—				
	picloram:fluroxypyr (1:1)	VH 96 ounces (1 pound)	VH 2%				
	picloram	VH 32 ounces (0.50 pound)	VH 1%				
Spiny aster (wolfweed) <i>(continued on next page)</i>	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	VH 20 ounces (0.6 pound)	VH 0.63%	10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, during good moisture and growth conditions.	Shred plants during winter. Regrowth will have leaves. Apply herbicide when regrowth is 10–12 inches tall. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.	
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	VH 32 ounces (0.63 pound)	VH 1%				
	picloram + 2,4-D amine or low-volatile ester	VH 8 ounces (0.125 pound) picloram + 16 ounces (0.5 pound) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)				
	picloram:fluroxypyr (1:1)	VH 24–32 ounces (0.25–0.33 pound)	VH 1%				
	triclopyr:fluroxypyr (3:1)	H 16–24 ounces (0.5–0.75 pound)	VH 0.5%				

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 5. Herbicides for controlling weeds on rangeland

Weed controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant/spot treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Spiny aster (wolfweed) <i>(continued from previous page)</i>	dicamba:2,4-D (1:3)	VH 32 ounces (1 pound)	VH 1%	10–25 gallons water for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, during good moisture and growth conditions.	Shred plants during winter. Regrowth will have leaves. Apply herbicide when regrowth is 10–12 inches tall. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	dicamba:2,4-D (1:1.3) + 2,4-D amine or low-volatile ester	VH 9–22 ounces (0.28–0.69 pound) dicamba:2,4-D (1:1.3) + 14–32 ounces (0.44–1 pound) 2,4-D (4 pounds per gallon product)	—			
	dicamba + 2,4-D amine or low-volatile ester	VH 8 ounces (0.25 pounds) dicamba + 24 ounces (0.75 pounds) 2,4-D (4 pounds per gallon product)	VH 0.25% dicamba + 0.75% 2,4-D (4 pounds per gallon product)			
Threadleaf groundsel	metsulfuron methyl	VH 0.4 ounce	—	2–4 gallons water for aerial spray; 10–25 gallons water for ground broadcast application. Add 32–64 ounces of surfactant per 100 gallons water.	Fall	Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	metsulfuron:chlorosulfuron (3:1)	VH 0.5 ounce	—			
	metsulfuron:chlorosulfuron (1:1)	VH 0.8 ounce	—			
	metsulfuron methyl dicamba:2,4-D (1:3)	VH Rate 2	—			
Twinleaf senna (twoleaf senna)	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	—	VH 0.63%	Thoroughly wet foliage. Mix with water and add 32–64 ounces surfactant per 100 gallons spray mix.	Late spring, good moisture and growth conditions.	Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	VH 1%			
	picloram:fluroxypyr (1:1)	—	VH 1%			
	dicamba:2,4-D (1:3)	—	VH 1%			
Upright prairie-coneflower	metsulfuron methyl	VH 0.2 ounce	—	2–4 gallons water for aerial spray. 10–25 gallons water for ground broadcast application. Add 32–64 ounces surfactant per 100 gallons water.	Spring, before flower stalk development.	Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	metsulfuron: chlorosulfuron (3:1)	VH 0.25 ounce	—			
	metsulfuron: chlorosulfuron (1:1)	VH 0.4 ounce	—			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Agarito, bumelia, catclaw acacia, catclaw mimosa, coyotillo, flameleaf sumac, lotebush, tasajillo, Texas mountain laurel, whitebrush	aminocyclopyrachlor: triclopyr amine (1:2)	—	VH 1.5%	Thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	Late spring through summer with mature, healthy leaves.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.
Ashe juniper (blueberry cedar)	hexazinone liquid	—	VH** 2 milliliters per 3 feet height or canopy diameter, whichever is greater	—	Late winter through summer	Apply undiluted hexazinone liquid, picloram, or hexazinone pellets between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid and picloram. If plant size requires more than a single 2- or 4-milliliter application of hexazinone liquid or picloram, or more than 1 hexazinone pellet, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone pellet	—	VH 1 pellet per 3 feet height or canopy diameter, whichever is greater	—		
	picloram	—	VH 4 milliliters per 3 feet height or canopy diameter, whichever is greater	—		
Ashe juniper (blueberry cedar), cholla, dog cactus, redberry juniper (redberry cedar), tasajillo	picloram	—	VH 1% H rating for cholla	Thoroughly wet foliage and stems or joints and stems for individual plant treatment. Mix with water and add 32–64 ounces surfactant per 100 gallons spray mix.	Anytime	—
Baccharis (dryland willow, Roosevelt willow, seep willow or willow baccharis) <i>(continued on next page)</i>	2,4-D low-volatile ester	H 48–96 ounces (1.5–3 pounds) 4 pounds per gallon product	H 1%	For aerial applications, minimum suggested total spray volume is 4 gallons water for aerial spray; 15–20 gallons water for ground broadcast. For individual plant treatment, thoroughly wet the entire foliage, stems, and trunks. Add 32–64 ounces surfactant per 100 gallons water.	Spring, when leaves are fully expanded and dark green.	Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	—	H 0.63%	For individual plant treatment thoroughly wet the entire foliage, stems, and trunks. Add 32–64 ounces surfactant per 100 gallons water.		
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	H 1%			
	dicamba:2,4-D (1:3)	—	H 1%			
	triclopyr ester	—	VH 1%			
	triclopyr:fluroxypr (3:1)	—	VH 0.5%			
	picloram:fluroxypr (1:1)	—	VH 1%			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Baccharis (dryland willow, Roosevelt willow, seep willow, or willow baccharis) <i>(continued from previous page)</i>	hexazinone liquid	—	VH** 2 milliliters per 3 feet height or canopy diameter, whichever is greater	—	Late winter–summer	Apply undiluted hexazinone liquid, picloram, or hexazinone pellets between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid and picloram. If plant size requires more than a single 2- or 4-milliliter application of hexazinone liquid or picloram, or more than 1 hexazinone pellet, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone pellet	—	VH** 1 pellet per 3 feet height or canopy diameter, whichever is greater	—		
Baccharis (dryland willow, Roosevelt willow, seep willow, or willow baccharis), blackbrush, bois d'arc, catclaw acacia, catclaw mimosa, Chinese tallow tree, elm, greenbriar, hackberry, pricklyash (Hercules club), Texas persimmon (see remarks), winged elm, yaupon	triclopyr ester	—	VH 25% in diesel fuel oil	Apply to lower 12–18 inches of trunk to wet the trunk; do not spray to point of runoff. Apply completely around the trunk.	Anytime—optimum time is during growing season when plants have mature leaves.	This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Use only on plants with smooth bark and a trunk diameter less than 4 inches. For Texas persimmon, apply in spring after leaves mature but before June 15.
	triclopyr ester	—	VH 25% in diesel fuel oil 10% d,l-limonene (a penetrant) may be added to the mixture—see remarks	Apply to the trunk in a 3- to 4-inch-wide band near ground level or at line dividing smooth bark from corky bark. Apply completely around the trunk.	Anytime—optimum time is during growing season when plants have mature leaves.	This is commonly called the streamline basal application method. Use a straight stream nozzle. Use only on plants with smooth bark and trunk diameter less than 4 inches. Addition of a penetrant to the mixtures aids with coverage around the trunk and increases the control for most species. Trade names for d,l limonene are Quick Step II, AD 100, Cide-Kick II, and Cide-Kick. Other penetrants may be effective but have not been tested on rangeland in Texas. For Texas persimmon, apply in spring after leaves mature but before June 15.
Bigelow shinoak (white shinoak)	tebuthiuron 20% pellets	VH 7.5 pounds pellets (1.5 pounds active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 100 square feet of ground area	—	Anytime—optimum period is October 1–April 1.	For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.
Blackberry	picloram:fluroxypyr (1:1)	VH** 48–64 ounces (0.5–0.67 pound)	VH 1–2%	Use at least 10 gallons water per acre, but increased volume up to 25 gallons per acre will improve coverage, and subsequent herbicide penetration into the plant. Add 32–64 ounces surfactant per 100 gallons spray mix.	Apply when leaves are fully expanded and the foliage is dark green, either before first flower or after fruit drop. Do not treat blackberries in the same year after shredding or burning.	—
	triclopyr:fluroxypr (3:1)	H 24–32 ounces (0.75 to 1 pound)	VH 0.5–1%			

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Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Blackbrush	aminopyralid:metsulfuron methyl (1:6.2)	VH 3.3 ounces (0.127 pound)	—	For aerial applications, suggested total spray volume is a minimum of 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use water + surfactant, crop oil or methylated seed oil.	Fall applications	Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures.
Blackbrush, guajillo	tebuthiuron 20% pellets	H 10–15 pounds pellets (2–3 pounds active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 45 square feet ground area or 2–4 inches stem diameter	—	Anytime—optimum period is October 1–April 1.	Use higher rate on deep soils with higher clay content. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge. Best results are expected on coarse-textured soils.
Blackjack oak, bois d’arc, elm, hackberry, lotebush, post oak, pricklyash (Hercules club), whitebrush (beebrush, beebush), willow, winged elm	hexazinone liquid	—	VH 4 milliliters per 3 feet canopy diameter or height, whichever is greater	—	Late winter–summer	Apply undiluted hexazinone liquid or hexazinone pellets to soil surface between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid. If plant size requires more than a single 4-milliliter application of hexazinone liquid, or 2 hexazinone pellets, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone pellet	—	VH 2 pellets per 3 feet canopy diameter or height, whichever is greater	—	Anytime—optimum period is October 1–April 1.	
Blackjack oak, post oak, winged elm	tebuthiuron 20% pellets	VH 10 pounds pellets (2 pounds active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 45 square feet of ground area or 2–4 inches of stem diameter	—	Anytime—optimum period is October 1–April 1.	For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.
Blackgum, sweetgum, and other hardwoods	triclopyr:2,4-D (1:2)	—	H 4% in diesel fuel oil	Apply to freshly cut surface of stump immediately after cutting.	Anytime—best results when soil is dry.	—
Burrobrush	picloram	—	VH 1%	Thoroughly wet foliage for individual plant treatment.	April–July	Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	—	VH 1.3%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	VH 2%			
Catclaw mimosa	tebuthiuron 20% pellets	H** 3.75 pounds pellets (0.75 pound active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 100 square feet of ground area or 2–4 inches of stem diameter	—	Anytime—optimum period is May 1–July 1 in Trans-Pecos and October 1–April 1 in rest of state.	Use only when brush is growing on sand, loamy sand, or sandy loam soil. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Cenizo	tebuthiuron 20% pellets	VH 3.75 pounds pellets (0.75 pounds active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 100 square feet of ground area or 2–4 inches of stem diameter	—	Anytime—optimum period is October 1–April 1.	For individual plant treatment, apply the pellets evenly on soil under the plant canopy and 1 foot beyond canopy edge.
Chinese tallow tree	picloram:2,4-D (1:4) (3.8 pounds per gallon product)	VH 80 ounces (2.4 pounds)	VH 0.63%	5–15 gallons as aerial spray or 10–25 gallons for ground broadcast application. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring or fall	Picloram:2,4-D (1:4), (3.8 pounds per gallon product); Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4) (2.5 pounds per gallon product)	VH 128 ounces (2.5 pounds)	VH 1%			
	picloram + 2,4-D amine	VH 32 ounces (0.5 pound) picloram + 64 ounces (2 pounds) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			
	picloram:fluroxypyr (1:1)	VH 80 ounces (0.84 pound)	VH 1%			
	picloram	VH 32 ounces (0.5 pound)	VH 0.5%			
	picloram + triclopyr ester	VH 32 ounces (0.5 pound) picloram + 16 ounces (0.5 pound) triclopyr ester	VH 0.5% picloram + 0.25% triclopyr ester			
	hexazinone liquid	—	VH 4 milliliters per 3 feet canopy diameter or height, whichever is greater	—	Late winter—summer	Apply undiluted hexazinone liquid, tebuthiuron 20% pellets, or hexazinone pellets to soil between stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid. If plant size requires more than a single 4 milliliters application of hexazinone liquid, or 2 hexazinone pellets, apply subsequent applications or pellets equally spaced around the plant.
	hexazinone pellets	—	VH 2 pellets per 3 feet canopy diameter or height, whichever is greater	—		
	tebuthiuron 20% pellets	—	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 45 square feet of ground area or 2–4 inches of stem diameter	—	Anytime—optimum period is October 1–April 1.	Do not use these treatments on marshy or poorly drained sites nor on soils classified as clays. Best results are expected on coarse-textured soils.
triclopyr ester	—	VH** 15% in diesel fuel	Apply to lower 12–18 inches of trunk to wet the bark, but not to point of runoff. Apply completely around the trunk.	Anytime—optimum time is during growing season when plants have mature leaves.	Use only on plants with a smooth bark and/or a trunk diameter less than 4 inches. This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred.	
triclopyr ester	—	VH 25% in diesel fuel				

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Christ thorn	triclopyr ester	—	VH 1%	Add 32–64 ounces surfactant per 100 gallons water. Thoroughly wet	Early summer	—
	triclopyr ester + picloram	—	VH 0.5% triclopyr ester + 0.5% picloram			
Common or eastern persimmon	dicamba	L 64 ounces (2 pounds)	H 1%	Ground broadcast 15–20 gallons water. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, when leaves are fully developed.	—
	picloram:fluroxypyr (1:1)	—	VH 1 to 2%			
Creosotebush, tarbush, whitethorn acacia	tebuthiuron 20% pellets	H 3.75–5 pounds of pellets (0.75–1 pound active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 100 square feet of ground area	—	Anytime—optimum period is May 1–July 1.	Use 5 pounds pellets per acre when soil is a loam, silt loam, silt, sandy clay loam, or clay loam. Use low rate when soil is a sand, loamy sand, or sandy loam. Do not treat mountainside or gravelly ridges with slopes of 7% or more. Do not treat if soils have a cation exchange capacity greater than 30 milliequivalent per 100 grams (commonly called “gyp” soils). For individual plant treatment, apply pellets evenly on soil under the plant canopy and 1 foot beyond the canopy edge.
Eastern redcedar	picloram	—	VH** 4 milliliters per 3 feet height or canopy diameter, whichever is greater	—	Spring or fall	Apply undiluted hexazinone liquid, picloram, or hexazinone pellets to soil surface between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid and picloram. If plant size requires more than one 4-milliliter application of hexazinone liquid or picloram, or more than 2 hexazinone pellets, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites, nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone liquid	—	VH 4 milliliters per 3 feet height or canopy diameter, whichever is greater, or 1-inch trunk diameter	—	Late winter through summer	
	hexazinone pellet	—	VH 2 pellets per 3 feet height or canopy diameter, whichever is greater, or 1-inch trunk diameter	—		
Elm, granjeno (spiny hackberry), hackberry, pricklyash, (Hercules club), yaupon	tebuthiuron 20% pellets	—	VH 0.5 ounce pellets (1/10 ounce active ingredient) per 45 square feet of ground area or 2–4 inches of stem diameter	—	Anytime during year—optimum period is October 1–April 1, except in Trans-Pecos, where optimum period is May 1–July 1.	Apply pellets evenly on the soil under the plant canopy and 1 foot beyond the canopy edge.

*See Table 4 for mixing information.

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Flameleaf sumac	picloram:2,4-D (1:4), (3.8 pound per gallon product)	—	VH 0.63%	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Late spring, when leaves mature.	Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	VH 1%			
	picloram:fluroxypyr (1:1)	H 48–96 ounces (0.5–1.0 pound)	VH 0.75%			
	picloram	H 16–32 ounces (0.25–0.5 pound)	VH 0.5%			
	picloram + triclopyr ester	H 16 ounces (0.25 pound) picloram + 8 ounces (0.25 pound) triclopyr ester	VH 0.25% picloram + 0.25% triclopyr ester			
	picloram + 2,4-D amine or low-volatile ester	—	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			
Giant reed	imazapyr	VH 64 ounces (1 pound)	VH 0.5%	Use a minimum 20–30 gallons per acre total volume of ground broadcast applications and a minimum 15 gallons per acre for aerial. When using individual plant applications, spray plants to runoff. Add 1% MSO to individual plant treatments and 32 ounces per acre for broadcast applications.	Spray when plants are actively growing during the summer or fall with a minimum 3 feet plant height.	Do not mow plants for 3–4 months after treatment. When exposure to aquatic environments is possible, use an herbicide with aquatic label.
Greenbriar	dicamba + 2,4-D low-volatile ester	—	H** 1.5% dicamba + 3% 2,4-D (4 pounds per gallon product) in diesel fuel oil	Thoroughly wet stems with diesel/herbicide mix.	Winter	Use as dormant stem treatment. Constant agitation is needed to maintain proper mixture.
Hardwoods with a diameter of >1 inch except mesquite and huisache	2,4-D amine	—	H Undiluted	Use tree injector or other injecting equipment. Apply in cuts spaced 2 inches apart at base of trees. Apply until 2,4-D runs from each end of cut.	Summer or winter	—

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Honeylocust	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	—	VH 0.63%	For aerial applications, the minimum suggested total spray volume is 5 gallons per acre. Use water plus surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 20–25 gallons per acre. Use water plus surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage, but not to the point of dripping, for individual plant treatments.	Late spring after leaves mature through summer.	Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	VH 1%			
	aminopyralid: picloram:fluroxypyr (1:2:2)	—	VH 1%			
	aminopyralid:clopyralid (1:4.6)	H 28 ounces (0.61 pound)	VH 1%	Add 32–64 ounces of surfactant per 100 gallons.		
	aminopyralid:2,4-D (1:8)	H 33.6 ounce (0.98 pound)	VH 1%			
	picloram:fluroxypyr (1:1)	M–H 48 ounces (0.5 pound)	—	For IPT, thoroughly spray foliage but not to dripping. Add 32–64 ounces of surfactant per 100 gallons.		
	aminopyralid:metsulfuron Methyl (1:6.2)	M–H 3.3 ounces (0.127 pound)	—			
Huisache (cut stumps)	aminocyclopyrachlor: triclopyr amine (1:2)	—	VH 8 % in water carrier + 1% MSO-OS	Thoroughly spray the cut surface as well as the bark from the cut to ground level but not to the point of runoff. Add 1% MSO-OS (organosilicone surfactant) to water carrier spray mix.	Anytime, except when snow or water prevents spraying to the ground line. This is a Brush Busters cut-stump application method. Apply with a backpack, knapsack sprayer, or spray bottle labeled for chemical use using low pressure. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Hydraulic shears equipped with a large orifice nozzle, such as a 5500-X12, can also be used for this method.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. Best for four or fewer stems. See label for additional site-use information and restrictions.

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Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks			
Huisache <i>(continued on next page)</i>	aminocyclopyrachlor: triclopyr amine (1:2)	VH 36–48 fluid ounces (0.56–0.75 pound)	VH 1.5%	For aerial applications, use at least 4 gallons per acre total spray volume. For dense canopies, carrier volume may be increased to 10 gallons per acre. For ground broadcast applications, suggested total spray volume is 10–25 gallons per acre. Use 4–5 fluid ounces per acre MSO or MSO-OS (organosilicone surfactant) spray adjuvant. For best results, use nozzles and pressure setting to deliver a mean spray droplet diameter within the range of 350 to 450 microns. For IPT, thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	The best results are achieved in the fall months (typically late September–November 1). Do not spray when soil temperature at a depth of 12 inches is below 75°F. For optimum root-kill, do not spray when >25% of the leaf canopy is damaged due to insects, disease, or hail. Apply with good soil moisture conditions and a full, healthy leaf canopy. May be best after cumulative rainfall of 4 inches or more during the 4 weeks prior to treatment or 3 inches or more during the 2 weeks prior to treatment.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions. Higher plant-kill can be expected for trees under 7 feet tall. If plants are shredded, wait until regrowth is 3 feet tall or higher before treatment. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.			
	aminopyralid:clopyralid (1:4.6) + picloram	M-H 28 fluid ounces (0.61 pound) + 32 fluid ounces (0.5 pound)	—						
	aminopyralid:2,4-D (1:8) + picloram:2,4-D (1:4) + picloram	M-H 34 fluid ounces (0.99 pound) + 72 fluid ounces (1.4 pounds) + 13 fluid ounces (0.2 pound)	—						
	picloram + triclopyr ester	L–M 32 ounces (0.5 pound) picloram + 16 ounces (0.5 pound) triclopyr ester	H 0.5% picloram + 0.5% triclopyr ester						
	picloram + clopyralid	L–M 32 ounces (0.5 pound) picloram + 11–21 ounces (0.25–0.5 pound) clopyralid	H 0.5% picloram + 0.5% clopyralid						
	picloram:fluroxypyr (1:1)	L–M 96 ounces (1.0 pound)	H 1%						
	picloram	L–M 32 ounces (0.5 pound)	H 1%						
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	—	VH 0.63%						
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	—	VH 1%						
	aminopyralid:clopyralid (1:4.6)	—	VH 1%						
	aminopyralid:metsulfuron methyl (1:6.2)	L 3.3 ounces (0.127 pound)	—				10–15 gallons water as aerial spray; 10–20 gallons water as ground broadcast. Add 32–64 ounces surfactant per 100 gallons water.	Fall, under good moisture conditions.	Because of metsulfuron methyl in the formulation, this herbicide is not recommended on bahiagrass pastures.
	aminopyralid:metsulfuron methyl (1:6.2) + triclopyr ester	M–H 3.3 ounces (0.127 pound) aminopyralid:metsulfuron methyl + 16 ounces (0.5 pound) triclopyr ester	—						
	aminopyralid:2,4-D (1:8)	L 24–34 ounces (0.70–0.98 pound)	—						

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Huisache <i>(continued from previous page)</i>	aminopyralid:2,4-D (1:8) + triclopyr ester	L 24 ounces (0.70 pound) aminopyralid:2,4-D + 16 ounces (0.5 pound) triclopyr ester	—	10–15 gallons water as aerial spray; 10–20 gallons water as ground broadcast. Add 32–64 ounces surfactant per 100 gallons water.	Fall, under good moisture conditions.	Because of metsulfuron methyl in the formulation, this herbicide is not recommended on bahiagrass pastures.
	triclopyr ester	—	H 15% in diesel fuel oil	Apply to lower 12–18 inches of trunk to wet the trunk; do not spray to point of runoff. Apply completely around the trunk.	Anytime—optimum time is growing season when plants have mature leaves.	This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Use only on plants with smooth bark and a trunk diameter less than 4 inches.
	triclopyr ester	—	VH 25% in diesel fuel oil			
Huisache, lotebush	tebuthiuron 20% pellets	—	L 0.5 ounce pellets (1/10 ounce active ingredient) per 45 square feet of ground area or 2–4 inches of stem diameter	—	Anytime during year—optimum period is October 1–April 1, except in Trans-Pecos, where optimum period is May 1–July 1.	Apply pellets evenly on the soil under the plant canopy and 1 foot beyond the canopy edge.
Lotebush	triclopyr ester	—	VH 15% in diesel fuel	Apply to lower 12–18 inches of the trunk to wet the bark. Do not spray to point of runoff. Apply completely around the trunk.	Anytime—optimum time is during growing season when plants have mature leaves.	This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred.
Macartney rose (mowed and other disturbed stands within 3 years of disturbance)	2,4-D amine	L** 64 ounces (2 pounds) 4 pounds per gallon product	L 1% 4 pounds per gallon product	5–15 gallons water as aerial spray; 25–30 gallons water as ground broadcast. Thoroughly wet foliage and stems for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring before June 1, good growth conditions.	Avoid spraying earlier than 9–12 months after mowing or when plants have high percentage of new growth. Poor control may be expected if plants are <3 feet tall when sprayed. Repeat treatment when necessary. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	H 80 ounces (2.4 pounds)	VH 0.63%		Spring or fall, good growth conditions.	
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	H 128 ounces (2.5 pounds)	VH 1%			
	picloram + 2,4-D amine or low-volatile ester	H 32 ounces (0.5 pound) picloram + 64 ounces (2 pounds) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			
	2,4-D low-volatile ester	L 64 ounces (2 pounds) 4 pounds per gallon product	L 1% (4 pounds per gallon product)		Fall, under good moisture conditions, before November 1.	

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Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Macartney rose (undisturbed stands)	2,4-D amine	L 128 ounces (4 pounds) 4 pounds per gallon product	L 1% (4 pounds per gallon product)	5–15 gallons water as aerial spray; 25–30 gallons water as ground broadcast. Thoroughly wet foliage and stems for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	Spring, before June 1, good growth conditions.	Picloram:2,4-D (1:4), (3.8 pounds per gallon product); Do not apply more than 80 ounces per acre per year.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	H 80 ounces (2.4 pounds)	VH 0.63%		Spring or fall, good growth conditions.	
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	H 128 ounces (2.5 pounds)	VH 1%			
	picloram + 2,4-D amine or low-volatile ester	H 32 ounces (0.5 pound) picloram + 64 ounces (2 pounds) 2,4-D (4 pounds per gallon product)	VH 0.25% picloram + 0.5% 2,4-D (4 pounds per gallon product)			
	2,4-D low-volatile ester	L 96 ounces (3 pounds) 4 pounds per gallon product	L 1% (4 pounds per gallon product)		Fall, good moisture conditions, before November 1.	
Mesquite, huisache	hexazinone liquid	—	M–H** 4–8 milliliters per 3 feet of canopy diameter or height, whichever is greater	—	Late winter–summer	Apply undiluted hexazinone liquid or hexazinone pellets to soil surface between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid. If plant size requires more than a single 4 milliliters application of hexazinone liquid, or 2 hexazinone pellets, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone pellet	—	M–H 2–4 pellets per 3 feet of canopy diameter or height, whichever is greater	—		
Mesquite (basal stem diameter ≤1.5 inches)	triclopyr ester	—	VH 15% in diesel fuel oil or basal bark oil	Apply to lower 12–18 inches of trunk to wet the trunk. Do not spray to point of runoff. Apply completely around the trunk.	Anytime—optimum time is during growing season when plants have mature leaves.	This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Use only on plants with smooth bark and a trunk diameter <4 inches.
Mesquite (basal stem diameter >1.5 inches)	triclopyr ester	—	VH 25% in diesel fuel oil or basal bark oil			
Mesquite (basal stem diameter ≤1.5 inches)	triclopyr ester	—	VH 15% in diesel fuel oil 10% d,l limonene (a penetrant) may be added to the mixture—see remarks	Apply to the trunk in a 3- to 4-inch-wide band near ground level or at the line dividing smooth bark from corky bark. Apply completely around the trunk.	Anytime—optimum is in the growing season when the leaves are mature.	This is commonly called the streamline basal application method. Use a straight stream nozzle. Use only on plants with smooth bark and a trunk diameter <4 inches. Add a penetrant to the mixture to improve coverage around the trunk. Trade names for d,l limonene are Quick Step II, Cide-Kick, Cide-Kick II and AD 100. Other penetrants may be effective but have not been tested on rangelands in Texas.
Mesquite (basal stem diameter >1.5 inches)	triclopyr ester	—	VH 25% in diesel fuel oil 10% d,l limonene (a penetrant) may be added to the mixture—see remarks			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Mesquite (basal stem diameter ≤4 inches)	aminocyclopyrachlor: triclopyr amine (1:2)	—	VH 15% in water carrier + 1% MSO-OS	Apply to lower 12–18 inches of trunk to wet the trunk, but do not spray to the point of runoff. Apply completely around each basal stem. Add 1% MSO-OS (organosilicone surfactant) to the water carrier spray mix.	Late spring through summer. This is a Brush Busters low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Use only on plants with smooth bark and a trunk diameter less than 4 inches.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.
Mesquite (seedlings and saplings)	triclopyr ester	—	VH 5% in diesel fuel oil	Apply to the lower 12–18 inches of trunk to point of runoff but not to the point of puddling.	May–August	This is a Brush Busters® low-volume basal application method. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred.
	diesel fuel oil, kerosene	—	H	Apply to the base of the trunk from 12–18 inches above soil surface down to the soil surface. Apply until the solution puddles on the soil surface.	Anytime the soil is dry and pulled away from the trunk.	Apply sufficient oil to penetrate to the plant bud zone. Diesel fuel oil does not evaporate as fast as kerosene.
	triclopyr ester	—	VH 2% in diesel fuel oil			
Mesquite, Christ thorn, and other hardwoods (cut stumps)	triclopyr ester	—	VH** 15% in diesel fuel oil or basal bark oil	Thoroughly spray the cut surface as well as the bark from the cut to ground level but not to the point of runoff.	Anytime, except when snow or water prevents spraying to the ground line.	This is a Brush Busters® cut-stump application method. Apply with a backpack, knapsack sprayer, or spray bottle labeled for chemical use using low pressures. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle is preferred. Hydraulic shears equipped with a large orifice nozzle, such as a 5500-X12, can also be used for this method.
	triclopyr:fluroxypr (3:1)	—	VH 10% in diesel fuel oil or basal bark oil			
Mesquite (cut stumps)	aminocyclopyrachlor: triclopyr amine (1:2)	—	VH 8 to 10% in water carrier + 1% MSO-OS	Thoroughly spray the cut surface as well as the bark from the cut to ground level but not to the point of runoff. Add 1% MSO-OS (organosilicone surfactant) to water carrier spray mix.	Anytime, except when snow or water prevents spraying to the ground line. This is a Brush Busters cut-stump application method. Apply with a backpack, knapsack sprayer, or spray bottle labeled for chemical use using low pressure. A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Hydraulic shears equipped with a large orifice nozzle, such as a 5500-X12, can also be used for this method.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Mesquite <i>(continued on next page)</i>	aminocyclopyrachlor: triclopyr amine (1:2)	VH 24–36 fluid ounces (0.375–0.56 pound)	VH 1.5%	For aerial applications, use at least 4 gallons per acre total spray volume. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use 4–5 fluid ounces per acre MSO or MSO-OS (organosilicone surfactant) spray adjuvant. For best results, use nozzles and pressure settings to deliver a mean spray droplet diameter within the range of 350 to 450 microns. For IPT, thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	Late spring through mid-summer with mature (dark-green) leaves. Optimum period begins when soil temperature at a depth of 12 inches reaches 75°F and continues for 45 days thereafter. For optimum root-kill, do not spray if white flowers or bean elongation are observable, if >25% of the leaf canopy is damaged due to insects, disease, or hail, if soil temperatures are less than 75°F, 12 inches deep, or if new vegetative growth is present due to recent rains.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.
	aminopyralid:clopyralid (1:4.6)	H 28 ounces (0.61 pound)	VH 1%			
	clopyralid	M–H 11–21 ounces (0.25–0.5 pound)	VH 1%			
	triclopyr ester + picloram	M 8–16 ounces (0.25–0.5 pound) triclopyr + 16–32 ounces (0.25–0.5 pound) picloram	M–H 0.5% triclopyr + 0.5% picloram			
	triclopyr ester + dicamba	L 8–16 ounces (0.25–0.5 pound) triclopyr + 8–16 ounces (0.25–0.5 pound) dicamba	M 0.5% triclopyr + 0.5% dicamba			
	triclopyr ester + clopyralid	M–H 4–16 ounces (0.125–0.5 pound) triclopyr + 5–11 ounces (0.125–0.25 pound) clopyralid	VH 0.5% triclopyr + 0.5% clopyralid			
	picloram + dicamba	M 16–32 ounces (0.25–0.5 pound) picloram + 8–16 ounces (0.25–0.5 pound) dicamba	H 0.5% picloram + 0.5% dicamba			
	picloram + clopyralid	M–H 16–32 ounces (0.25–0.5 pound) picloram + 11–21 ounces (0.25–0.5 pound) clopyralid	VH 0.5% picloram + 0.5% clopyralid			
	triclopyr ester + clopyralid + picloram	M–H** 4–8 ounces (0.125–0.25 pound) triclopyr + 5–11 ounces (0.125–0.25 pound) clopyralid + 32 ounces (0.5 pound) picloram	—			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Mesquite <i>(continued from previous page)</i>	aminopyrliid:clopyralid + picloram	H 28 ounces (0.61 pound) aminopyrliid: clopyrliid + 16–32 ounces (0.25–0.5 pound) picloram	—	For aerial applications, use at least 4 gallons per acre total spray volume. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre Use 4–5 fluid ounces per acre MSO or MSO-OS (organosilicone surfactant) spray adjuvant.	Late spring through mid-summer with mature (dark-green) leaves. Optimum period begins when soil temperature at a depth of 12 inches reaches 75°F and continues for 45 days thereafter. For optimum root-kill, do not spray if white flowers or bean elongation are observable, if >25% of the leaf canopy is damaged due to insects, disease, or hail, if soil temperatures are less than 75°F, 12 inches deep, or if new vegetative growth is present due to recent rains.	Recommended for mixtures of mesquite and pricklypear or tasajillo cactus. The tank mix of aminopyrliid: clopyralid plus picloram also controls mesquite better in South Texas mixed brush habitat than does aminopyrliid: clopyralid alone.
	aminopyrliid:clopyralid + triclopyr ester	H 28 ounces (0.61 pound) aminopyrliid: clopyrliid + 8–32 ounces (0.25–0.75 pound) triclopyr ester	—	For best results, use nozzles and pressure settings to deliver a mean spray droplet diameter within the range of 350 to 450 microns. For IPT, thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.		
	clopyralid (see remarks)	H 21 ounces (0.5 pound)	VH 1%		August 1–September 30 with a soil temperature of 75°F or more at a depth of 12 inches. Do not apply after a frost has occurred.	Use only in Bandera, Blanco, Burnet, Coryell, Edwards, Kendall, Lampasas, Montague, Real, Val Verde, and Wise Counties and the counties north and west of the named counties.
	picloram	—	VH 128 ounces (2 pounds)	Applied with a carpeted roller.	Late spring–August with mature (dark green) leaves. Best control during the period that begins when soil temperature at a depth of 12 inches reaches 75°F and continued for 45 days thereafter; when clopyralid is used alone or in a tank mix the period should continue for 60 days after soil temperature reaches 75°F.	Mesquite should be <6 feet tall and should pass under carpeted roller without breaking the main stem. Mix recommended quantity of herbicide with water to make 8 gallons mixture. Add 3–6 ounces surfactant for each 8 gallons mixed.
	clopyralid	—	VH 84 ounces (2 pounds)			
	picloram + clopyralid	—	VH 64 ounces (1 pound) picloram + 43 ounces (1 pound) clopyralid			

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Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Mesquite (suppression and weed control)	2,4-D amine or low-volatile ester	L 32–28 ounces (2–4 pound)	M 2% (4 pounds per gallon product)	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Late spring–mid-summer with mature (dark green) leaves. Optimum period begins when soil temperature at a depth of 12 inches reaches 75°F and continues for 45 days thereafter. If treatment is applied before optimum soil temperatures, efficacy rates will be lower and multiple applications over a period of years may be necessary to maintain less than 10% canopy cover.	Treatments will control many weeds. Use of a treatment with a low control rating may result in multi-stem growth form that may be more difficult to control in the future. Picloram:2,4-D (1:4), (3.8 pounds per gallon product); Do not apply more than 80 ounces per acre per year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures.
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	L 20–32 ounces (0.6–0.9 pound)	—			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	L 32–48 ounces (0.6–0.9 pound)	—			
	dicamba:2,4-D (1:3)	L 32–48 ounces (1–1.5 pounds)	—			
	metsulfuron methyl dicamba:2,4-D (1:3)	L Rate 1–Rate 2	—			
	picloram + 2,4-D amine or low-volatile ester	L 8–12 ounces (0.125–0.1875 pound) picloram + 32–48 ounces (1–1.5 pounds) 2,4-D (4 pounds per gallon product)	—			
	dicamba + 2,4-D amine or low-volatile ester	L 8–12 ounces (0.25–0.375 pound) dicamba + 24–36 ounces (0.75–1.125 pounds) 2,4-D (4 pounds per gallon product)	—			
	triclopyr ester	L 16–32 ounces (0.5–1 pound)	M 1%			
dicamba	L 16–32 ounces (0.5–1 pound)	M 1%				

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Mesquite, western honey	triclopyr ester + clopyralid	—	VH 0.5% triclopyr ester + 0.5% clopyralid	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	The preferred application time is spring to early summer, 40–90 days after bud break. Spray with minimum soil temperature of 75°F at 12–18 inches soil depth. Soil moisture should be adequate for plant growth. Not all years provide adequate conditions for spraying. 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.	Western honey mesquite is most common in the western part of the Trans-Pecos region of Texas.
	aminopyrliid:clopyralid + triclopyr ester	H-VH 28 ounces (0.61 pound) aminopyrliid: clopyralid + 8 ounces (0.25 pound) triclopyr ester	—			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 (approximately 2–3 weeks). Foliage should be robust, dark green, and undamaged. Do not spray foliage damaged by drought, frost, hail, wind, insects, and browsing.
	aminopyralid:clopyralid	M-H 28 ounces (0.61 pound) aminopyrliid: clopyralid	—			Suggested for ground broadcast
Mixed brush—South Texas (includes several of the following: blackbrush, catclaw acacia, granjeno or spiny hackberry, guajillo, huisache, mesquite, pricklypear, retama, skunkbush, tasajillo, twisted acacia <i>(continued on next page)</i>)	picloram + triclopyr ester	M** 32 ounces (0.5 pound) picloram + 16 ounces (0.5 pound) triclopyr ester	H 0.5% picloram + 0.5% triclopyr ester	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 20–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Late spring–mid-summer with mature (dark-green) leaves. Optimum period of application begins when soil temperature at a depth of 12 inches reaches 75°F and continues for 45 days thereafter; with the clopyralid tank mix, the period should continue for 60 days after soil temperature reaches 75°F. If mesquite has 10% canopy cover or less, application may be made in spring or fall.	The mixture of 32 ounces picloram + 21 ounces clopyralid or 32 ounces picloram + 28 ounces aminopyrliid:clopyralid will usually provide better results than the 32 ounces picloram + 11 ounces clopyralid mixture. Mixtures will control most weeds.

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

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Mixed brush—South Texas (includes several of the following: blackbrush, catclaw acacia, granjeno or spiny hackberry, guajillo, huisache, mesquite, pricklypear, retama, skunkbush, tasajillo, twisted acacia <i>(continued from previous page)</i>	picloram + clopyralid	M 32 ounces (0.5 pound) picloram + 11–21 ounces (0.25–0.5 pound) clopyralid	H 0.5% picloram + 0.5% clopyralid	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 20–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Late spring–mid-summer with mature (dark-green) leaves. Optimum period of application begins when soil temperature at a depth of 12 inches reaches 75°F and continues for 45 days thereafter; with the clopyralid tank mix, the period should continue for 60 days after soil temperature reaches 75°F. If mesquite has 10% canopy cover or less, application may be made in spring or fall.	The mixture of 32 ounces picloram + 21 ounces clopyralid or 32 ounces picloram + 28 ounces aminopyrid:clopyralid will usually provide better results than the 32 ounces picloram + 11 ounces clopyralid mixture. Mixtures will control most weeds.
	picloram + dicamba	M 32 ounces (0.5 pound) picloram + 16 ounces (0.5 pound) dicamba	H 0.5% picloram + 0.5% dicamba			
	aminopyrid:clopyralid + picloram	M 28 ounces (0.61 pound) aminopyrid:clopyralid + 16–32 ounces (0.25–0.5 pound) picloram	—			
	aminopyrid:clopyralid + triclopyr ester	M 28 ounces (0.61 pound) aminopyrid:clopyralid + 8–32 ounces (0.25–0.75 pound) triclopyr ester	—			
Mixed brush—Davis Mountains (includes catclaw acacia, catclaw mimosa, and whitebrush)	tebuthiuron 20% pellets	M** 7.5–10 pounds of pellets (1.5–2 pounds active ingredient)	H 0.5 ounce of pellets (0.1 ounce active ingredient) per 50–100 square feet of ground area	—	Anytime—optimum period is May 1–July 1.	Use 10 pounds pellets per acre when soil is a loam, silt loam, silt, sandy clay loam, or clay loam. Use low rate when soil is a sand, loamy sand, or sandy loam. For individual plant treatment apply pellets evenly on soil under the plant canopy and 1 foot beyond the canopy edge.
Mohrs shinoak	tebuthiuron 20% pellets	VH 5 pounds of pellets (1 pounds active ingredient)	VH 0.5 ounce of pellets (0.1 ounce active ingredient) per 100 square feet of ground area	—	Anytime—optimum period is October 1–April 1.	Use only when oak stand is predominantly Mohrs shinoak. These stands are generally found in Coke, Mitchell, Nolan, Sterling, and Taylor Counties. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.

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Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Pricklypear, tasajillo	aminopyralid: picloram:fluroxypyr (1:2:2)	H 32 ounces (0.5 pound)	VH 1%	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 10–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Anytime—best results have been obtained with late summer through fall applications.	Use 1 pint per acre picloram only on High Plains where no brush overstory is present. Late summer or fall applications, especially with fluroxypyr, will provide best results, but aerially spray in the winter or early spring if heavy overstory of woody plants is present or if damage to live oak is a concern. Picloram:2,4-D (1:4), (3.8 pounds per gallon product): Do not apply more than 80 ounces per acre per year.
	picloram	H** 16–32 ounces (0.25–0.5 pound)	VH 1%			
	picloram:fluroxypyr (1:1)	H 64 ounces (0.67 pound)	VH 1%			
	picloram:2,4-D (1:4), (3.8 pounds per gallon product)	H 80 ounces (2.4 pounds)	VH 1.3%			
	picloram:2,4-D (1:4), (2.5 pounds per gallon product)	H 128 ounces (2.5 pounds)	VH 2%			
	triclopyr: fluroxypyr (3:1)	—	VH 1%			
	fluroxypyr	—	VH 0.5%			
	prescribed burn + picloram	VH** 8–16 ounces (0.125–0.25 pound)	VH 1%			
aminocyclopyrachlor: triclopyr amine (1:2)	—	H-VH 1.5%	For individual plant treatment, thoroughly wet both sides of all pads. Use a water carrier and add 1% v/v MSO-OS adjuvant	Best during wet conditions.	Data mostly from South Texas. Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.	

*See Table 4 for mixing information.

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Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Redberry juniper (redberry cedar)	hexazinone liquid (plants <6 feet tall)	—	VH 2 milliliters per 3 feet height or canopy diameter (whichever is greater)	—	Late winter–summer	Apply undiluted hexazinone liquid or hexazinone pellets to soil surface between the stem base and the edge of the canopy. Use an exact delivery handgun applicator to apply hexazinone liquid. If plant size requires more than a single 2- or 4-milliliter application of hexazinone liquid, or 1 hexazinone pellet, apply subsequent applications or pellets equally spaced around the plant. Do not use these treatments on marshy or poorly drained sites, nor on soils classified as clays. Best results are expected on coarse-textured soils.
	hexazinone pellet (plants <6 feet tall)	—	VH 1 pellet per 3 feet height or canopy diameter (whichever is greater)	—		
	hexazinone liquid (plants >6 feet tall)	—	H 4 milliliters per 3 feet height or canopy diameter (whichever is greater)	—		
	hexazinone pellet (plants >6 feet tall)	—	H 2 pellets per 3 feet of height or canopy diameter (whichever is greater)	—		
	picloram	—	VH** 4 milliliters per 3 feet of height or canopy diameter (whichever is greater)	—	Spring–fall, before expected rainfall.	Apply undiluted picloram to the stem base at or near the ground line. Use an exact delivery handgun applicator to apply the 4-milliliter dose. If plant size requires more than a single 4-milliliter application, space subsequent applications equally around the plant. Do not use on marshy or poorly drained sites nor on soils classified as clays.
Redberry juniper (cut stumps)	picloram	—	VH 4% in water	Spray the sides of the stump and the cut surface, including the cambium, immediately after cutting, to thoroughly wet the stem and root collar area, but not to the point of runoff. Add 32–64 ounces surfactant to 100 gallons spray mix.	Anytime, except when snow or water prevent spraying to the ground line.	This is commonly called the cut stump application method. Apply with a backpack, knapsack sprayer, or spray bottle labeled for chemical use using low pressures and a solid cone or flat fan nozzle. Add 32–64 ounces surfactant per 100 gallons water.
Retama	picloram + triclopyr ester	L–M 32 ounces (0.5 pound) picloram + 16 ounces (0.5 pound) triclopyr ester	H 0.5% picloram + 0.5% triclopyr ester	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 20–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	Spring, with mature foliage or fall with good soil moisture and foliage.	
	picloram + clopyralid	L–M 32 ounces (0.5 pound) picloram + 11–21 ounces (0.25–0.5 pound) clopyralid	H 0.5% picloram + 0.5% clopyralid			
	picloram:fluroxypyr (1:1)	L–M 96 ounces (1.0 pound)	H 1%			
	picloram	L–M 32 ounces (0.5 pound)	H 1%			

*See Table 4 for mixing information.

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Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Running live oak	tebuthiuron 20% pellets	VH 5–10 pounds pellets (1–2 pounds active ingredient)	VH 0.5 ounce pellets (0.1 ounce active ingredient) per 50–100 square feet of ground area	—	Anytime—optimum period is October 1–April 1.	Use low rate on brush 2–8 feet tall. Use 7.5 pounds pellets per acre when brush is 2–8 feet tall on rolling or hummocking site and when live oak plants are 8 feet or taller without understory species such as yaupon. Use 10 pounds pellets per acre when live oak plants are taller than 8 feet and an understory of yaupon and other species is present. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.
Sacahuista	tebuthiuron 20% pellets	—	H 0.25 ounce pellets (0.05 ounce active ingredient) per plant	—	Anytime—optimum period is October 1–April 1 except in Trans-Pecos, where optimum period is May 1–July 1.	Apply pellets evenly on the soil under the plant canopy near the stem base.
Saltcedar	imazapyr	VH** 64 ounces (1 pound)	VH 1%	Minimum 10 gallons per acre for aerial or ground broadcast sprays. Thoroughly wet foliage for individual plant treatment. Add 32–64 ounces surfactant per 100 gallons water.	July–September, or until leaves begin to turn yellow.	When exposure to aquatic environments is possible, use aquatic labels of imazapyr and glyphosate (see Table 2). Imazapyr alone or in combination with glyphosate will cause damage to desirable plants if contacted by the spray mix.
	imazapyr + glyphosate	VH 32 ounces (0.5 pound) imazapyr + 16 ounces (0.5 pound) glyphosate	VH 0.5% imazapyr + 0.5% glyphosate			
	triclopyr ester	—	VH 25% in diesel fuel oil			
Sand sagebrush	2,4-D low-volatile ester	H 32 ounces (1 pound) 4 pounds per gallon product [up to 64 ounces (2 pounds) for ground broadcast]	VH 1% (4 pounds per gallon product)	For aerial applications, the minimum suggested total spray volume is 4 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. For ground broadcast applications, the suggested total spray volume is 20–25 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil. Thoroughly wet foliage for individual plant treatments. Add 32–64 ounces surfactant per 100 gallons water.	May 1–June 15 under good growth conditions with plants fully leafed.	Do not spray when plants are defoliated by late freeze, hail, or unfavorable growth conditions. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
	metsulfuron methyl dicamba:2,4-D (1:3) + 2,4-D low-volatile ester	H Rate 1 metsulfuron methyl dicamba:2,4-D (1:3) + 16 ounces (0.5 pound) 2,4-D (4 pounds per gallon product)	—			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Sand shinnery oak	tebuthiuron 20% pellets	VH 3.75–5 pounds of pellets (0.75–1 pound active ingredient)	VH 0.5 ounce of pellets (0.1 ounce active ingredient) per 100 square feet of ground area	—	Anytime—optimum period is October 1–April 1 except in Trans-Pecos where optimum period is May 1–July 1.	Use 3.75 pounds pellets per acre in southern High Plains and Rolling Plains. Use 5 pounds pellets per acre in eastern Panhandle north of Prairie Dog Town Fork of the Red River. For individual plant treatment, apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.
	tebuthiuron 80DF	H–VH 1.25 pounds (1 pound)	—	Apply by mixing with water and using ground equipment equipped with straight stream nozzles spaced 3–6 feet apart, delivering a total spray volume of 20–30 gallons per acre.	Anytime—optimum period is October 1–April 1 except in Trans-Pecos where optimum period is May 1–July 1.	Use the closer spacing of nozzles when treating high densities of sand shinnery. Applications will result in damage to grass directly under each nozzle that can persist for 1–3 years. Agitation is important to dissolve and maintain tebuthiuron 80DF in solution during application.
Saw palmetto	metsulfuron methyl dicamba:2,4-D (1:3)	H–VH Rate 2 or Rate 3 (see remarks)	—	For ground broadcast applications, the suggested total spray volume is 15–30 gallons per acre. Use water + surfactant, crop oil, or methylated seed oil.	Mid–late summer (August)	Rate 2 applications generally result in “high” control levels the first year after treatment, improving to “very high” by the second year after treatment. Rate 3 applications can be expected to produce “very high” control levels by the first year after treatment. Do not mow treated areas for at least 1 year. Because of metsulfuron methyl in the formulation, these herbicides are not recommended on bahiagrass pastures for weed control.
Texas persimmon	aminocyclopyrachlor: triclopyr amine (1:2)	—	VH 2%	Thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	Late spring through summer with mature (dark green), healthy leaves. Applications before July 1 have been the most effective and consistent.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Whitebrush (beebrush, beebush)	tebuthiuron 20% pellets	VH** 5–7.5 pounds of pellets (1–1.5 pounds active ingredient)	VH 0.5 ounce of pellets (0.1 ounce active ingredient) per 50–100 square feet of ground area	—	Anytime—optimum period is October 1–April 1 except in Trans-Pecos, where optimum period is May 1–July 1.	Use 5 pounds pellets per acre on sand, loamy sand, or sandy loam soils. Use 6.25 pounds pellets per acre on soils with 20% to 30% clay. Use 7.5 pounds pellets per acre on areas with grass production >1,500 pounds per acre or on areas where mesquite, Texas persimmon, or other woody plants have a canopy cover of 20% or more with whitebrush that is 6 feet tall or taller. For individual plant treatment apply pellets evenly on the soil under the plant canopy and 1 foot beyond canopy edge.
	aminocyclopyrachlor: triclopyr amine (1:2)	M-VH 36 ounces per acre	VH 1.5%	Use a minimum of 20 gallons per acre spray volume for ground broadcast applications or 4.5 gallons per acre for aerial applications. Add MSO-QS at 4 ounces per acre in water carrier. For individual plant applications, thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	May-October: make applications with good growing conditions and mature, healthy leaves.	May improve broadcast control using ground applications vs. aerial. Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.
Yaupon	aminocyclopyrachlor: triclopyr amine (1:2)	—	H–VH 1.5%	Thoroughly spray foliage to wet but not dripping. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	Late spring through summer with mature (dark green) and healthy leaves.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low

Table 6. Herbicides for controlling brush on rangeland

Brush controlled	Herbicide (common and chemical names, Table 2)	Broadcast rate per acre (active ingredient rate in parentheses)	Individual plant treatment* (active ingredient rate in parentheses)	Spray volume (per acre for broadcast, as described for individual plant)	Time to apply	Remarks
Yucca (species)	aminocyclopyrachlor: triclopyr amine (1:2)	—	H-VH 1.5%	Thoroughly wet the center whorl of each individual yucca. Add 32–64 ounces (0.25–0.5%) nonionic surfactant per 100 gallons water.	Late spring through summer with mature, healthy leaves.	Aminocyclopyrachlor:triclopyr amine requires specific picolinic acid chemistry training and certification before use. See label for additional site-use information and restrictions.
	triclopyr ester	—	H 2% in diesel fuel oil	Spray the center of each individual whorl of leaves to the point of runoff.	Anytime	Complete coverage of leaves is not necessary. The crown of each plant must be thoroughly wet with the herbicide mixture.
		—	H 2% in 1:5 diesel fuel oil:water emulsion		May–September	Use emulsifier and agitate to maintain emulsion. Complete coverage of leaves is not necessary. The crown of each plant must be thoroughly wet with the herbicide mixture.
		—	VH 15% in diesel fuel oil	A nozzle with a small orifice, like a 5500-X1 adjustable cone nozzle, is preferred. Spray a 2-second burst into each whorl.	Spring–summer	Direct spray into the center of each whorl.
		—	H Undiluted 2–4 milliliters per plant whorl			
		—	VH Undiluted			
		—	—			
	metsulfuron methyl dicamba:2,4-D (1:3) + 2,4-D low-volatile ester	H Rate 2 metsulfuron methyl dicamba:2,4-D (1:3) + 16–24 ounces 2,4-D (4 pounds active ingredient per gallon product)	—	Crop oil concentrate, modified seed oil, or modified seed oil with organosilicone are the preferred adjuvants. For aerial applications, a minimum of 4 gallons per acre total spray volume is recommended.	Spring–fall before frost	A second follow-up application of metsulfuron methyl dicamba:2,4-D (1:3) at Rate 1 or Rate 2 + 2,4-D low-volatile ester at 0.5–0.75 pound active ingredient per acre within 2 years of the initial application may be required to control yucca seedlings and regrowth from rootstocks.
	metsulfuron: chlorosulfuron (3:1) + 2,4-D low-volatile ester	H 0.675 ounce metsulfuron: chlorosulfuron (3:1) + 32 ounces 2,4-D (4 pounds active ingredient per gallon product)	—			

*See Table 4 for mixing information.

**Treatment control ratings: VH – Very High; H – High; M – Moderate; L – Low