

SECTION W. PASTURE AND RANGELAND

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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 manage-

ment 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

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

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

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

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

aminopyralid + triclopyr (Capstone Specialty Herbicide)

Rate 0.05 to 0.075 lbs 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

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

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

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

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 reseeding.

Site of action (both) Group 4: synthetic auxin

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

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

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

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

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

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 post-emergence 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

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

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 Sulfonyleurea

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

picloram (several products)

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

pyraflufen (Edict 2SC IVM)

Rate 0.001 to 0.005 lb ai/A (1.0 oz/A to 3.5 oz/A Edict 2SC IVM)

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

quinclorac (Paramount)

Rate 0.14 to 0.75 lb ai/A (3 to 16 oz/A Paramount)

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

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 Pyrimidindione

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

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

triclopyr (several 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

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

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Controlling undesirable plants on 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. 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. Controlling undesirable plants usually requires more intensive management. In most cases, it is futile to try to control undesirable plants without improving management.

Other methods Methods that have a definite place in range management are: chemical, rotobearing, plowing, disking, raiing, chaining, burning, reseeding, and changes in grazing schedules. There are specific sites and reasons for use of the controls listed. Each is effective if used properly. Obtain specific information locally from the county Extension agent or professional range manager.

Safety and toxic hazard The toxicity of chemicals used in range weed control is low. No evidence of direct damage to animals as a result of these herbicides is available. 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 may be used successfully. On small areas, ground or hand equipment may be 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.

Management to Reduce Weed Problems

2,4-D (several products)

Rate 0.71 to 2 lb ae/a

Time Spray when annual weeds are young, succulent, 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 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 label for rates for various weed species and for proper application timing.

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

aminopyralid (Milestone)

Rate 0.75 to 1.75 oz ae/a (3 to 7 oz/a)

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.

Caution Do not exceed 7 oz/a of Milestone in 1 year. 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 Milestone in the preceding 18 months, unless allowed by supplemental labels; see label for details.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

aminopyralid + 2,4-D (Forefront R&P)

Rate 1.5 to 2.6 pints/a

Time Apply when weeds are young and actively growing.

Remarks Use 1.5 to 2 pints/a on common vetch, yellow wood-sorrel, and absinth wormwood. Most susceptible species can be controlled with 2 to 2.6 pints/a.

Caution Do not plant grasses for 30 days after application. Do not use on newly seeded grass areas until grass is well established. May suppress smooth brome grass. Do not spray pastures containing desirable forbs, especially legumes, unless injury can be tolerated. Allow 3 days after grazing before moving animals to areas with desirable sensitive broadleaf plants. 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 14 days after application. Do not use straw or manure from treated areas for compost or mulch. Wait one year after application to rotate to cropland.

Site of action (both) Group 4: synthetic auxin

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

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 mareetail 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 Pyridine

carfentrazone (Aim)

Rate 0.5 to 2 oz/a

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

Remarks Using a nonionic surfactant or crop oil concentrate enhances control. Controls corn spurry, a species not listed on many labels of herbicides used in pasture.

Caution No preharvest interval required. Allow at least 7 days between applications. Do not exceed three applications or 5.9 oz/a per season.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Triazinone

chlorsulfuron (Telar)

Rate 0.25 to 1.33 oz/a

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. Telar applied before flowering can reduce seed head development of cool-season grasses.

Caution Stressed grasses may be injured. No grazing or harvest restrictions for applications up to 1.33 oz/a. Do not exceed 1.33 oz/a per year.

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

Chemical family Sulfonylurea

clopyralid (Stinger or Transline)

Rate 0.5 to 1.33 pints/a

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.

Remarks Apply only once in a 12-mo period. Do not allow drift to crops. May be tank mixed with 2,4-D. Grasses may be planted any time after application.

Caution Do not spray pastures if forage legume component is desired. See label restrictions on planting crops into treated areas. 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

Chemical family Pyridine

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

dicamba (Banvel, Vanquish, or Clarity)

Rate 0.25 to 1 lb ae/a

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. 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.

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

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

dicamba + diflufenzopyr (Overdrive)

Rate 4 to 8 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 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.

Caution Do not exceed 8 oz/a of Overdrive in a season. Do not plant any crop for 30 days after application. Grazing is possible immediately after application.

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

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

fluroxypyr (Starane Ultra)

Rate 0.4 to 0.7 pints/a

Time Apply after weeds emerge. In pastures, use the low rate for weeds less than 4 inches tall, and 0.66 pint/a for weeds less than 8 inches tall. Rates up to 0.7 pints/a can be used on Conservation Reserve Program (CRP) land.

Remarks Apply to established grasses and to new plantings that are in the two-true-leaf to booting stage of growth.

Caution No grazing restrictions for lactating dairy animals. Preharvest interval for forage is 7 days. Do not feed treated forage for 2 days before slaughter for meat. Do not exceed 0.7 pints/a of Starane in one growing season.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

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

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

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.

Caution A nonselective herbicide that kills forage plants on contact. Total treatments must not exceed 8 lb ai/a per year. Remove domestic livestock before application. Wait 8 weeks after broadcast application and 14 days after spot or wiper application before grazing or harvesting.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

halosulfuron (Sandea)

Rate 0.33 to 1.33 oz/a.

Time Postemergence.

Remarks For control of sedges in range and pastures.

Caution Do not apply more than 1.33 oz/a in a 12 month period.

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

Chemical family Sulfonylurea

hexazinone (Velpar L)

Rate 2.75 to 4.5 pints/a per season.

Time Just before or during period of active growth of brush species to be controlled.

Remarks For control of herbaceous and woody weeds in range and pastures.

Caution Do not apply to brush standing in water, or where desirable trees or shrubs are growing immediately adjacent to weedy plants. Do not cut hay from treated areas. Do not use on

marshy or poorly drained sites, or on soils classified as clays. Do not apply to snow-covered or frozen ground.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

imazapic (Plateau, Panoramic)

Rate 0.0312 to 0.1874 lb ai/a (2 to 12 oz/a)

Time Annual weeds are best controlled preemergence up to small, actively growing plants. 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 Use lower rates (4 to 6 oz/a) for early-season downy brome control. Higher rates (8 to 12 oz/a) 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) may injure establishing perennial grasses. New plantings of bluebunch wheatgrass (*Pseudoroegneria spicata*), intermediate wheatgrass (*Thinopyrum intermedium*), crested wheatgrass (*Agropyron cristatum*), Bozoiiski Russian wildrye (*Psathyrostachys juncea*), Siberian wheatgrass (*Agropyron fragile*), and big squirreltail (*Sitanion jubatum*) have survived preemergent fall application of imazapic.

Caution Do not cut hay for 7 days after application. Do not exceed 12 oz/a in a calendar year.

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

Chemical family Imidazolinone

MCPA (several products)

Rate 0.46 to 0.7 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, Canada thistle, and buttercup (multiple applications may be required for buttercup control).

Caution 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

metsulfuron (Escort XP)

Rate 0.33 to 2 oz/a Escort

Time Apply postemergence to actively growing weeds.

Remarks Controls a wide range of broadleaf weeds. For best results, use a nonionic or organosilicone surfactant.

Caution Consult labels for each product; labels differ significantly. Note restrictions on label for use on fescue, timothy, and ryegrass pastures. After applying 3.33 oz/a, wait 3 days to graze. No grazing restriction at or below 1.66 oz/a. Note recropping restrictions on label. Grass may be planted 60 to 90 days after application.

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

Chemical family Sulfonylurea

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

pendimethalin (Prowl H2O)

Rate 1 to 4 lb ai/a (1.1 to 4.2 quarts/a)

Time Apply prior to emergence of weeds.

Remarks Controls annual grasses and some broadleaf weeds as they germinate.

Caution Application rate depends on soil texture; coarse soils require less herbicide. Do not apply more than 4.2 quarts/a in a crop season. Grazing restrictions apply; do not graze before 45 days after application.

Site of action Group 3: microtubule assembly

Chemical family Dinitroaniline

picloram (Tordon 22K)

Rate 0.5 pint to 2 quarts/a

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. Apply at rates over 0.5 lb ae/a as spot-treatments only and not to exceed 25% of landowner's acreage in any particular watershed in a single season.

Caution **Most formulations are restricted-use herbicides.** Do not apply on or near susceptible crops or desirable plants. Label includes buffer zone restrictions, air temperature limits, and grazing restrictions. Do not contaminate water or 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 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

sulfosulfuron (Outrider)

Rate 0.035 to 0.062 lb ai/a (0.75 to 1.33 oz/a product)

Time Apply in fall after late-summer and early-fall rains.

Remarks Use higher rates if weeds are larger. Controls annual grasses and some annual forbs. Effective when applied to emerged plants. Apply in a solution of 10 to 50 gal/a of water. Add a surfactant at 0.25% by volume.

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.

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

Chemical family Sulfonylurea

tebuthiuron (Spike 20P)

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

Time May be applied any time.

Remarks Do not exceed 2 lb ai/a if annual precipitation is less than 20 inches. Controls certain woody species including sagebrush. Treatments become effective after enough rain falls to move the chemical into the root zone where it is absorbed by plants. Applications just before seasonal rains will give the most rapid response. Brush will continue to die for several months after application. During this time woody plants may go through repeated defoliations. A single application is normally effective for several years. Areas treated may be overseeded with grass.

Caution 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. **Rate** and annual rainfall affect haying and grazing restrictions; see label. Contact a Dow representative for more details.

Site of action Group 7: photosystem II inhibitor

Chemical family Substituted urea

triasulfuron (Amber)

Rate 0.013 to 0.026 lb ai/a (0.28 to 0.56 oz/a)

Time Apply postemergence to actively growing weeds. Apply preemergence to downy brome and cheat (see **Remarks**).

Remarks Apply in a tank-mix with an appropriate herbicide having another mode of action to control a wide spectrum of broadleaf weeds. Add a nonionic surfactant to the spray mixture. Consult label for tolerant grasses. Apply high rate listed above for preemergent, 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. Note recropping restrictions on label.

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

Chemical family Sulfonylurea

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

triclopyr ester (Remedy Ultra)

Rate 1 to 2 pints/a

Time When plants are actively growing.

Remarks Do not spray pastures containing desirable broadleaf forbs, especially legumes, unless injury to these plants can be tolerated. Can be used for woody weed control; see label for basal, thinline basal and cut stump application instructions.

Caution Haying and grazing restrictions vary with application rate and livestock type; see label. Do not apply more than 2 quarts in one growing season.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

Chemical family Pyridine

triclopyr choline (Vastlan)

Rate 1 to 2 quarts/a product

Time Apply when woody plants and broadleaf weeds 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 and use at least a spray volume of 10 gal/a.

Caution Do not allow drift to desirable vegetation. Do not apply more than 2 qt/a Vastlan in a growing season. Many forbs (desirable broadleaf plants) can be seriously injured or killed.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

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
