

# SECTION W. PASTURE AND RANGELAND

## Small Pastures

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Serious weed management issues in pastures are a symptom of a problem with the crop or site. These problems can include grazing methods, fertilization programs, forage species selection, and irrigation or water management.

Land used for grazing livestock will not warrant the major expense required for herbicide use or other methods to control weeds, in many scenarios. It is usually more appropriate to look for ways to manage the forage and the site to prevent or reduce weed problems. Changing the grazing methods, fertilization, forage species, and water management will change the competitive balance in favor of the forage rather than the weeds, in many cases.

Healthy and well-established forage plants are more likely to resist weed invasions. Therefore, manage desirable forage species to make them as competitive as possible with weeds. The areas around gates, water troughs, feed bunks, bedding grounds, roadways, and fence lines should be the first to receive attention, because forage plants are sparse there and the soil is disturbed frequently. Weeds often first become established in these spots; then, it is much easier for them to spread out to grazing land. It is not practical to completely stop disturbing the soil, but reseeding a competitive grass can make the sites much less inviting to weed invasion. If it is not practical or economical to overseed an entire pasture, consider seeding livestock trails and reseeding both sides of roadways, since this is where weeds are likely to show up first.

Pastures can be made more competitive against weeds by taking reasonable measures to promote the forage. This is crop management, not weed management. Controlling weeds does not necessarily mean an increase in forage yield. As a general rule, every unit of weeds produced reduces forage by an equivalent amount. If available resources are used to make the crop grow better, a yield increase can be expected, and the impact of weeds should be reduced. It is important to carefully select the forage species and variety for the site and the objectives. Then fertility, soil pH, irrigation or drainage, grazing management, mowing, and periodic overseeding all have potential to influence crop growth and the ability of the forage to compete with weeds.

When forage deteriorates to the point that corrective measures must be taken, the question is how to best correct the situation. If tillage is feasible, it is tempting to start over by plowing or disking, to prepare a new seedbed for a pasture. This may be the best alternative, but more often it exposes many new weed seeds to an environment that favors their germination. The land is out of forage production for several months, and nothing has been done to prevent further deterioration under this management scenario. Increased soil erosion and the relatively high cost are additional disadvantages of complete pasture renovation.

It may be better to simply overseed the pasture by the most suitable method. Several types of no-till planters and techniques may be appropriate. If the seed is simply broadcast on the soil surface it will help to irrigate, run livestock over the field for a few days, or harrow and then pack or roll the field to move the seed into contact with the soil. Broadcast seeding spreads the forage seed over the entire pasture area, which should be more competitive with the weeds than drilling in rows. However, no-till planting in rows offers the obvious advantages of not taking the field out of production for a long period, and creating little soil disturbance that would expose new weed seeds to conditions that favor their germination. Increasing the seeding rate of the forage by approximately 30% is recommended when using the broadcast method.

In areas inaccessible to machinery, it may be appropriate to feed seeds of desirable species to the livestock so the seed will be planted after passing through the animals. Certain grasses and most small-seeded legumes remain viable after going through an animal's digestive system.

There are times when direct action to manage weeds is advisable. Some examples of these situations are provided below.

1. Weeds that are new to a farm or property and few in number should be controlled with a shovel, herbicide, or other appropriate method, before populations become well-established.
2. Poisonous plants can cause unacceptable livestock losses. Implement control programs in grazing areas that are small enough and accessible. Fencing might be appropriate in serious cases, but herbicides or shovels are good tools if plants are widespread and relatively few. Poisonous plants frequently are the first to appear in spring. Delay introducing livestock into these areas until adequate forage is available, then do not overgraze. For more information on pasture management and poisonous plants, access the Oregon State University Small Farms website: <http://smallfarms.oregonstate.edu>
3. Certain perennial weeds—such as Himalayan blackberry, Canada thistle, leafy spurge, field bindweed, and quackgrass—cannot be discouraged by competition from vigorous forage plants. Herbicides, physical removal, or tillage are common control methods for these species, but consider grazing different livestock, such as goats or sheep, which may provide effective control.
4. If weeds have become so dense and the forage species so thin that the site is unprofitable, using herbicides or tillage may be the best management option. This should be done only when necessary.

When attempting to reduce weeds in small pastures, direct management and resources to promote growth of forage species so they will be better able to compete with the weeds. This concept is helpful in correcting certain weed problems and in slowing or preventing invasion of new weed species. Careful use of herbicides can be a useful tool for forage management. In terms of overall importance, livestock management follows closely behind management of the forage sites. The best chemical for forage production is probably fertilizer.

When herbicide use is justified, being able to buy products in the small quantities needed can be a problem. Do not buy more product than needed for the current year, when possible, because secure storage of the extra herbicide will be needed.

Below is a partial listing of some of the herbicide products available to effectively manage weeds in small pastures. This list changes continuously and herbicide brand names come and go; always refer to the active ingredients in this list when purchasing a product to apply to your pasture.

## Management to Reduce Weed Problems

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### 2,4-D (several products)

**Rate** 0.7 to 2 lb ae/A, depending on weed species and size

**Time** Depends on target weeds. Apply to grass pastures when annual and biennial broadleaf weeds are small and actively growing, and established perennials are at bud stage, unless indicated otherwise on the label.

**Remarks** Controls many broadleaf weeds. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage, before flower stalks are apparent. Spray perennial weeds while still seedlings (coming from seed), or wait until bud stage of growth.

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not graze lactating dairy cattle in treated areas for 7 days after application. Preharvest interval is 30 days for hay. Do not permit animals being finished for slaughter to graze treated fields within 3 days of slaughter.

**Site of action** Group 4: synthetic auxin

**Chemical family** Phenoxy acetic acid

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### aminopyralid (Milestone Specialty Herbicide)

**Rate** 0.049 to 0.108 lb ae/A (3 to 7 fl oz/A)

**Time** Apply to actively growing broadleaf weeds. Consult label for application rates for specific weeds.

**Remarks** A nonionic surfactant at 1 to 2 quarts/100 gal of spray enhances control under adverse environmental conditions. Controls several broadleaf weeds. Application rate depends on weed species and stage of growth. Follow main label and supplemental label restrictions for grazing, forage and manure management.

**Caution** Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not use treated plant residues for compost. Do not exceed 7 fl oz/A Milestone per year.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### **aminopyralid + metsulfuron (Chaparral Specialty Herbicide)**

**Rate** 0.049 to 0.108 lb ae/A aminopyralid + 0.0089 to 0.019 lb ai/A metsulfuron (1.5 to 3.3 oz/A)

**Time** Apply to actively growing broadleaf weeds. Consult label for application rates for specific weeds.

**Remarks** A nonionic surfactant applied at 0.25% v/v or crop oil concentrate applied at 1% v/v of spray enhances control under adverse environmental conditions. Chaparral controls many broadleaf weeds. Application rate depends on weed species and stage of growth. Follow main label and supplemental label restrictions for grazing, forage and manure management.

**Caution** Do not let spray drift onto desirable vegetation; many forbs (desirable broadleaf plants in pastures) will be seriously injured or killed. Do not exceed 3.3 oz/A Chaparral per year. Do not use on grasses grown for seed or on timothy hay or other cool-season grasses grown for hay. Do not overseed pastures with ryegrasses for 4 months following application of Chaparral. Do not use treated plant residues for compost.

**Site of action** Group 4: synthetic auxin; Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (aminopyralid) Pyridine; (metsulfuron) Sulfonylurea

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### **aminopyralid + 2,4-D (ForeFront R&P Specialty Herbicide)**

**Rate** 0.06 to 0.108 lb ae/A aminopyralid + 0.5 to 0.87 lb ae/A 2,4-D (1.5 to 2.6 pints/A)

**Time** Apply to actively growing broadleaf weeds. Consult label for application rates for specific weeds.

**Remarks** A nonionic surfactant applied at 0.25% to 0.5% v/v of spray enhances control under adverse environmental conditions. ForeFront R&P controls many broadleaf weeds. Application rate depends on weed species and stage of growth. Follow main label and supplemental label restrictions for grazing, forage and manure management.

**Caution** Do not let spray drift onto desirable vegetation; many forbs (desirable broadleaf plants in pastures) will be seriously injured or killed. Do not exceed the broadcast rate of 2.6 pints/A ForeFront R&P per year. Do not use on grasses grown for seed or grasses grown for hay intended for export. Do not use treated plant residues for compost.

**Site of action** Group 4: synthetic auxins

**Chemical family** (aminopyralid) Pyridine; (2,4-D) Phenoxy acetic acid

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### **aminopyralid + triclopyr (Capstone Herbicide)**

**Rate** 0.05 to 0.075 lb ae/A aminopyralid + 0.5 to 0.75 lb ae/A triclopyr (4 to 6 pints/A)

**Time** Apply to actively growing broadleaf weeds. Consult label for application rates for specific weeds.

**Remarks** A nonionic surfactant applied at 0.25 to 0.5% v/v of spray enhances control under adverse environmental conditions. Capstone controls many broadleaf weeds and woody species. Application rate depends on weed species and stage of growth. Follow detailed supplemental label, preharvest intervals and main label restrictions for grazing, forage and manure management.

**Caution** Do not let spray drift onto desirable vegetation; many forbs (desirable broadleaf plants in pastures) will be seriously injured or killed. Do not use treated plant residues for compost.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridines

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### **carfentrazone (Aim EC)**

**Rate** 0.0078 to 0.031 lb ai/A (0.5 to 2 fl oz/A Aim EC)

**Time** Apply to seedling grass pastures (at least 5 leaves) or established grass pastures up to the boot growth stage, and when broadleaf weeds are less than 6 inches tall.

**Remarks** The use of a nonionic surfactant, crop oil concentrate, or methylated seed oil is required. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v or AMS at 2 to 4 lb/A, in addition to the nonionic surfactant, COC, or MSO.

**Caution** There are no feeding or grazing restrictions following applications of Aim. Do not make applications less than 7 days apart or make more than 3 applications per growing season. Do not exceed a total of 5.9 oz/A per growing season.

**Site of action** Group 14: protoporphyrinogen oxidase (PPO) inhibitor

**Chemical family** Triazinone

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### **chlorsulfuron (Telar XP and others)**

**Rate** 0.19 to 1.0 oz ai/A (0.25 to 1.33 oz/A Telar XP)

**Time** Apply preemergence or postemergence to actively growing weeds.

**Remarks** Controls a wide range of broadleaf weeds. For best postemergence application results, apply with a nonionic surfactant. For perennial weed control, the best control occurs when applications are made at the bud to bloom stage or fall rosette growth stage. For annual weeds, apply at the seedling growth stage. There are no grazing restrictions for any livestock, including lactating animals, with application rates of 1 oz ai/A (1.33 oz/A) or less.

**Caution** Do not allow drift to desirable vegetation. Telar XP injures or kills desirable forbs including broadleaf forage species such as clovers and alfalfa. Bluegrass, bromes, orchardgrass and wheatgrasses tolerate rates of 0.25 to 1.0 oz/A. Fescue, bluestems, lovegrasses and wildrye tolerate rates of 0.25 to 0.5 oz/A. In general, apply to only well-established forage grasses. Do not apply more than 1.33 oz/A of Telar XP per year to pastures.

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

**Chemical family** Sulfonylurea

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### **clopyralid + 2,4-D (Curtail)**

**Rate** 0.19 to 0.38 lb ae/A clopyralid + 1 to 2 lb ae/A 2,4-D (2 to 4 quarts/A Curtail)

**Time** Apply to grass pastures when broadleaf weeds are actively growing.

**Remarks** Controls many broadleaf weeds. Application rate depends on weeds to be controlled and density of the infestation. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage, and before flower stalks become apparent.

**Caution** Do not allow to drift onto desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants, particularly legumes) can be seriously injured or killed. Do not graze lactating dairy cattle in treated areas for 14 days after application. Do not cut for hay within 7 days of application. Wait at least 2 weeks after application to graze animals scheduled for slaughter in 7 days or less. Do not use hay or straw from treated areas for composting or mulching. Note label restrictions on overseeding or reseeding.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (clopyralid) pyridine; (2,4-D) phenoxy acetic acid

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### **dicamba + 2,4-D (Weedmaster, Pasturemaster, or Latigo)**

**Rate** 0.5 to 4 pints/A Weedmaster or Pasturemaster, or 0.33 to 2.5 pints/A Latigo, depending on weed species and size at application

**Time** Depends on target weeds; see label. In general, apply to grass pastures when annual and biennial broadleaf weeds are small and actively growing, and established perennials are at bud stage.

**Remarks** Controls broadleaf weeds. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage, before flower stalks are apparent. Unless label indicates otherwise, spray perennial weeds while still seedlings (coming from seed), or wait until bud stage of growth.

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) can be seriously injured or killed. For Weedmaster and Latigo, do not graze lactating dairy cattle in treated areas for 7 days after application. Do not cut for hay for lactating dairy animals within 37 days of application. Do not permit animals being finished for slaughter to graze treated fields within 30 days of slaughter. For Pasturemaster, do not graze dairy animals on treated areas until 21 days after application of 1 gal (1 lb ai/A) or 40 days for up to 2 gal (2 lb ai/A). Remove meat animals from treated areas 30 days prior to slaughter. Do not cut grass hay within 51 days of application of 1 gal (1 lb ai/A) or within 70 days for up to 2 gal (2 lb ai/A). Note label restrictions on overseeding or reseedling.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (dicamba) benzoic acid; (2,4-D) phenoxy acetic acid

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### **dicamba + diflufenzopyr (Distinct, Overdrive)**

**Rate** 4 to 8 oz/A

**Time** Apply to grass pastures when annual and biennial broadleaf weeds are small and actively growing. Can also be applied in the fall to senesced knapweed species for control the following spring.

**Remarks** Controls broadleaf weeds. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage, before flower stalks are apparent.

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) and legumes can be seriously injured or killed by applications. Use with a nonionic surfactant or methylated seed oil to maximize weed control efficacy. There are no feeding or grazing restrictions when using these products.

**Site of action** (dicamba) Group 4: synthetic auxin; (diflufenzopyr) Group 19; auxin transport

**Chemical family** (dicamba) benzoic acid; (diflufenzopyr) semicarbazone

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### **dicamba + halosulfuron (Yukon)**

**Rate** 4 to 8 oz/A

**Time** Apply to grass pastures when annual and biennial broadleaf weeds and yellow nutsedge are small and actively growing.

**Remarks** Controls broadleaf weeds and yellow nutsedge. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage, before flower stalks are apparent.

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) and legumes can be seriously injured or killed by Yukon herbicide. Use with a nonionic surfactant or methylated seed oil to maximize weed control efficacy. There are no grazing restrictions when using Yukon. The preharvest interval for grass forage production is 37 days. Do not apply more than 8 oz of Yukon per year.

**Site of action** (dicamba) Group 4: synthetic auxin; (halosulfuron) Group 2; acetolactate synthase (ALS) inhibitor

**Chemical family** (dicamba) benzoic acid; (halosulfuron) sulfonyleurea

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### **fluroxypyr (Vista XRT and others)**

**Rate** 0.13 to 0.48 lb ae/A (6 to 22 oz/A Vista XRT)

**Time** Apply to established grasses when broadleaf weeds and woody brush species are actively growing in noncropland areas, including grazed sites within those areas.

**Remarks** Only weeds emerged at the time of application will be controlled. Optimum weed control efficacy will occur when applications are made in warm conditions, with ambient temperatures of 55° to 85°F. Use the lower rates on broadleaf weeds less than 4 inches tall. There are no grazing restrictions for lactating or nonlactating dairy animals.

**Caution** Do not exceed 22 oz/A of Vista XRT per growing season. Preharvest interval is 7 days for hay or silage. Remove meat animals from treated forage at least 2 days before slaughter.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### **glyphosate (several products)**

**Rate** Consult label. Several concentrations of glyphosate are available.

**Time** Depends on weed or brush species to be controlled. Annual weeds are best controlled when small and actively growing. Apply to perennial weeds at or beyond full flower, or in late summer, or fall after seed forms but before a killing frost.

**Remarks** Controls susceptible grass and broadleaf plants including many desirable grasses and forbs. Use as a spot treatment, treating up to 10% of any area. Repeat applications can be made in the same area at 30-day intervals. Glyphosate is nonselective and may control all vegetation present, so consider reseeding the areas treated.

**Caution** Will kill forage plants on contact; do not allow drift onto desirable vegetation. Remove livestock before applying, and do not graze or harvest for 14 days after application. Do not exceed 6 lb ae/A or 8 lb ai/A per year.

**Site of action** Group 9: inhibits EPSP synthase

**Chemical family** None generally accepted

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### **halosulfuron (Sandea)**

**Rate** 0.03 to 0.06 lb ai/A halosulfuron (0.66 to 1.33 oz/A Sandea)

**Time** Apply to pasture when yellow nutsedge is small and actively growing.

**Remarks** Controls yellow nutsedge. May be applied as a postemergence broadcast application or as a spot treatment. A second spot treatment may be necessary to control yellow nutsedge. Use with a nonionic surfactant or methylated seed oil to maximize weed control efficacy.

**Caution** Do not apply more than 1.33 oz of Sandea per year. There are no grazing restrictions following Sandea applications. Forage preharvest interval is 37 days.

**Site of action** Group 2; acetolactate synthase (ALS) inhibitor

**Chemical family** Sulfonyleurea

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### **MCPA (several products)**

**Rate** 1 to 1.85 lb ae/A (2.16 to 4 pints/A Shredder or other MCPA-4 formulations)

**Time** Apply to annual broadleaf weeds when small and actively growing. Spray perennials in early-bud to full-bloom stage and during regrowth in fall.

**Remarks** Controls certain annual broadleaf and perennial weeds in grass pastures.

**Caution** Do not graze dairy animals or meat animals intended for slaughter for 7 days after treatment. Preharvest interval is 21 days for hay. Do not use this treatment if alfalfa is present and desired. Do not use if temporary injury to clovers cannot be tolerated. Do not use on newly seeded areas until grass is well established. Do not use from early boot to milk stage if grass seed production is desired.

**Site of action** Group 4: synthetic auxin

**Chemical family** Phenoxy acetic acid

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### **metsulfuron (Escort XP and others)**

**Rate** 0.06 to 0.6 oz ai/A (0.1 to 1.0 oz/A Escort XP)

**Time** Apply to actively growing weeds.

**Remarks** Consult labels, which differ significantly. Information for Escort XP is provided by supplemental labels (Section 2(ee) recommendation for pastures). Controls a wide range of broadleaf weeds. For best results, apply with a nonionic or silicone surfactant. No grazing restrictions for any livestock, including lactating animals, with application rates of 1 oz ai/A (1.67 oz/A) or less. Note restrictions on timothy, fescue, and ryegrass pastures. Note recropping intervals.

**Caution** Do not allow drift to desirable vegetation. Injures or kills desirable forbs. Do not apply more than 1.67oz/A of Escort XP per year.

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

**Chemical family** Sulfonylurea

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### **pendimethalin (Prowl H2O)**

**Rate** 1.0 to 4.0 lbs ai/A (1.1 to 4.2 quarts/A Prowl H2O)

**Time** Apply to established stands of cool season forage grasses or mixtures with alfalfa prior to germination of annual grass and broadleaf weeds in fall, winter or spring.

**Remarks** Controls dodder, most annual grasses, and certain broadleaf weeds as they germinate, but will not control established weeds. Application rate varies with soil texture. Chemigation applications are labeled.

**Caution** Sequential applications may be made, but do not apply more than 4.2 quarts/A per year. Refer to main labels for crop rotation restrictions. There are no harvest or grazing restrictions following applications to pure grass stands, but do not harvest or graze for 14 days following application to mixed stands of grasses and alfalfa.

**Site of action** Group 3: microtubule assembly inhibitor

**Chemical family** Dinitroaniline

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### **picloram (Tordon and several others)**

**Rate** 0.06 to 0.5 lb ae/A

**Time** Apply to established grasses when weeds are growing well.

**Remarks** To control many annual and perennial broadleaf weeds and woody plant species.

**Caution** **A restricted-use herbicide.** Legumes are highly sensitive to picloram.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### pyraflufen (Venue)

**Rate** 0.0026 to 0.0046 lb ai/acre (2.0 to 3.5 oz/A)

**Time** Apply to broadleaf seedling weeds that are less than 4 inches tall or less than 3 inches in diameter if in the rosette stage. Thorough, uniform spray coverage is essential for good control of broadleaf weeds.

**Remarks** For postemergence broadleaf weed control in improved pastures. May be tank mixed with the synthetic auxin herbicides to broaden the weed control spectrum. Always apply with a methylated seed oil or nonionic surfactant at a rate of 0.5% v/v for optimum activity.

**Caution** Do not exceed two applications per season. Allow a minimum of 14 days between applications. Do not apply more than 7 oz/A per season. Livestock may graze treated area as soon as foliage is dry after application.

**Site of action** Group 14: protoporphyrinogen oxidase (PPO) inhibitor

**Chemical family** Phenylpyrazole

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### quinclorac (Paramount or Facet L)

**Rate** 0.14 to 0.75 lb ai/A (3 to 16 oz/A Paramount or 12 to 64 oz/A Facet L)

**Time** For the control and suppression of broadleaf perennial weeds and some broadleaf annual species. For field bindweed control apply in fall, but before a killing frost. Field bindweed should be actively growing and at least 4 inches long. Repeat applications are necessary to maintain adequate control.

**Remarks** May be used on Kentucky bluegrass, orchardgrass, annual and perennial ryegrass, and fine and tall fescue pasture mixes as well as other cool season grasses listed on the label. Adequate soil moisture and/or light rain after application is required for root uptake. Adding methylated seed oil or crop oil concentrate is required for consistent control. Nitrogen solutions or ammonium sulfate can be added to enhance control but should not replace the MSO or COC.

**Caution** Do not harvest treated area for hay within 7 days of treatment.

**Site of action** Group 4: synthetic auxin

**Chemical family** Quinoline carboxylic acid

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### saflufenacil (Sharpen)

**Rate** 0.022 to 0.045 lb ai/A (1 to 2 fl oz/A Sharpen)

**Time** Apply only to established stands (defined as grass planted in fall or spring that has gone through a first cutting/mowing) of perennial cool-season forage grasses to control annual broadleaf weeds.

**Remarks** A methylated seed oil is required for maximum efficacy. See Sharpen label for more information on adjuvants and tank-mixes. There are no grazing or feeding restrictions following applications of Sharpen.

**Caution** Do not exceed 6 fl oz/A per year. Sharpen may cause transitory injury to forage grasses (leaf necrosis) under certain conditions, but new growth is normal and vigor is not reduced. Sharpen will severely injure or kill some desirable broadleaf forages including clovers.

**Site of action** Group 14: protoporphyrinogen oxidase (PPO) inhibitor

**Chemical family** Pyrimidinedione

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### sulfosulfuron (Outrider)

**Rate** 0.035 to 0.062 lb ai/A (0.75 to 1.33 oz/A Outrider)

**Time** Apply postemergence in the spring or fall to actively growing weeds.



**Remarks** Controls select annual grasses and a range of broadleaf weeds. Review label for list of weed species controlled and information on grass species selectivity. Always apply Outrider with a nonionic surfactant. There are no grazing restrictions for any livestock, but for best weed control efficacy do not mow or graze the treated pasture for 2 weeks prior to or after application.

**Caution** This product is selective in crested wheatgrass, and selectivity in other pasture grasses is increased when they are not actively growing. If concerns exist about selectivity on desirable pasture grasses, a small area of the pasture should be treated to confirm selectivity prior to treating entire pasture.

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

**Chemical family** Sulfonylurea

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### **triasulfuron (Amber)**

**Rate** 0.21 to 0.42 oz ai/A (0.28 to 0.56 oz/A) Amber

**Time** Apply preemergence (for partial control of downy brome and cheat at the 0.56-oz/A rate) or postemergence to actively growing weeds.

**Remarks** Controls a wide range of broadleaf weeds when tank mixed with herbicides having another mode of action. See Amber label for tank-mix recommendations for specific weed species. For best postemergence application results, apply with a nonionic surfactant.

**Caution** See label for list of tolerant forage grass species. Orchardgrass, red fescue (fine fescues) and ryegrasses are likely to be injured by Amber. In general, apply to only tolerant grasses which have been established for at least 60 days. Amber Injures or kills desirable forbs including broadleaf forage species, such as clovers and alfalfa. There are no grazing restrictions, but do not harvest treated areas as hay for 30 days following applications of Amber.

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

**Chemical family** Sulfonylurea

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### **triclopyr (Garlon and several other products)**

**Rate** 0.75 to 2 lb ae/A (1 quart to 0.66 gal/A product)

**Time** Apply to grass pastures when broadleaf weeds and woody plants are actively growing.

**Remarks** Adjust rate for type of vegetation to be controlled. Controls both emerged herbaceous and woody broadleaf plants. To control biennial thistles or other biennial species, apply before flower stalks appear. Add an approved nonionic surfactant to the spray mix.

**Caution** Do not allow drift to desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not allow grazing or harvest green forage for lactating dairy animals from treated areas during the same growing season after application. Withdraw livestock from grazing treated grass at least 3 days before slaughter during the season of application. Preharvest interval is 14 days for hay.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### **triclopyr + 2,4-D (Crossbow and others)**

*May not be applied to forage that will be cut and sold for commercial purposes*

**Rate** 1% to 1.5% solution for spot treatments or up to 1 gal/A, depending on target weeds.

**Time** Apply to grass pastures when broadleaf weeds are actively growing.

**Remarks** May not be applied to forage that will be cut and sold for commercial purposes. Controls many broadleaf weeds. The smaller the annual weeds, the easier they are to control. Spray biennial weeds in the seedling to rosette stage, before flower stalks are apparent. This herbicide mixture is also very effective on a number of woody species.

**Caution** Do not allow to drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Note restrictions on label, particularly for grazing lactating dairy cattle, and for overseeding or reseeding.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (triclopyr) pyridine; (2,4-D) phenoxy acetic acid

# Weed Control in Pasture and Rangeland

Tim Prather and John Spring

*Revised March 2022*

Controlling undesirable plants on pasture and rangeland is an important part of an overall range management program. Undesirable plants use space, moisture, and nutrients that could be put to better use producing forage for grazing animals and wildlife. Poisonous plants are an additional threat to animal health and productivity.

Weed and brush control are not in themselves range management, but are merely tools available to the manager. Long-term control of undesirable plants usually requires more intensive management. In most cases, undesirable plants are able to proliferate as a result of fire, poor grazing management, or other disturbances that degrade pasture and rangeland. It is usually futile to try to control undesirable plants without improving management to reduce or remove these underlying stressors.

**Other methods:** Methods that have a definite place in range management are: chemical, roto-beating, plowing, disking, raiing, chaining, burning, reseeding, and changes in grazing schedules. There are specific sites and reasons for use of these controls. Each is effective if used properly. Well planned combinations of control methods applied in an integrated management system are more effective than any single method alone. In designing a management plan, obtain as much specific, locally relevant expert knowledge as possible. Ideally, consult a range of experts with different perspectives and combine input to develop a strategy that will work for conditions and management objectives of the particular land unit in question.

**Safety and toxicity hazard:** The toxicity of chemicals used in range weed control is generally very low. No evidence of direct damage to animals is available as a result of proper use of currently labelled herbicides. However, take all precautions to prevent drift and damage to susceptible plants in the vicinity.

**Methods of chemical application:** Methods of application depend on the species, terrain, and size of the area. In most extensive range weed control projects, the herbicide is applied by aircraft, either fixed-wing or helicopter. However, ground equipment is also used successfully. On small areas and for spot treatments, ground or hand equipment is often most economical.

Some pastures contain poisonous plants. Grazing livestock normally do not eat many poisonous plants, but sometimes the composition of plants change after spraying. This can make some plants more palatable. Do not graze pastures known to have poisonous plants for at least 3 weeks after spraying.

Spot-spray to control perennial weeds in pastures. Follow recommendations to control specific weeds.

Many crops are grazed or used for pasture. When areas not generally defined as pasture are to be grazed, examine the herbicide label to determine what grazing restrictions apply before using the herbicide.

**Caution:** This handbook is not intended as a complete guide to herbicide use. Before using any chemical, read the label on the container. Before a chemical can be recommended for a specific use, it must be thoroughly tested. The recommendation on the manufacturer's label, when followed, can prevent many problems arising from the wrong use of a chemical.

**A note on generic products:** *Many active ingredients are no longer under patent protection of the original registrant and are available under multiple trade names from different manufacturers. Pricing can vary meaningfully between trade names, as can active ingredient concentration, surfactant loading, and other formulation characteristics. Trusted retailers and consultants should be able to assist in identifying and comparing competing formulations of the same active ingredient. Several free, online search tools also facilitate searching and comparing formulations by active ingredient, and trade name including those from Agrian, CDMS, Farmers Business Network, and Greenbook. In the following section, a limited number of trade names are presented per active ingredient for general reference. If generic products are available for an active ingredient, 'several products' or 'several others' is used to indicate the availability of other commercial formulations.*

**A note on premix products:** *Many herbicide formulations for use in range and pasture include various combinations of two or more active ingredients. In most cases, these active ingredients are also available as stand-alone formulations. In the following listing, only stand-alone formulations are considered, unless an active ingredient is only commercially available in a premix product. A table of premix formulations is included at the end of the section, and includes many popular herbicide formulations and trade names used in range and pasture.*

## Herbicides to Reduce Weed Problems

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### 2,4-D (several products)

**Rate** 0.475 to 2 lb ae/A

**Time** Spray when annual weeds are small and actively growing. Treat perennial weeds at the specific growth stage(s) described on the label.

**Remarks** Controls many annual, biennial, and perennial broadleaf weeds in rangeland and grass pastures. Also controls or suppresses certain brushy species, including sagebrush, rabbitbrush, manzanita, and some chaparral species. Deep-rooted perennial weeds and woody plants usually require repeated applications for maximum control. See specific product label for rates for various weed species and for proper application timing. Multiple forms of 2,4-D are currently available, including choline, acid, amine, and ester salts. Different formulations vary substantially in volatility and risk for off-site vapor movement. Relative volatility risks are: very low (choline and acid formulations), low (amine) and high (ester, including 'low volatility' esters, which are only low volatility relative to now-obsolete and extremely volatile historic formulations of 2,4-D). Use choline or acid formulations in proximity to sensitive sites or crops, particularly during warm temperatures. Use of 2,4-D is tightly regulated during much of the growing season in many counties in eastern Washington. See product labeling and retail support for details on particular products. 2,4-D is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** Do not apply if spray drift may contact nearby crops or desirable plants or contaminate water for irrigation or domestic use. Do not graze meat animals within 3 days of slaughter. Do not graze dairy animals within 7 days after application. Do not cut hay within 30 days after application. Do not use on bentgrass, alfalfa, clover or other legumes, or on newly seeded pasture. When grass seed production is desired, do not apply after heading begins or when grass is in the boot to milk stage. Kills legumes.

**Site of action** Group 4: synthetic auxin

**Chemical family** Phenoxy acetic acid

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### aminopyralid (Milestone, Whetstone)

**Rate** 0.005 to 0.11 lb ae/A (3 to 7 oz/A Milestone)

**Time** Apply postemergence to actively growing plants or in the fall over senesced Russian knapweed plants or preemergence or postemergence for marestalk control.

**Remarks** Controls a range of broadleaf weeds, including many in the sunflower and legume families. No restrictions on grazing or hay harvest. Surfactants have similar effects in combination with aminopyralid. Generally less injurious to desirable forbs than other synthetic auxin herbicides. Aminopyralid is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** Do not exceed a total of 0.11 lb ae/A (7 oz/A of Milestone) per year. For spot treatments, aminopyralid may be applied at an equivalent broadcast rate of up to 0.22 lb ae/A (14 oz/A Milestone), but no more than 50% of an acre may be treated at this rate. Allow 3 days after grazing on aminopyralid-treated forage before moving grazing animals to areas with plants sensitive to aminopyralid. Do not use plant residues that were treated within 3 days before harvest for compost or mulch that will be applied to susceptible broadleaf plants. Hay cannot be moved off farm if treated with aminopyralid in the preceding 18 months, unless specifically permitted by supplemental labels; see label for details.

**Site of action** Group 4: synthetic auxin

**Chemical family** (aminopyralid) Pyridine; (2,4-D) Phenoxy acetic acid

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### aminopyralid + floryrauxifen-benzyl (DuraCor)

**Rate** 1 oz ae/A aminopyralid + 0.01 oz ae/A floryrauxifen-benzyl to 1.66 oz ae/A aminopyralid + 0.17 oz ae/A floryrauxifen-benzyl (12 to 20 oz/A DuraCor). Recommended rate varies by target species and growth stage, see label for details.

**Time** Apply to small actively growing weeds for best results. Use higher rates for larger weeds or stressful conditions, and for improved soil residual persistence. Apply only to well-established perennial grasses, some species may be tolerant to earlier applications, see label for full details.

**Remarks** Floryrauxifen-benzyl improves control of several species not well controlled by aminopyralid alone (Milestone), and increases soil residual. Can be used to treat terrestrial weeds up to the water's edge and in some seasonally dry wetland sites, see

label for full restrictions.

**Caution** Do not apply more than 20 oz/A DuraCor per year. Spot treatments may be made at up to twice this rate, provided no more than 50% of an acre is treated at the higher rate. Do not make more than 2 applications per year, or re-treat within 30 days. Do not transfer animals fed on treated grasses to areas in which sensitive broadleaf crops may occur without a 3-day waiting period on untreated pasture. Both active ingredients can accumulate and persist in manure and damage sensitive plants for years after application. See label for full restrictions on use and movement of manure when animals are fed treated forages. Do not use grasses treated with aminopyralid + florypyrauxifen in the preceding 18 months for hay intended for export outside the US. Unless specifically allowed by supplemental labelling, the following uses of hay treated within the preceding 18 months are prohibited: distribution or sell off of the farm or ranch where harvested; use in silage, haylage, baleage and/or green chop; use of hay or manure from animals fed treated hay in compost; and use of treated grasses for seed production. Do not use where damage to legumes or other desirable broadleaves cannot be tolerated. Do not rotate to any crop for at least 1 year after application, restrictions vary slightly between products. See label for specifics.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (both) Pyridine

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### **aminopyralid + florypyrauxifen-benzyl (TerraVue)**

**Rate** 0.18 oz ae/A aminopyralid + 0.02 oz ae/A florypyrauxifen-benzyl to 0.26 oz ae/A aminopyralid + 0.24 oz ae/A florypyrauxifen-benzyl (2 to 2.85 oz/A TerraVue). Recommended rate varies by target species and growth stage. See label for details.

**Time** Apply to small actively growing weeds for best results. Use higher rates for larger weeds or stressful conditions, and for improved soil residual persistence. Apply only to well-established perennial grasses, some species may be tolerant to earlier applications. See label for full details.

**Remarks** Florypyrauxifen-benzyl improves control of several species not well controlled by aminopyralid alone (Milestone), and increases soil residual. Can be used to treat terrestrial weeds up to the water's edge and in some seasonally dry wetland sites. See label for full restrictions.

**Caution** Do not apply more than 2.85 oz/A TerraVue per year unless attempting total vegetation control and then do not apply more than 5.7 oz/A TerraVue per year. If spot treatment is needed after a broadcast application, wait at least 30 days and spot treatment can be 2 to 5.7 oz/A TerraVue provided no more than 50% of an acre is treated at this higher rate. Do not transfer animals fed on treated grasses to areas in which sensitive broadleaf crops may occur without a 3-day waiting period on untreated pasture. Both active ingredients can accumulate and persist in manure and damage sensitive plants for years after application. See label for full restrictions on use and movement of manure when animals are fed treated forages. Do not use grasses treated with aminopyralid + florypyrauxifen in the preceding 18 months for hay intended for export outside the US. Unless specifically allowed by supplemental labelling, the following uses of hay treated within the preceding 18 months are prohibited: distribution or sell off of the farm or ranch where harvested; use in silage, haylage, bailing and/or green chop; use of hay or manure from animals fed treated hay in compost; and use of treated grasses for seed production. Do not use where damage to legumes or other desirable broadleaves cannot be tolerated. Do not rotate to any crop for at least 1 year after application, restrictions vary slightly between products. See label for specifics.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (both) Pyridine

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### **aminopyralid + metsulfuron (Chaparral)**

**Rate** 1 to 3.3 oz/A

**Time** Apply postemergence to actively growing plants or in the fall over senesced Russian knapweed plants or preemergence or postemergence for mare's tail control.

**Remarks** Controls a range of broadleaf weeds, including many in the sunflower and legume families. In general, 2 oz/A controls most pasture weeds with lower rates (< 2 oz/A) effective on annual weeds and higher rates (>2 oz/A) effective on woody weeds. No restrictions on grazing or hay harvest. Surfactants have similar effects in combination with aminopyralid.

**Caution** Do not exceed 3.3 oz/A of Chaparral in 1 year. Allow 3 days after grazing on Chaparral-treated forage before moving grazing animals to areas with plants sensitive to aminopyralid. Do not use plant residues that were treated within 3 days before

harvest for compost or mulch that will be applied to susceptible broadleaf plants.

**Site of action** aminopyralid Group 4: synthetic auxin; metsulfuron-methyl Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (aminopyralid) Pyridine; (metsulfuron) Sulfonylurea

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### **carfentrazone (Aim EC)**

**Rate** 0.008 to 0.03 lb ai/A (0.5 to 2 oz/A Aim EC)

**Time** Apply postemergence to small (less than 4 inches tall) actively growing broadleaf weeds.

**Remarks** Controls corn spurry, a species not listed on many labels of herbicides used in pasture. Provides contact, foliar burn-down activity of small broadleaf weeds only. Full coverage essential for good activity. Use of nonionic surfactant (NIS), crop oil concentrate (COC), or methylated seed oil (MSO) is required. Inclusion of a liquid sprayable nitrogen fertilizer at 2 to 4% v/v or ammonium sulfate at 2 to 4 lb per acre is allowed and recommended for best activity. For optimal control, especially of larger weeds, tank mix with a systemic herbicide.

**Caution** No preharvest interval required. Allow at least 7 days between applications. Do not exceed three applications or 0.093 lb ai/A (5.9 oz/A Aim) per season.

**Site of action** Group 14: protoporphyrinogen oxidase inhibitor

**Chemical family** Triazinone

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### **chlorsulfuron (Telar XP)**

**Rate** 0.01 to 0.06 lb ai/A (0.25 to 1.33 oz/A Telar XP)

**Time** For perennial weeds, apply at budding or flowering stage or in fall at rosette stage. Apply early in life cycle of annual weeds.

**Remarks** Bluegrass, bromes, orchardgrass, and wheatgrasses tolerate rates of 0.25 to 1 oz/A. Fescue, bluestems, lovegrasses, and wild rye tolerate rates of 0.25 to 0.5 oz/A. Apply only to established grasses. Perennial grasses vary in their tolerance to chlorsulfuron; see label for species-specific tolerances and recommended rates, and for reseeding intervals. Chlorsulfuron applied before flowering can reduce seed head development of cool-season grasses. Chlorsulfuron is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** Stressed grasses may be injured. No grazing or harvest restrictions for applications up to 0.06 lb ai/A (1.33 oz/A Telar XP). Do not exceed 0.047 lb ai/A (1 oz/Ac Telar XP) in a single application. Do not make more than 3 separate applications per acre per year, or apply with less than 14 days between applications. Do not exceed 0.06 lb ai/A (1.33 oz/A Telar XP) per year. Incompatible with most desirable broadleaf species. Clean sprayer per label instructions immediately after spraying, and/or at the end of every day.

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

**Chemical family** Sulfonylurea

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### **clopyralid (Stinger, Transline, several others)**

**Rate** 0.12 to 0.5 lb ae/A (0.33 to 1.33 pints/A Transline)

**Time** Apply to young, actively growing weeds. Established grasses are tolerant. Apply to Canada thistle after most basal leaves have emerged but before bud stage, or to fall regrowth following first light frost of the season. Apply to diffuse and spotted knapweeds from mid bolt to late bud stage, to Russian knapweed from bud to mid flower, and to yellow starthistle from rosette to mid-bolting.

**Remarks** May be tank mixed with 2,4-D for expanded spectrum of activity. Grasses may be planted any time after application. Clopyralid is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** Apply only once in a 12-month period. Do not allow drift to crops. Do not spray pastures if forage legume component is desired. See label restrictions on planting crops into treated areas, and for restrictions on treating grass hay for international export. Before moving livestock from treated site into sensitive crop areas, allow 7 days of grazing on an untreated pasture.

**Site of action** Group 4: synthetic auxin

### clopyralid + 2,4-D (Curtail)

**Rate** 2 to 4 quarts/A

**Time** Apply when weeds are young and actively growing.

**Remarks** Use 2 quarts/A on light to moderate infestations of Canada thistle and knapweeds (spotted and diffuse) in good growing conditions. Use 3 quarts/A for dense infestations or under poor growing conditions. On Russian knapweed, use 3 to 4 quarts/A.

**Caution** Do not plant grasses for 30 days after application. Do not use on newly seeded grass areas until grass is well established. Do not use on bentgrass. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. Do not use hay or straw from treated area for composting or mulching on susceptible broadleaf crops. Do not graze dairy cattle in treated area for 14 days after application. Remove meat animals from area 7 days before slaughter if pasture was treated less than 2 weeks earlier. Do not cut for hay within 30 days after application. Do not use straw or manure from treated areas for compost or mulch.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (clopyralid) pyridine; (2,4-D) phenoxy acetic acid

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### dicamba (Clarity, Vanquish, several others)

**Rate** 0.25 to 1 lb ae/A, depends on weed species and growth stage.

**Time** Apply after weeds emerge. Treat annuals when small and actively growing. See label for proper timing and rates on perennials.

**Remarks** Controls many annual, biennial, and perennial broadleaf weeds and many woody brush and vine species. Rate depends on weed species and growth stage at time of treatment; see label for specifics. Can be applied using water, oil-water emulsions, or sprayable fluid fertilizer as the carrier. May also be applied as a cut-surface treatment to control unwanted trees or to prevent sprouts on cut trees. Formulations of dicamba currently registered in rangeland have significant potential for volatilization and off site movement. Use appropriate caution in proximity to sensitive sites or crops, particularly during high temperatures. Use of dicamba is tightly regulated during much of the growing season in many counties in eastern Washington. See product labeling and retail support for details on managing volatility risk. Dicamba is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** No waiting period between treatment and grazing non-lactating animals (see label for timing restrictions on dairy animals). Meat animals must be removed from treated areas 30 days before slaughter. Rates over 2 lb ai/A may temporarily injure many grass species. Newly seeded grasses (see label) may be injured at rates exceeding 0.75 lb ae/A. Do not exceed 8 lb ae/A per season. Kills legumes.

**Site of action** Group 4: synthetic auxin

**Chemical family** Benzoic acid

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### dicamba + 2,4-D (Weedmaster or Pasturemaster)

**Rate** 0.5 to 4 pints product/A

**Time** When weeds are actively growing.

**Remarks** For pasture, range, and non-cropland. Spot spraying rates can go as high as 6 pints/A; see label for weeds controlled at higher rates.

**Caution** Do not apply when grass is in boot stage. See label for grazing restrictions.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (dicamba) benzoic acid; (2,4-D) phenoxy acetic acid

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### dicamba + diflufenzopyr (Overdrive, Distinct)

**Rate** 0.125 to 0.25 lb ae dicamba + 0.05 to 0.1 lb/A diflufenzopyr (4 to 8 oz/A Overdrive)

**Time** Apply postemergence to actively growing plants. May also be applied to Russian knapweed in the fall over senesced plants. May be applied pre- or post-emergence for marestalk control.

**Remarks** Controls a range of broadleaf weeds with lower rates used on annual weeds and higher rates on perennial weeds. Will injure desirable legumes. Use a nonionic surfactant or methylated seed oil. Diflufenzopyr can complement the activity of other synthetic auxin herbicides when tank mixed, See label for specific recommendations.

**Caution** Do not exceed 0.25 lb ae dicamba + 0.1 lb ae diflufenzopyr per acre (8 oz/A of Overdrive) per season. Do not plant any crop for 30 days after application. Grazing is allowed immediately after application.

**Site of action** (dicamba) Group 4: synthetic auxin; (diflufenzopyr) Group 19; auxin transport

**Chemical family** (dicamba) benzoic acid; (diflufenzopyr) semicarbazone

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### **fluroxypyr (Vista XRT, Starane Ultra, several others)**

**Rate** 0.13 to 0.5 lb ae/A (6 to 23 oz/A Vista)

**Time** Apply after weeds emerge and during period of active growth prior to bud stage.

**Remarks** Apply to established grasses and to new plantings that are in the two-true-leaf to boot stage of growth. Rates and allowed use sites vary between specific products. Consult specific labels to confirm. Fluroxypyr is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** No grazing restrictions for livestock, including lactating dairy animals. Preharvest interval for forage is 7 days. Do not feed treated forage for 2 days before slaughter for meat. Split applications may be made in a single year, provided maximum application rate is not exceeded. Do not exceed 0.5 lb ae fluroxypyr/A (23 oz/A Vista XRT) per year. May injure legumes and other broadleaf plants.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### **fluroxypyr + picloram (Surmount)**

**Rate** 1.5 to 2.5 pints/A (herbaceous) or 3 to 4 pints/A (woody)

**Time** Apply after weeds emerge. Apply low rate to actively growing, small weeds and up to 2 pints/A when weeds are dense or not growing well.

**Remarks** If applying before seeding new grass, wait 3 weeks before seeding. To new plantings, apply after grasses are tillering.

**Caution** Not registered for use in Oregon. Lactating dairy animals may not graze or be fed treated forage for 14 days after application. Do not feed treated forage for 3 days before slaughter for meat. No other livestock restrictions. Preharvest interval for hay is 7 days.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (both) pyridine

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### **fluroxypyr + triclopyr (PastureGard)**

**Rate** 1.5 to 3 pints/A (herbaceous) or 3 to 8 pints/A (woody)

**Time** Apply after weeds emerge and are still small, not after flower bud stage. Apply low rate to actively growing annual weeds and apply 2 to 3 pints/A to biennial or perennial weed species.

**Remarks** Do not use on bentgrass. Wait at least 3 weeks after application to reseed. Apply to new plantings after grasses are tillering.

**Caution** Do not exceed 8 pints/A in one growing season. Do not feed treated forages to lactating animals during the season of application. Do not feed treated forages for 3 days before slaughter for meat. Preharvest interval for hay is 14 days.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (both) pyridine



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### glyphosate (several products)

**Rate** 0.1875 to 3.75 lb ae/A

**Time** Annual weeds are best controlled when small and actively growing. Apply to actively growing perennial weeds at or beyond full flower. Results are best if applied in late summer or fall after fruit forms. Fall treatments must be before a killing frost.

**Remarks** Controls many annual and perennial weed species before renovating pastures. Rates depend on weed species, stage of growth, and density. Repeat treatments may be necessary to control weeds regenerating from underground parts or seed. May also be applied as a spot treatment or by wiper application to established pastures, but do not treat more than 10% of any acre at one time. Further applications may be made to the same area at 30-day intervals. Some glyphosate products are labelled for control of weeds in and around water and riparian areas; check specific labels for permissible uses and restrictions. Low rates of glyphosate can be applied during winter dormancy period of desirable perennials for control of cheatgrass and other winter annual grasses in some situations. See label for details.

**Caution** A nonselective herbicide that kills plants on contact with green tissue. Total treatments must not exceed 8 lb ai/A per year. Remove domestic livestock before application. Grazing and harvest restrictions vary by formulation; check product label for specific restrictions.

**Site of action** Group 9: inhibits EPSP synthase

**Chemical family** None generally accepted

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### halosulfuron (Sandea, several others)

**Rate** 0.03 to 0.06 lb ai/A (0.67 to 1.33 oz/A Sandea).

**Time** Postemergence to small weeds. See label for specific size recommendations per weed species.

**Remarks** For control of sedges (especially yellow nutsedge) and some broadleaf weeds in established grasses in range and pastures. Use of nonionic surfactant is recommended.

**Caution** Do not make more than 2 applications or apply more than 0.06 lb ai/A (1.33 oz/A Sandea) in a 12-month period. Spot treatments are limited to a rate of 0.75 oz/A per application, but 2 sequential spot applications may be made, treating only emerged sedges each time. No pre-grazing or pre-slaughter waiting period, including for lactating animals. Wait 37 days before mechanical harvest of treated forages.

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

**Chemical family** Sulfonylurea

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### hexazinone (Velpar DF VU, several others)

**Rate** Individual stem basal soil applications, up to maximum per-acre rate of 0.67 lb ai/A per year.

**Time** Apply to undesirable brush and woody plants from late winter through summer, pre-budbreak until new growth hardens off.

**Remarks** For control of herbaceous and woody weeds in range and pastures with basal directed applications only.

**Caution** Apply only as basal stem applications using exact-delivery handgun applicator. See specific product label for application directions and use restrictions. Injury to desirable trees or other plants may result if chemical is washed or moved into contact with their roots. Do not apply to frozen soils. No grazing or harvest restrictions when applied as basal soil application.

**Site of action** Group 5: photosystem II inhibitor

**Chemical family** Triazinone

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### imazapic (Plateau, Panoramic, several others)

**Rate** 0.0312 to 0.1874 lb ai/A (2 to 12 oz/A Plateau); see label for specific recommendations by weed species.

**Time** Annual weeds may be treated preemergence or early postemergence. Most reliable control of problematic winter annual grasses (cheatgrass, medusahead, ventenata, etc.) is obtained by early post-emergence applications made at the 1-to 2-leaf stage when adequate soil moisture is present and plants are actively growing. Apply to actively growing perennial weeds at or beyond full flower. Results are best if applied in late summer or fall after fruit forms. Leafy spurge can be sprayed before the latex stops

flowing in fall (test by breaking open a stem to see whether latex will ooze from the wound). Russian knapweed and Dalmatian toadflax can be controlled in late fall.

**Remarks** Spray adjuvant required for post-emergence applications. A combined surfactant + methylated seed oil provides best activity, but may increase potential for injury of vulnerable perennial grasses; see label for specific details. Rates vary by weed to be controlled and tolerance of desirable perennials present; see label for specifics. Generally, use lower rates (4 to 6 oz/A Plateau) for early-season annual weed control. Higher rates (8 to 12 oz/A Plateau) applied in late summer or fall are needed to control leafy spurge. Fall to early winter application at rates above 0.125 lb ai/A (8 oz/A Plateau) may injure establishing perennial grasses. Perennial grasses and forbs are known to vary considerably in their tolerance to imazapic at both seedling and established stages. See label for listing of tolerance ranges for specific species.

**Caution** Do not cut hay for 7 days after application. Do not exceed 0.1875 lb ai/A (12 oz/A Plateau) in a calendar year. Do not rotate treated pastures into crop production for 12 to 48 months depending on rate. See specific label for details.

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

**Chemical family** Imidazolinone

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### **imazapyr (Arsenal, several others)**

**Rate** For spot treatment only. Do not treat more than 10% of available area to be grazed or cut for hay. Apply 0.03 lb ae/Ac to 0.75 lb ae/A imazapyr (48 oz/A Arsenal)

**Time** Apply to small, actively growing weeds.

**Remarks** An adjuvant is required, nonionic surfactant (NIS), methylated seed oil (MSO) or silicone-based surfactant are all permissible. Invert emulsions can be used also. Has activity on many problematic weeds. Several formulations are labelled for use in certain riparian and aquatic sites; see specific labels for details. Many formulations are also labelled for single stem application to problematic woody species (cut stump and injection methods).

**Caution** Do not treat more than 10% of available area to be grazed or hayed. Do not apply more than 0.75 lb ae per acre per year. No grazing restrictions following application; do not cut forage grass for hay for 7 days after application. Do not plant rotational crops for 12 month following application, plus successful completion of field bioassay.

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

**Chemical family** Imidazolinone

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### **indaziflam (Rejuvra)**

**Rate** Grazed areas 0.046 to 0.065 lb ai/A (3.5 to 5 oz/A Rejuvra); areas not grazed or cut for hay 0.046 to 0.09 lb ai/A (3.5 to 7 oz/A Rejuvra). Use lower rates only where weed pressure is light and shorter period of residual activity is desired.

**Time** Apply at least several weeks prior to expected germination of targeted weeds. Apply to dry soils when rain is not expected for at least 48 hr. Can be successfully applied several months in advance of weed germination.

**Remarks** Indaziflam provides multiple years of pre-emergent control of germinating seeds of most species from a single application. Provides excellent control of winter annual grass weeds (e.g., cheatgrass, medusahead, feral rye, etc.). Indaziflam is safe over the top of most well-established perennial grasses, but see label for full details. Use only in areas in which desirable perennial grass stands are of adequate density to meet management goals for several years after application without any further plant recruitment. Do not expect to conduct successful seedings of desirable plants for several years after application. Pre-emergent activity only, use appropriate tank-mix partners if weeds have emerged prior to application. Does not control established perennial weeds.

**Caution** Adequate binding time on dry soil reduces risk of indaziflam moving into the root zone of desirable plants. Do not apply to or around water. Do not apply to saturated, frozen, or snowcovered ground. Do not harvest hay within 40 days of application. Do not exceed a maximum rate of 0.065 lb ai/A (5 oz/A Rejuvra) in a single application. On grazed areas, do not apply more than 0.078 lb ai/A (6 oz/A Rejuvra) in a 12-month period. Do not make more than 2 applications in a 12-month period. Allow at least 60 days between applications.

**Site of action** Group 29, inhibition of cellulose biosynthesis

**Chemical family** Alkylazine

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### **MCPA ester (Rhonox, several products)**

**Rate** 0.46 to 0.1.39 lb ae/A

**Time** Apply to annual broadleaf weeds when small and actively growing. Spray perennials in early-bud to full-bloom stage and during re-growth in fall.

**Remarks** Controls certain annual broadleaf and perennial weeds in grass pasture and rangeland, including hoary cress, and buttercup (multiple applications may be required for buttercup control).

**Caution** Do not apply more than a total of 1.5 lb ae/A per year. Do not apply more than 2 applications per year, with minimum reapplication interval of 21 days. Use of MCPA is tightly regulated during much of the growing season in many counties in eastern Washington. Do not graze for 7 days after treatment. Do not use this treatment on desirable alfalfa. Do not use if temporary injury to clovers cannot be tolerated. Do not use on newly seeded areas until grass is well established. Do not use from early boot to milk stage where grass seed production is desired.

**Site of action** Group 4: synthetic auxin

**Chemical family** Phenoxy acetic acid

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### **metsulfuron (Escort XP, several others)**

**Rate** 0.00375 to 0.0625 lb ai/A (0.1 to 1.67 oz/A Escort XP), depends on use site

**Time** Apply postemergence to actively growing weeds.

**Remarks** Controls a wide range of broadleaf weeds. For best results, use a nonionic or organosilicone surfactant. Use 0.00375 lb ai/A (0.1 oz/A Escort XP) for grass establishment and on seedling grasses, and rates of 0.012 to 0.0625 lb ai/A (0.33 to 1.67 oz/A Escort XP) for established grasses. Metsulfuron is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** Consult labels for each product; labels differ significantly. Perennial grass species vary in their tolerance to metsulfuron, see label for specific cautions and restrictions for use and for replanting intervals. Note recropping restrictions on label. No grazing restrictions at rates less than 0.0625 lb ai/A (1.67 oz/A Escort XP). Do not apply more than 0.0625 lb ai/A (1.67 oz/A Escort XP) per year on pasture, rangeland, or CRP. Metsulfuron is not safe for legumes or broadleaf plants. Rotation intervals to crop production can be lengthy, see label for specific crop information.

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

**Chemical family** Sulfonylurea

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### **metsulfuron-methyl + dicamba + 2,4-D (Cimarron Max)**

**Rate** 0.25 oz/A metsulfuron-methyl + 1 pint/A dicamba + 2,4-D to 1 oz/A metsulfuron-methyl + 4 pints/A dicamba + 2,4-D. The label tells how to select the use rate, given weed spectrum and sizes.

**Time** Apply pre- or post-emergence. Results are best if applied to young, actively growing weeds.

**Remarks** Cimarron Max is a co-pack with two components: 1) metsulfuron-methyl and 2) a combination of dicamba and 2,4-D at 1 lb ai/gal dicamba and 2.87 lb ai/gal 2,4-D.

**Caution** Weeds often are less susceptible after exposure to cold weather or drought.

**Site of action** (metsulfuron-methyl) Group 2: acetolactate synthase (ALS) inhibitor; (dicamba and 2,4-D) Group 4: synthetic auxin

**Chemical family** (metsulfuron-methyl) Sulfonylurea; (dicamba) Benzoic acid; (2,4-D) Phenoxy acetic acid

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### **pendimethalin (Prowl H2O, Satellite Hydrocap)**

**Rate** 1 to 4 lb ai/A (1.1 to 4.2 quarts/A Prowl H2O)

**Time** Apply prior to emergence of target weed(s).

**Remarks** Controls many annual grasses and broadleaf weeds as they germinate. Apply only to established grasses with more than 6 tillers per plant.

**Caution** Do not apply more than 4.2 quarts/A per year. May be applied in a single application or in sequential applications made

30 or more days apart. There is no preharvest or grazing interval for grass stands treated with Prowl H2O, other labels may differ. Do not graze or harvest for hay mixed stands of alfalfa/cool-season grasses within 14 days of treatment. Do not apply to mixed stands of cool-season grasses and legumes other than alfalfa. Do not apply if surface water is present in field.

**Site of action** Group 3: microtubule assembly

**Chemical family** Dinitroaniline

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### picloram (Tordon 22K, several others)

**Rate** 0.125 to 1 lb ae/A (8 to 64 oz/A Tordon 22K). Maximum allowable rate varies by application method and targeted weed,

**Time** Treat when weeds are growing actively, in the spring before full bloom, or in late summer or fall. Re-treat in subsequent years as needed.

**Remarks** Controls many troublesome perennial and woody weed species including thistles, yellow starthistle, leafy spurge, knapweeds, field bindweed, rabbitbrush, rush skeletonweed, and poison-oak. Rates depend on weed species and plant density. Do not apply at over seasonal maximum rate, which varies by application method and targeted weed; see specific product label for full restrictions. Not compatible with legumes or other desirable broadleaf plants. Applicators using backpack or other handheld equipment often inadvertently apply well over the intended, labeled rate of this product when spot-treating scattered plants or small patches of broadleaf weeds. When this occurs, perennial grasses may be severely damaged or killed in over-treated patches, and injury can persist for many years after treatment. Take particular care to avoid this when spot applying – calibrate equipment and do not spray past the point of leaf wetting. Picloram is premixed with additional active ingredient(s) in several widely used products registered for range and pasture. See table of premix products at end of section for more details.

**Caution** **Most formulations are restricted-use herbicides.** Do not apply on or near susceptible crops or desirable plants. Buffer zone restrictions, air temperature limits, and grazing restrictions are required. Do not contaminate water or use where surface water from treated areas can run off to adjacent cropland. Do not apply to inner bank or bottom of irrigation ditches. Do not apply to snow or frozen ground. Do not use in surface irrigated or sub-irrigated areas, areas subject to frequent flooding, or with shallow water table. Do not allow grazing in areas where poisonous plants were sprayed until plants have died – herbicide may increase palatability. Do not spray pastures if the forage legume component is desired. Do not move treated soil. Do not transfer livestock onto crop areas for at least 7 days after grazing on land treated with picloram. See label for other grazing restrictions.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### pyraflufen-ethyl (Venue)

**Rate** 0.0026 to 0.0046 lb ai/A (2 to 3.5 oz/A Venue)

**Time** Apply postemergence to small (less than 4 inches tall) actively growing broadleaf weeds.

**Remarks** Provides contact, foliar burndown activity of small broadleaf weeds only. Full coverage essential for good activity. Use of a crop oil surfactant required for best weed control. For optimal control, especially of larger weeds, tank mix with a systemic herbicide.

**Caution** Livestock may graze as soon as spray dries. Allow at least 14 days between applications. Do not apply more than 0.0046 lb ai/A (3.5 oz/A Venue) in a single application. Do not exceed two applications or exceed 0.093 lb ai/A (7 oz/A Venue) per season. Maximum 30 day rotational restriction to any crop.

**Site of action** Group 14: protoporphyrinogen oxidase inhibitor

**Chemical family** Triazinone

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### quinclorac (Facet L, several others)

**Rate** 0.14 to 0.75 lb ae/A (12 to 64 oz/A Facet L)

**Time** Apply to emerged, actively growing weeds. For field bindweed, apply in the fall just prior to first killing frost.

**Remarks** Good activity on field bindweed relative to most other options. Controls or suppresses a number of other broadleaf and some grass weeds. Suppresses leafy spurge. For control of bindweed and other difficult perennial weeds, apply to at least 4" of green fall regrowth just prior to the first killing frost of the season. Continued annual applications will be necessary to

maintain bindweed control.

**Caution** Do not cut treated forages for hay within 7 days of application. Do not apply to water or areas with surface water present. Do not apply to irrigation ditches or areas that act as a channel for water entering cropland. Do not apply more than 0.75 lb ae/A per year (64 oz/A Facet L).

**Site of action** Group 4: synthetic auxin

**Chemical family** Quinoline-carboxylate

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### **rimsulfuron (Laramie 25DF, several others)**

**Rate** 0.047 to 0.0625 lb ai/A (3 to 4 oz/A Laramie 25DF)

**Time** Apply in fall or spring outside times of usually frozen soil. If possible, apply so that 0.5 inch or more of precipitation occurs within 2 to 3 weeks of application.

**Remarks** For use in restoration of degraded rangelands severely infested with cheatgrass, medusahead, and certain other weeds. To release perennial grasses for site restoration in areas infested with downy brome or medusahead, apply in the fall no more than 6 weeks before the expected date of soil freezing. To prepare infested areas with inadequate perennial grass density for re-seeding, apply in the spring after soils thaw and at least 7 months prior to anticipated reseeding date. See label for compatible species and full details on reseeding interval. Rimsulfuron may cause injury to desired perennial grasses; see label for specifics.

**Caution** Requires continuous agitation to maintain suspension in spray tank. Failure to maintain agitation can result in dramatic over-or under-application, as well as sprayer plugging. Do not graze treated sites or cut for hay for at least 1 year after application. Deferment of grazing also allows time for establishment/recovery of desirable perennial grasses. Do not apply more than 0.0625 lb ai (4 oz/A Laramie 25DF) per acre per year. Clean spray equipment with ammonia immediately after application per label directions.

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

**Chemical family** Sulfonylurea

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### **propoxycarbazone (Lambient)**

**Rate** 0.039 to 0.053 lb ai/A (0.9 to 1.2 oz/A Lambient). Use lower rate only for light weed infestations under favorable environmental conditions.

**Time** Apply early post-emerge to actively growing weeds in the fall or spring. Best control of cheatgrass, medusahead and other annual grass weeds will be obtained at 1 to 2 leaf stage. Larger grass weeds will likely be suppressed, not controlled.

**Remarks** Use nonionic surfactant (NIS) at 0.25 to 0.5 % v/v. A nitrogen fertilizer may also be included for best weed control. For weed control in established stands of perennial grasses, apply 0.053 lb ai/A (1.2 oz/A Lambient) in the fall when target weeds have emerged. Propoxycarbazone can cause stunting, injury, and/or seedhead suppression in established grasses. Grass species are known to vary in their tolerance to propoxycarbazone. See label for full details and recommendations. Where perennial grass stands include recently established plants, wait until seedlings have reached at least the 5 leaf stage, and expect that injury or thinning of seedling grasses is likely. For areas to be reseeded, wait at least 90 days after application before seeding desired perennial grasses. See label for known species sensitivities in reseeding.

**Caution** Not recommended for use in seed production of otherwise tolerant species. Do not apply more than 0.053 lb ai (1.2 oz/A Lambient) per acre per year. Do not cut treated hay within 7 days of application. Not safe for legumes.

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

**Chemical family** Triazolinone

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### **saflufenacil (Detail)**

**Rate** Growing season: 0.022 to 0.044 lb ai/A (1 to 2 oz/A Detail); Dormant season: 0.022 to 0.089 lb ai/A (1 to 4 oz/A Detail)

**Time** Apply to small, broadleaf weeds during active growth or dormant season of perennial grasses.

**Remarks** Provides contact, foliar burndown activity of broadleaf weeds, and short-term soil residual activity at higher rates. Full coverage essential for good post-emergence control. Requires methylated seed oil (MSO) at 1% v/v; do not substitute other surfactants. Apply only to established perennial grasses. May cause transitory grass injury, but normal growth and vigor is not

reduced under normal conditions.

**Caution** Do not apply more than 0.044 lb ai per acre per year for growing season applications, or 0.089 lb ai per acre per year for dormant season applications. Sequential applications may be made provided total seasonal limits are not exceeded, and applications are separated by at least 14 days. Dormant season sequential applications should be made in a fall/winter followed by early spring sequence.

**Site of action** Group 14: protoporphyrinogen oxidase inhibitor

**Chemical family** N-phenyl-imide

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### sulfosulfuron (Outrider)

**Rate** 0.035 to 0.062 lb ai/A (0.75 to 1.33 oz/A Outrider)

**Time** Apply in fall or spring to emerged, actively growing weeds. For cheatgrass control, apply at 1-to 2-leaf stage, application to larger cheatgrass plants will result in suppression only. Injury risk to desirable perennials is reduced if applied during periods when perennials are not actively growing.

**Remarks** Use higher rates if weeds are larger, and for best control of difficult species. Controls annual grasses and some annual forbs. Use nonionic surfactant at 0.25 to 0.5 % v/v (1 quart/100 gal).

**Caution** Outrider controls meadow foxtail. If meadow foxtail is an important forage grass, do not apply Outrider to areas where meadow foxtail is present. Perennial bromes can be reduced in the first season after application. Addition of spring nitrogen can reduce injury. Generally safe on perennial grasses, but can cause temporary stunting and chlorosis. If unsure about safety on desirable grass species, test on small area to confirm selectivity. Treated forage may be grazed immediately after application, but for best weed control, defer grazing for 2 weeks after application. Clean application equipment with 1% v/v ammonia solution immediately after application, see label for full details.

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

**Chemical family** Sulfonylurea

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### tebuthiuron (Spike 20P)

**Rate** 0.5 to 4 lb ai/A (2.5 to 20 lb/A product)

**Time** May be applied any time. Best efficacy is obtained from applications made just prior to onset of fall/winter precipitation. Best safety on perennial grasses obtained from applications made during grass dormancy.

**Remarks** A surface applied, pelleted herbicide for control of woody vegetation, including sagebrush. May be applied as spot treatments, or broadcast. Treatments become effective after enough rain falls to move the chemical into the root zone where it is absorbed by target plants. Brush will continue to die for several months after application, and full control may take several years to achieve. For best efficacy, do not disturb treated plants by chaining, woodcutting, burning, etc. for 2 years after treatment. During this time woody plants may go through repeated cycles of leaf growth and defoliation. A single application is normally effective for several years. Areas treated may be overseeded with grass. Tebuthiuron will also control herbaceous broadleaf plants, including legumes.

**Caution** Do not apply tebuthiuron anywhere roots of desirable woody plants may be present. Do not exceed 2 lb ai/A (10 lb/A Spike 20P) if average annual precipitation is less than 20 inches, or more than 4 lb ai/A (20 lb/A Spike 20P) in areas with over 20 inches annual precipitation. Maximum use rate is 4 lb ai/A once every 3 years and no more than 2 treatments totaling 6 lb ai/A in any 6-year period. Tebuthiuron has potential to contaminate groundwater, and has many restrictions regarding movement to groundwater. Check label carefully to insure prohibited uses are avoided. May slightly and temporarily injure desirable grasses. Minimize injury by applying herbicide when grasses are dormant. Do not apply on field crops, near desirable trees or shrubs, or to areas into which their roots may extend. May seriously injure desirable forage legumes and other broadleaf plants. Rate and annual rainfall affect haying and grazing restrictions; see label. Contact retailer or Corteva representative for more details and assistance in label interpretation.

**Site of action** Group 7: photosystem II inhibitor

**Chemical family** Substituted urea

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### triasulfuron (Amber)

**Rate** 0.013 to 0.026 lb ai/A (0.28 to 0.56 oz/A Amber)

**Time** Apply postemergence to actively growing weeds. Apply preemergence for suppression of downy brome and cheat.

**Remarks** Perennial grasses vary in their tolerance to triasulfuron, consult label for specifics. Apply in a tank-mix with an appropriate herbicide having another mode of action to control a wide spectrum of broadleaf weeds. Nonionic surfactant (NIS) required for postemergent applications. Apply 0.026 lb ai/A (0.56 oz/A Amber) for prior to emergence for partial control of downy brome and cheat.

**Caution** Orchardgrass, red fescue, and ryegrasses will likely be injured by triasulfuron. Preharvest interval is 30 days for hay; grazing may occur immediately after application. Recropping restrictions are long for some situations. Do not apply more than 0.026 lb ai/A in a single application. Do not apply more than 0.0394 lb ai/A (0.84 oz/A Amber) total per acre per year. Do not make more than 2 applications per year. Minimum retreatment interval 60 days. Do not apply to seedling grasses for at least 60 days after emergence. Will severely injure legumes and other desirable broadleaf plants.

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

**Chemical family** Sulfonylurea

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### **triasulfuron + dicamba (Rave)**

**Rate** 2 to 4 oz/A

**Time** Apply postemergence to actively growing weeds.

**Remarks** Add a nonionic surfactant to the spray mixture. Consult label for tolerant grasses.

**Caution** Wait 60 days after grasses emerge before applying Rave. Orchardgrass, red fescue, and ryegrasses will likely be injured. Clovers and alfalfa also may be injured. After applying, wait at least 30 days to cut for hay or to slaughter meat animals that were exposed, and wait at least 8 days to graze lactating cows.

**Site of action** (triasulfuron) Group 2: acetolactate synthase (ALS) inhibitor; (dicamba) Group 4: synthetic auxin

**Chemical family** (triasulfuron) Sulfonylurea; (dicamba) Benzoic acid

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### **triclopyr (Remedy Ultra, Vastlan, Garlon XRT, several others.)**

**Rate** 1 to 2 lb ae/A

**Time** Apply when woody plants and broadleaf weeds are actively growing. Apply to annual and biennial plants prior to bolting.

**Remarks** Controls both emerged herbaceous and woody broadleaf plants, including sulfur cinquefoil. Controls many trees, brush, and other woody plants (see label for basal, trunk, and cut stump application uses). Multiple formulations of triclopyr are registered for use in rangeland, including choline, amine, and ester salts. Most formulations are esters. Different forms vary substantially in volatility and risk for off-site vapor movement. Relative volatility risks are: very low (choline), low (amine) and high (ester). Select choline or amine formulations for use in proximity to sensitive sites or crops, particularly during warm temperatures. Triclopyr is premixed with additional active ingredient(s) in several products registered for range and pasture. See table of pre-mix products at end of section for more details.

**Caution** Do not allow drift to desirable vegetation. Do not apply more than 2 lb ai/A in a growing season on rangeland. Desirable broadleaf plants will be seriously injured or killed. See specific product label for haying and grazing restrictions. Some formulations of triclopyr are labeled for aquatic, riparian, and wetland applications, see label and retailer or manufacturer for specifics. Permits are generally required for aquatic applications, and additional use restrictions generally apply to riparian and wetland applications.

**Site of action** Group 4: synthetic auxin

**Chemical family** Pyridine

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### **triclopyr + 2,4-D (Crossbow)**

**Rate** Spot treatment: use 1 to 1.5% mixture in water. Broadcast: up to 1.5 gal/A (3 lb ae of 2,4-D and 1.5 lb ae of triclopyr).

**Time** Postemergence, to actively growing plants.

**Remarks** Controls many woody plants as well as annual and perennial broadleaf weeds.

**Caution** No forage may be sold for commercial purposes.

**Site of action** (both) Group 4: synthetic auxin

**Chemical family** (triclopyr) pyridine; (2,4-D) phenoxy acetic acid

## PREMIX PRODUCTS

There are a large number of premix products available for use in rangeland and pasture, including some of the most commonly used herbicides on the market. Manufacturers premix multiple active ingredients for many reasons, including:

**Increased efficacy.** Many active ingredients have good activity on a somewhat limited range of weed species, but by combining multiple active ingredients manufacturers can achieve control of a large range of weeds with a single product. In other cases, particular active ingredients interact to provide synergistic activity, in which performance of the mixture is better than the simple sum of its parts.

**Reduced Cost.** Often, combining a slightly reduced rate of a high-performing but expensive active ingredient with a more economical tank mix partner can achieve the same weed control activity as either product used alone at higher rates, and in many cases at a lower overall cost.

**Resistance Management.** Good stewardship of herbicide resources is important to sustaining effectiveness of these critical and limited tools, even in rangelands where resistance issues are currently less widespread than in crop production. The best herbicide use strategy to prevent selection of herbicide resistant weed populations is to tank mix multiple modes of action in every application, and premixes can be an easy way to do so. To be effective for resistance management purposes, a tank mix must include multiple modes of action that are each effective on the target weed.

Active Ingredients	Trade Name(s)
2,4-D + aminopyralid	Forefront HL, GrazonNext HL, PasturAll HL, Forefront HL, Gunslinger AMP
2,4-D + clopyralid	Commando, Cody, Curtail
2,4-D + dicamba	Brash, Brush-Rhap, Burnmaster, Latigo, Outlaw, RangeStar, Rifle D, Spitfire, Veteran 720, Weedmaster
2,4-D + dicamba + fluroxypyr	E2, Scorch
2,4-D + picloram	Graslan L, Grazon P+D, Gunslinger P+D, Trooper P+D,
2,4-D + triclopyr	Crossbow, Candor, Crossroad, Everett
aminopyralid + clopyralid	Sendero
aminopyralid + metsulfuron	Chaparral, Opensight
aminopyralid + picloram + fluroxypyr	MezaVue
aminopyralid + triclopyr	Capstone, Milestone VM Plus
chlorsulfuron + metsulfuron	Cimmaron Plus
clopyralid + MCPA	Curtail M, Commando M
clopyralid + triclopyr	Prescott
dicamba + halosulfuron	Yukon
dicamba + triasulfuron	Rave
fluroxypyr + picloram	Triumph XTR, Surmount
fluroxypyr + triclopyr	Cleargraze, Pasturegard HL
imazapyr + metsulfuron	Lineage Clearstand
indaziflam + rimsulfuron	Esplanade Sure