

SECTION E.

FORAGE AND SEED CROPS

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Grass Hay

Tim Prather

Revised March 2019

2,4-D amine (several trade names)

Rate 0.7 to 2 lb ae/a

Time Depends on weeds to be controlled. Apply to grass when annual and biennial broadleaf weeds are small and actively growing, and established perennials are at bud stage, unless label indicates otherwise.

Remarks Controls many broadleaf weeds. Application rate depends on weed species and size. 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. Spray perennial weeds while they are still seedlings (coming from seed) or wait until bud stage of growth.

Caution Do not allow spray 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. Do not cut for hay within 30 days of application. Do not graze lactating dairy cattle in treated areas for 7 days after application. 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)

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

Time Apply to actively growing weeds. Consult label for specifics.

Remarks A nonionic surfactant at 1 to 2 quarts/100 gal spray will enhance control under adverse environmental conditions. Controls several broadleaf weeds. Application rate depends on weed species and stage of growth. Apply at least 2 weeks before harvest to ensure weed control. There are no restrictions on grazing or hay harvest.

Caution Do not allow drift to desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Allow at least 3 days of grazing on an untreated pasture before transferring grazing animals from treated areas where sensitive broadleaf crops grow. Do not exceed 7 fl oz/a Milestone per year. Do not spread manure from animals that have grazed or consumed treated forage within the previous 3 days on land used for growing broadleaf crops. If Milestone is applied by someone besides the landowner, a copy of Dow AgroSciences Stewardship instructions must be provided (www.

aminopyralidstewardshipinstructions.com). Not for use in hay for export.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

aminopyralid + metsulfuron (Chaparral)

Rate 2 to 3.3 oz/a

Time Apply to actively growing weeds under conditions favorable for plant growth.

Remarks Rate depends on target broadleaf weed species. Use a higher rate when growing conditions are less than favorable, weeds are mature or weed foliage is tall and dense, or when residual control is important. Adding a high-quality nonionic surfactant, at 0.25 to 0.5 v/v, enhances control.

Caution Off farm use of hay is allowed by supplemental label.

Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not harvest for hay within 7 days. Allowing at least 14 days after application before harvest provides maximum herbicidal activity. Do not transfer grazing animals from treated areas to areas where sensitive broadleaf crops grow without first allowing 3 days of grazing on untreated pastures. Do not spread manure from animals that have grazed or consumed treated forage within the previous 3 days on land used for growing broadleaf crops. If Milestone is applied by someone besides the landowner, a copy of Dow AgroSciences Stewardship instructions must be provided (www.aminopyralidstewardshipinstructions.com). Not for use in hay for export.

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

Chemical family (aminopyralid) pyridine; (metsulfuron) Sulfonylurea

aminopyralid + 2,4-D (ForeFront HL)

Rate 0.06 to 0.11 lb ae aminopyralid + 0.5 to 0.87 lb ae 2,4-D/a (1.5 to 2.6 pints/a product)

Time Apply to actively growing weeds under conditions favorable for plant growth.

Remarks Rate depends on target broadleaf weed species. Use a higher rate when growing conditions are less than favorable, weeds are mature or weed foliage is tall and dense, or when residual control is important. Adding a high-quality nonionic surfactant, at 0.25 to 0.5 v/v, enhances control.

Caution Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not harvest for hay within 7 days. Allowing at least 14 days after application before harvest provides maximum herbicidal activity. Do not transfer grazing animals from treated areas to areas where sensitive broadleaf crops grow without first allowing 3 days of grazing on untreated pastures. Do not spread manure from animals that have grazed or consumed treated forage within the previous 3 days on land used for growing broadleaf crops. If Milestone is applied by someone besides the landowner, a copy of Dow AgroSciences Stewardship instructions must be provided (www.aminopyralidstewardshipinstructions.com). Not for use in hay for export.

Site of action Group 4: synthetic auxin

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

bromoxynil + pyrasulfotole (Huskie)

Rate 0.185 to 0.205 lb ai/a bromoxynil + 0.033 to 0.036 lb ai/a pyrasulfotole (13.5 to 15 oz/a Huskie)

Time Apply preemergence to established hay. See label for weed size recommendations and application timings, but control of most species is best at the 15 fl oz/a rate when weeds have from one to six leaves. Two applications of Huskie can be made per year separated by at least 30 days.

Remarks For most consistent weed control under adverse growing conditions, add AMS or an ammonium nitrogen source as directed by the spray additives section of the label, but do not use these additives if crop injury is a concern. Huskie may be tank mixed with a variety of other broadleaf and grass herbicides and other pesticides; see label for instructions.

Caution See label for crop rotation restrictions. Wheat, triticale, and oats may be planted 1 month after application; most other crops may be planted 9 months after application. Do not graze or cut grass for forage within 7 days of application, or cut grass for hay within 30 days of application. Do not exceed 30 oz/a of Huskie per year. Aerial and chemigation applications are prohibited.

Site of action (bromoxynil) Group 6: photosystem II inhibitor; (pyrasulfotole) Group 28: inhibits 4hydroxyphenylpyruvatedioxygenase (4-HPPD)

Chemical family (bromoxynil) Nitrite; (pyrasulfotole) Isoxazole

carfentrazone (Aim EC)

Rate 0.008 to 0.031 lb ai/a (0.5 to 2 fl oz Aim EC)

Time Apply to emerged and actively growing annual broadleaf weeds no more than 4 inches tall or across. May be applied before seeding and up to jointing stage of crop.

Remarks Add surfactant; see label for mixing and application directions. Apply in at least 10 gal/a of spray solution. See label for control of specific weeds and adjuvant recommendations. There are no harvest or grazing restrictions.

Caution Do not exceed 0.093 lb ai/a (5.9 fl oz/a Aim EC) or three applications per season.

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

Chemical family Triazolinone

clopyralid (Stinger, Transline)

Rate 0.125 to 0.5 lb ae/a (0.33 to 1.33 pints/a product)

Time Depends on weeds to be controlled. Apply to grass when annual and biennial broadleaf weeds are small and actively

growing, and established perennials are at bud stage of growth unless label indicates otherwise.

Remarks Controls some broadleaf weeds. Application rate depends on weed species and size. The smaller the annual weeds, the easier they are to control. Spray biennial species in the seedling to rosette stage and before flower stalks appear. Spray perennial weeds while they are still seedlings (coming from seed) or wait until bud stage of growth unless label indicates otherwise. There are no restrictions on haying or grazing after applying Stinger if used alone at labeled rates.

Caution Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Do not use plant residues—including hay from treated areas and manure from animals that consumed forage from treated areas—for composting or mulching where susceptible plants may be grown the following season. Do not spread manure from animals that have grazed or consumed forage from treated areas on land for growing susceptible broadleaf crops. Do not exceed 4 pints/a per year.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

clopyralid + 2,4-D (Curtail)

Rate 0.21 to 0.42 lb ae/a clopyralid + 1.175 to 2.35 lb ae/a 2,4-D (2 to 4 quarts/a product)

Time Apply to grass 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 spray to drift to 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 cut for hay within 30 days of application. Do not graze lactating dairy cattle in treated areas for 14 days after application. Do not permit animals being finished for slaughter to graze freshly treated fields within 7 days of slaughter. Removal is not needed after 2 weeks from application. Do not use hay or straw from treated areas for composting or mulching. Do not spread manure from animals that have grazed or consumed treated forage within the previous 3 days on land used for growing broadleaf crops. Note label restrictions on overseeding or reseeding.

Site of action Group 4: synthetic auxin

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

dicamba (Banvel or Clarity)

Rate 0.25 to 2 lb ae/a (0.5 to 4 pints/a product)

Time Depends on weeds to be controlled. Apply to grass when annual and biennial broadleaf weeds are small and actively growing, and established perennials are at bud stage of growth unless label indicates otherwise.

Remarks Controls many broadleaf weeds. Application rate depends on weed species and size. 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. Spray perennial weeds while they are still seedlings (coming from seed) or wait until bud stage of growth. Maximum rate per season is 2 lb ai/a. There are no haying or grazing restrictions except for lactating dairy animals.

Caution Do not allow drift onto desirable vegetation. Do not apply to newly seeded areas until grass is well established. Desirable vegetation (including broadleaf plants) can be seriously injured or killed.

Restrictions Treated hay for lactating dairy animals: If up to 0.5 lb ae/a (1 pint) was used, delay harvest 37 days; if up to 1 lb ae/a (2 pints) was used, delay harvest 51 days; if up to 2 lb ae/a (4 pints) was used, delay harvest 70 days. Do not graze lactating dairy animals in treated areas for 7 to 40 days after treatment, depending on usage rate.

Site of action Group 4: synthetic auxin

Chemical family Benzoic acid

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

Rate 0.5 to 4 pints/a Weedmaster or Pasturemaster, or 0.33 to 2.5 pints/a Latigo

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

Remarks Controls broadleaf weeds. Application rate depends on weed species and size. 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. Unless label indicates otherwise, spray perennial weeds while they are still seedlings (coming from seed) or wait until bud stage of growth.

Caution Do not allow spray to drift onto 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 cut for hay for lactating dairy animals within 37 days of application. Do not graze lactating dairy cattle in treated areas for 7 days after application. Do not permit animals being finished for slaughter to graze treated fields within 30 days of slaughter. Note label restrictions on overseeding or reseeded.

Site of action Group 4: synthetic auxin

Chemical family (dicamba) Nitrile; (2,4-D) Phenoxy acetic acid

dicamba + diflufenzopyr (Overdrive)

Rate 0.0156 to 0.03125 lb ae/a dicamba + 0.00625 to 0.0125 lb ae/a diflufenzopyr (4 to 8 oz/a Overdrive)

Time Apply to annual and biennial broadleaf weeds when they are small and actively growing, and established perennials are at bud stage.

Remarks Controls broadleaf weeds. Application rate depends on weed species and size. The smaller the annual weeds, the easier they are to control.

Caution Do not allow spray to drift onto 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. A maximum of 8 ounces may be used per season.

Site of action Group 4: synthetic auxin

Chemical family (dicamba) nitrile; (diflufenzopyr) semicarbazone

flufenacet + metribuzin (Axiom DF)

Rate 0.27 to 0.31 lb ai/a flufenacet + 0.068 to 0.084 lb ai/a metribuzin (8 to 10 oz/a Axiom) in established timothy hay.

Time Apply before weeds emerge, or no later than the two-leaf stage of volunteer grasses.

Remarks Do not graze timothy in the fall and cut height cannot be shorter than 3.5 inches. Rain or irrigation after application is needed for sufficient weed control activity.

Caution Harvest at lower than 3.5 inches may cause injury to timothy. Grazing in fall after hay harvest may cause injury to timothy. It is best to harvest at 4 inches to allow energy stored in stems to be used to produce new stems next year.

Site of action (flufenacet) Group 15: inhibits very long chain fatty acid synthesis; (metribuzin) Group 5: photosystem II inhibitor

Chemical family (flufenacet) Oxyacetamide; (metribuzin) Triazinone

fluroxypyr (Starane Ultra)

Rate 0.11 to 0.14 lb ae/a (0.3 to 0.4 pints/a product)

Time Apply in spring when broadleaf weeds are actively growing and are less than 8 inches tall.

Remarks Only weeds emerged at the time of treatment will be controlled. May be applied to bluegrass, bromegrass, fescue, orchardgrass, ryegrass, timothy and sorghum, sorghum-sudan, sudan, and triticale. A second application may be made no less than 14 days after the first. There are no grazing restrictions.

Caution Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants) can be seriously injured or killed. Do not harvest for hay or silage within 7 days of application. Meat animals must be withdrawn from treated forage at least 2 days before slaughter. Do not exceed 0.25 lb ae/a (0.7 pints/a) per growing season.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

glyphosate (several trade names)

Rate Consult label. Several formulations and concentrations are available.

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

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

Caution Kills forage plants on contact. Do not allow drift to 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 + dicamba (Yukon)

Rate 0.5 to 1 oz ai/a halosulfuron + 2.2 to 4.4 oz ai/a dicamba (4 – 8 oz product/a)

Time Postemergence broadcast application to established forage grasses/hay. Apply uniformly with ground equipment in a minimum of 10 gal of water per acre. Use a water volume that will provide uniform coverage of plants.

Remarks Do not apply more than 8 oz/a Yukon per year. For new pasture seeding, apply after the grasses are well established and have developed a secondary root system. It is recommended to make an application as soon as possible after removal of hay or before weeds exceed label height restriction.

Caution Wait for at least 48 hours after application before irrigation.

Site of Action Group 2, acetolactate synthase (ALS) inhibitor, Group 4 synthetic auxin

Chemical family (halosulfuron) Sulfonylurea, (dicamba) Benzoic acid

MCPA (Clean Crop MCP Amine 4)

Rate 1 to 1.5 lb ae/a (1 to 1.5 quarts/a product)

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 and grass hay.

Caution Do not graze dairy animals for 7 days after treatment. Do not harvest for hay less than 21 days after application. Do not graze meat animals in treated areas within 7 days of slaughter. Do not use this treatment if alfalfa is present and desirable. 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 0.0188 to 0.124 (0.5 to 3.3 oz/a Escort)

Time Apply to actively growing weeds and in established grasses.

Remarks Controls a wide range of broadleaf weeds. For best results, use a nonionic or silicone surfactant. No grazing restrictions for any livestock, including lactating animals, with application rates up to and including 2 oz ai/a (3.3 oz/a product). Note grazing restrictions with higher rates. Note label restrictions for use on timothy and fescue, which must be established 12 and 24 months respectively, and for use on ryegrass pastures. Note recropping intervals that are dependent on soil pH on the label.

Caution Do not allow drift to desirable vegetation. Injures or kills desirable forbs. Do not use if soil pH is above 7.9.

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

Chemical family Sulfonylurea

pendimethalin (Prowl H2O)

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

Time Fall after the last cutting, during winter dormancy, in the spring, or between cuttings.

Remarks Apply to perennial cool-season grasses with more than 6 established tillers and prior to weed germination. Most effective when incorporated prior to weed germination. May be applied in a single or sequential applications made 30 or more days apart. Soil incorporation with rainfall or sprinkler will enhance activity. There is no preharvest or pre-grazing interval for Prowl H2O-treated grass forage, green chop, silage or hay.

Caution Before treating grass hay for export with Prowl H2O, it is the grower's responsibility to determine if pendimethalin

residues are acceptable for their export market. Do not exceed 4.2 quarts/a of product per year. Refer to label for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

saflufenacil (Sharpen)

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

Time Apply only to established stands of perennial cool-season and warm-season forage grasses.

Remarks A methylated seed oil is required for postemergence control of broadleaf weeds. See label for more information on adjuvants and tank-mixes.

Caution Do not exceed 6 fl oz/a per year. Sharpen may cause leaf necrosis under certain conditions, but new growth is normal and vigor is not reduced. Disease, extremely cold weather, drought, extensive frost heaving, low or high pH, salinity, and other environmental pressures may weaken grass stands and make the crop more susceptible to herbicidal injury

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

Chemical family Pyrimidindione

triclopyr (Garlon 3A)

Rate 0.75 to 2 lb ae/a (1 quart to 0.66 gal/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.

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. Do not harvest for hay within 14 days of application.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

triclopyr choline (Vastlan)

Rate 1 to 2 lb ae/a (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. Withdraw livestock from grazing treated grasses at least 3 days before slaughter during the season of application. Do not harvest for hay within 14 days of application.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

triclopyr + 2,4-D (Crossbow)

Rate 1 to 1.5% solution for spot treatments or up to 1 gal/a product

Time Apply to grass when broadleaf weeds are actively growing.

Remarks Do not apply to forage that is to be cut and sold for commercial purposes. Controls many broadleaf weeds and is very effective on a number of woody species. Rate depends on weeds to be controlled. The smaller the annual weeds, the easier they are to control. Spray biennial weeds in the seedling to rosette stage and before flower stalks appear.

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 harvest for hay for 14 days after application. Note haying and grazing restrictions, particularly for lactating dairy cattle on the label. Note label restrictions on overseeding or reseeding.

Site of action Group 4: synthetic auxin

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

triclopyr + fluroxypyr (PastureGard)

Rate 0.56 to 1.5 lb ae triclopyr + 0.19 to 0.5 lb ae fluroxypyr/a (3 to 8 pints/a product)

Time Apply when weeds are small and actively growing, before the bud stage of growth.

Remarks Adjust rate for target vegetation. Controls emerged herbaceous and woody broadleaf plants. To control biennial thistles or other biennial species, apply before flower stalks appear. An agricultural surfactant may be added to improve foliar wetting.

Caution Do not let spray drift onto 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 or consuming treated hay at least 3 days before slaughter during the season of application. Do not harvest for hay within 14 days of application. Do not exceed 4 quarts/a of PastureGard per annual growing season.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

Forage Alfalfa

Tim Prather

Revised March 2019

Annual Grass and Broadleaf Weeds in Establishing New Seedlings

benfen (Balan DF)

Rate 1.2 to 1.5 lb ai/a (2 to 2.5 lb/a Balan DF)

Time Apply to a clean, clod-free soil surface before planting, and incorporate 2 to 3 inches deep within 4 hours after application.

Remarks Use lower rates on coarse and medium soils, higher rates on fine soils. Avoid overlapping spray.

Caution Do not plant wheat, barley, rye, other domestic grasses, and onions for 10 months after application. Do not plant milo (grain sorghum), corn, oats, sugar beets, other root crops, or spinach for 12 months after application.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

EPTC (Eptam)

Rate 2 to 4 lb ai/a (2.3 to 4.6 pints/a Eptam)

Time Apply before planting, and incorporate immediately and thoroughly into soil.

Remarks Use lower rate on sandy soils, higher rate on silty and clay soils, and for quackgrass and nutsedge control. Incorporate 2 to 3 inches deep with power-driven rotary tiller for band or broadcast application, or set a tandem disk 4 to 6 inches deep and use it twice, at right angles, for broadcast application.

Caution Crop may be temporarily injured. Do not use EPTC if a grass or grain companion crop is to be planted with the alfalfa. Do not use if atrazine was used in the previous year.

Site of action Group 8: lipid synthesis inhibitor but not an ACCase inhibitor

Chemical family Thiocarbamate

imazamox (Raptor)

Rate 0.031 to 0.047 lb ai/a (4 to 6 oz/a Raptor)

Time Apply postemergence to actively growing weeds when most are 1 to 3 inches tall or across, and seedling alfalfa is in the second trifoliate leaf stage or later.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate) and a liquid fertilizer (2.5% UAN) or ammonium sulfate (12 to 15 lb/ 100 gal H₂O) solution is required. Alfalfa height may be temporarily reduced after treatment. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not exceed 6 oz/a product per season. Note recroping restrictions before use. Some crops cannot be planted within 26 months of application. Only rotational crops harvested at maturity may be used for feed or food.

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

Chemical family Imidazolinone

imazethapyr (Pursuit)

Rate 0.047 to 0.094 lb ai/a (3 to 6 oz/a Pursuit)

Time Apply after seedling alfalfa has reached second trifoliate growth stage, and when most weeds are actively growing and 1 to 3 inches tall or across.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate) and either a liquid fertilizer (28% UAN) solution or an ammonium sulfate (12 to 15 lb /100 gal H₂O) is required.

Temporary height reduction or slight leaf yellowing may occur soon after application. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not feed, graze, or harvest alfalfa for 30 days after application. See recropping restrictions before using. Some rotation crops cannot be planted within 40 months of application. Use only rotation crops harvested at maturity for feed or food.

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

Chemical family Imidazolinone

pendimethalin (Prowl H₂O)

Rate 0.475 to 0.95 lb ai/a (1 to 2 pints/a Prowl H₂O)

Time Apply before weeds emerge, when alfalfa has a fully expanded second trifoliolate leaf, and before alfalfa is 6 inches tall.

Remarks Controls most annual grasses and several broadleaf weeds, including dodder, as they germinate. Soil incorporation with rain or sprinkler irrigation enhances control. Will not control emerged weeds.

Caution Do not harvest for hay or forage within 50 days of application. Do not exceed 4 quarts/a of product per year. Refer to label for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

terbacil (Sinbar WDG)

Rate 0.2 to 0.4 lb ai/a (0.25 to 0.5 lbs/a Sinbar WDG)

Time Apply to dormant alfalfa up until early spring prior to 2 inches of growth.

Remarks Limit application to 0.25 to 0.3 lb/a on sandy soils with 0.5 to 0.9% organic matter. Alfalfa tap root must be at least 6 inches long. In sandy soils with at least 1% organic matter apply 0.25 to 0.3 lb/a when alfalfa tap roots are at least 4 inches long. For loam, silt and clay soils apply up to 0.5 lb/a when alfalfa tap roots are at least 4 inches long.

Caution Do not use higher rates on soils with less than 1% organic matter. Do not apply on snow-covered or frozen ground.

Site of action Group 5: photosystem II inhibitor

Chemical family Uracil

trifluralin (Treflan HFP)

Rate 0.5 to 0.75 lb ai/a (1 to 1.5 pints/a Treflan HFP)

Time Before planting, apply and thoroughly incorporate into top 2 to 3 inches of soil.

Remarks Use lower rates on coarse and medium soils, higher rates on fine soils.

Caution Some crop stand reduction and stunting may occur with this use. Do not plant sugar beets, red beets, spinach, proso millet, corn, sorghum, oats, annual or perennial grass crops, or grass mixtures for 12 months after a spring application, or 14 months after a fall application. Moldboard plowing to a depth of 12 inches before planting these crops reduces the possibility of crop injury. If land has not been irrigated, do not plant these crops for 18 months after a spring application or 20 months after a fall application.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Annual Broadleaf Weeds in Establishing New Stands

2,4-DB (Butyrac 200 or Butoxone)

Rate 0.5 to 1.5 lb ae/a (1 to 3 quarts/a Butyrac 200)

Time Apply postemergence to seedling weeds less than 3 inches tall. See label for size of alfalfa when treating.

Remarks Controls broadleaf weeds only. Use the higher rate in arid areas. 2,4-DB is progressively more damaging to alfalfa as it matures. Certain annual broadleaf weeds such as smartweed, prostrate knotweed, redroot pigweed, and chickweed have proven resistant, especially under conditions west of the Cascades. Will not control grasses.

Caution Do not graze seedling alfalfa within 60 days after application.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

bromoxynil (Buctril)

Rate 0.25 to 0.375 lb ai/a (0.5 to 0.75 quart/a) or 0.5 lb ai/a (1 quart/a) when applied through sprinkler irrigation

Time Apply in spring or fall when alfalfa has at least four trifoliolate leaves and weeds listed as susceptible or moderately susceptible have no more than four leaves or are no more than 2 inches tall or 1 inch wide.

Remarks For broadleaf weeds only. Crop may be temporarily stunted, but yield should not drop.

Caution Do not treat if temperature exceeds or is expected to exceed 70°F during the 3 days after application by ground, or exceeds 85°F if applied through the sprinkler; crop injury may be unacceptable. Do not add a surfactant or crop oil because crop injury may increase. Do not cut for feed, or graze for 30 days after application.

Site of action Group 6: photosystem II inhibitor

Chemical family Nitrile

bromoxynil (Buctril) + 2,4-DB

Rate 0.25 lb ai/a bromoxynil + 0.5 lb ae/a 2,4-DB

Time Apply in spring or fall when alfalfa has at least four trifoliolate leaves.

Remarks For broadleaf weeds only. For improved control of tansy mustard, henbit, pigweed, and kochia compared to bromoxynil. Do not apply through a sprinkler. Follow the label for 2,4-DB. Crop may be temporarily stunted, but yields should not drop.

Caution Do not treat if temperature exceeds, or is expected to exceed, 70°F during the 3 days after application; crop injury may be unacceptable. Do not add a surfactant or crop oil because crop injury may increase. Do not graze or cut for feed for 30 days after application.

Site of action (bromoxynil) Group 6: photosystem II inhibitor; (2,4-DB) Group 4: synthetic auxin

Chemical family (bromoxynil) nitrile; (2,4-DB) phenoxy acetic acid

Annual Grass Weeds in Establishing New Stands

clethodim (Select 2EC, Select Max, Section Three, Intensity, or Intensity One)

Rate Select 2EC, or Intensity: use 0.094 to 0.125 lb ai/a (6 to 8 fl oz/a product). Section Three: use 0.094 to 0.24 lb ai/a (4 to 10.5 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product).

Time Apply to actively growing annual or perennial grasses at the stage of grass growth indicated on label.

Remarks For grass control only. See label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier at 1% v/v in the finished spray volume. Adding ammonium sulfate has improved control of difficult-to-control grasses. Clethodim is most effective on actively growing grasses before they reach the maximum size indicated on label. In irrigated alfalfa, for best results, apply within 2 to 4 days after irrigation. Use at least 8 oz/a of Select or 17 oz/a of Select Max or 6.67 fl oz/a of Section Three to control annual bluegrass.

Caution Control may be erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for forage or hay. Do not exceed 32 fl oz/a of Select 2EC or 64 fl oz/a of Select Max or 21.33 fl oz/a Section Three.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses at the appropriate stage of grass growth as indicated by the label.

Remarks For grass control only. See label for specific herbicide rates, weed species, and weed size. Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints for each acre of alfalfa treated. Sethoxydim is most effective on actively growing grasses before they have been cut, but before they reach the maximum size indicated on the label. Larger, more mature grasses can be controlled, but two applications may be required. Sethoxydim will not control annual bluegrass or any of the fine fescues, and offers weak control on downy brome and quackgrass.

Caution Control may be erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not apply within 7 days of feeding, grazing, or harvesting for green chop or silage, or within 14 days of harvesting hay. Do not exceed 1.22 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

Summer Annual Grasses in Established Stands

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses at stage of grass growth indicated on label.

Remarks See label for specific herbicide rates, weed species, and weed size. Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/a. Sethoxydim is most effective on actively growing grasses before they are cut or reach the maximum size indicated on label. Larger, more mature grasses can be controlled, but two applications may be required. Sethoxydim will not control annual bluegrass or any of the fine fescues.

Caution Control often is erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not apply within 7 days of feeding, grazing, or harvesting for green chop or silage, or within 14 days of harvesting hay. Do not exceed 0.94 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

trifluralin (Treflan TR-10 or Treflan HFP)

Rate 2 lb ai/a

Time Apply before weeds emerge.

Remarks Trifluralin must be activated by a single rain or overhead sprinkler irrigation of at least 0.5 inch, or by furrow irrigation that thoroughly wets the beds between furrows. If not activated within 3 days, mechanically incorporate trifluralin with equipment that will not damage the alfalfa. May be applied during dormancy or during the growing season after a cutting. Apply before weeds are expected to germinate; trifluralin will not control established weeds.

Caution Do not cut for hay or graze within 21 days of application. Apply no more than 2 lb ai/a per growing season. If rotating out of established alfalfa the year after applying, plant only crops for which trifluralin can be applied as a preplant treatment, because injury may result.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Quackgrass, Volunteer Cereals, and Annual Grasses in New or Established Stands

clethodim (Select, Select 2EC, Select Max, Section Three, Intensity, or Intensity One)

Rate Select 2EC, or Intensity: use 0.094 to 0.125 lb ai/a (6 to 8 fl oz/a product). Section Three: use 0.094 to 0.24 lb ai/a (4 to 10.5 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product).

Time Apply to actively growing annual or perennial grasses at stage of grass growth indicated on label.

Remarks For grass control only. Weak on quackgrass. See label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier at 1% v/v in the finished spray volume. Adding ammonium sulfate has improved control of difficult-to-control grasses. Clethodim is most effective on actively growing grasses before they reach the maximum

size indicated on label. Use the higher rate under heavy grass pressure and/or when annual bluegrass is more mature.

Caution Control may be erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for forage or hay. Do not exceed 32 fl oz/a of Select 2EC or 64 fl oz of Select Max or 21.33 fl oz/a Section Three per season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

pronamide (Kerb)

Rate 0.25 to 2 lb ai/a (1 to 4 lb/a 50-W; 1.2 to 4.8 pints/a SC)

Time Apply October through early December.

Remarks The low rates are for grass suppression only. Herbicidal activity is optimal when applied under cool conditions (55°F or cooler) and followed by rain or overhead irrigation. Use higher rates for perennial grass control. On fields to be treated, remove residue by burning or tilling into the soil.

Caution A restricted-use herbicide. Apply on new plantings only after alfalfa reaches the first trifoliolate leaf stage. Do not apply preplant, preemergence, or in the seed-leaf stage. Do not graze treated fields or feed clippings or crop residue to livestock within 25 days of applying (if less than 1.5 lb ai/a) or within 45 days (if 1.5 to 2 lb ai/a).

Site of action Group 3: microtubule assembly inhibitor

Chemical family Benzamide

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses at stage of grass growth indicated by the label.

Remarks Refer to label for specific herbicide rates, weed species, and weed size. Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/a. Sethoxydim is most effective on actively growing grasses before they have been cut and before they reach the maximum size indicated on label. Larger, more mature grasses can be controlled, but two applications may be required. Sethoxydim will not control annual bluegrass or any of the fine fescues.

Caution Control often is erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not apply within 7 days of feeding, grazing, or harvesting for green chop or silage, or within 14 days of harvesting hay. Do not exceed 0.94 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

Winter Annual Grasses and Broadleaf Weeds in Established Stands

carfentrazone (Aim EC)

Rate 0.008 to 0.04 lb ai/a (0.5 to 2.5 oz/a Aim EC)

Time Apply in the fall after the alfalfa is dormant or in spring before spring growth.

Remarks Broadcast applications are to be made to dormant alfalfa established for at least 1 year. See the Aim EC label for recommended adjuvants.

Caution Do not apply more than 2.5 oz/a of Aim EC per year.

Site of Action Group 14: Protoporphyrinogen oxidase inhibitor

Chemical family Triazolinone

diuron (Karmex or Direx)

Rate 1.2 to 2.4 lb ai/a (1.5 to 3 lb/a product)

Time Apply at start of dormancy (late October through early December).

Remarks Apply as a broadcast spray to dormant alfalfa established more than 1 year. Not very effective on downy brome (cheatgrass), or on volunteer cereals.

Caution Do not use on soils with less than 1% organic matter. Do not apply to snow-covered or frozen soil. Consult label on replant timing as labels and rates vary.

Site of action Group 7: photosystem II inhibitor

Chemical family Substituted urea

flumioxazin (Chateau)

Rate 0.1275 lb ai/a (4 oz /a Chateau)

Time Apply preemergence to the weeds.

Remarks To minimize crop injury, applications should be made as soon as possible after cutting and removing alfalfa. Flumioxazin will burn treated leaves and stems. A second application can be made 60 days after the first application. Will only give fair control of many annual grasses. If weeds are present when applications are made after the last harvest in the fall, or when the alfalfa is dormant, apply with paraquat to burndown weeds present.

Caution Do not harvest or graze within 25 days of application. Do not make second application within 60 days of the first application. Do not exceed 8 oz of Chateau during a single growing season.

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

Chemical family N-phenylphthalimide

hexazinone (Velpar DF)

Special precautions are needed for use on seed crops in Walla Walla County in Washington. See Section F, Alfalfa Seed

Rate 0.45 to 1.5 lb ai/a (0.67 to 2 lb/a Velpar)

Time Apply in fall after crop is dormant and before spring growth starts. On nondormant and semidormant varieties, apply in winter when alfalfa is least actively growing.

Remarks Labels differ slightly between Velpar formulations. Use lower rate on coarse, sandy soils low in organic matter. Apply to alfalfa established at least one growing season but not on snow-covered or frozen ground. Results are best if applied before or soon after weeds emerge (before weeds are 2 inches tall or across).

Caution Do not graze or harvest within 30 days after application. Do not apply to alfalfa growing under stress from insect, disease, winter injury, or other factors. Very heavy rain or irrigation soon after application may result in crop injury or nonperformance of the herbicide. Hexazinone persists in soil up to 24 months. Read label for crop rotation restrictions and other cautions.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

metribuzin (Dimetric EXT, TriCor DF, TriCor 4F, Metribuzin 75)

Rate 0.25 to 1 lb ai/a

Time Apply in the fall after crop is dormant and before spring growth starts.

Remarks Consult label for the product used. Broadcast spray dormant alfalfa established 1 year or more. Use the 0.25-lb rate of Sencor if the only target weed is common chickweed.

Caution Do not use on sand or use Sencor on soils with a pH greater than 8.2. Do not apply on snow-covered or frozen ground. Use lower rates on coarse, sandy soils or soils low in organic matter. Do not graze or harvest within 28 days after application. Stunting and chlorosis may occur, particularly in nondormant alfalfa. Stress—which may be caused in part by low fertility, disease, insects, overcutting, drought, or frost—may increase the possibility of crop injury. Avoid overlapping, because injury may occur. See herbicide label for recropping recommendations.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

norflurazon (Solicam DF)

Rate 1 to 2 lb ai/a (1.27 to 2.58 lb/a Solicam DF)

Time Apply no earlier than 5 months after crop emerges, or to dormant alfalfa, or after a harvest in the growing crop before weeds emerge.

Remarks Use lower rates on coarse and medium soils, higher rate on fine soils. At least 0.5 inch of overhead moisture required to move herbicide into soil. Fall or winter applications are recommended in nonirrigated areas with less than 15 inches of annual moisture (rain and snow combined) or less than 4 inches of spring rain. Will not control established weeds. Control established weeds or weeds that emerge before activation with a labeled postemergence herbicide.

Caution Do not apply to seedling alfalfa earlier than 5 months after planting. Do not exceed 2 lb ai/a per year. Preharvest interval is 28 days. Note rotation restrictions. Bioassay soils containing more than 65% sand before crop rotation. Rotation crops can be planted when no signs of phytotoxicity are observed in bioassay plants for 4 months after emergence.

Site of action Group 12: bleaching; inhibits carotenoid biosynthesis

Chemical family Pyridazinone

paraquat (Gramoxone Inteon, Firestorm, Parazone)

Rate Firestorm: 0.49 to 1 lb ai/a (1.3 to 2.7 pints/a product). Gramoxone Inteon: 0.5 to 0.75 lb ai/a (2 to 3 pints/a product). Add nonionic surfactant with 75% or greater surface-active agent at 1 pint, or crop oil concentrate with 15% to 20% approved emulsifier at 1 gal/100 gal spray mix.

Time Apply after last fall cutting when crop is dormant and before spring growth starts.

Remarks Apply soon after weeds germinate. Alfalfa should be dormant. Do not apply if fall regrowth after the last cutting is more than 6 inches high or if spring regrowth is more than 2 inches high. Control decreases as weed size increases. Use 20 gal/a or more water carrier for ground application. Paraquat is a contact herbicide. Excellent knockdown plus residual control usually is obtained by combining paraquat with one of the residual herbicides.

Caution A restricted-use herbicide. Do not pasture animals in treated fields before first cutting. Do not graze, cut, or harvest within 42 days of application. Do not apply more than once per season. Follow safety precautions on the labels.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

pendimethalin (Prowl H₂O)

Rate 1 to 4 lb ai/a (1.2 to 4.8 quarts/a Prowl H₂O)

Time Fall after the last cutting, during winter dormancy, in the spring, or between cuttings.

Remarks Controls most annual grasses and certain broadleaf weeds, including dodder, as they germinate. Apply to alfalfa that has gone through one growing season. May apply in a single application, or in sequential applications. Apply prior to the alfalfa reaching 6 inches in growth. Soil incorporation with rain-fall or sprinkler will enhance activity.

Caution Do not harvest alfalfa hay or forage less than 14 days after applying up to 2 pints/a. If more than 2 pints/a are applied, do not harvest for hay or forage within 50 days of application. Utilize the 28 day harvest interval only once per cropping season. Do not exceed 4 quarts/a of product per year. Refer to label for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

saflufenacil (Sharpen)

Rate 0.022 to 0.045 lb ai/a (1 to 2 oz/a Sharpen)

Time Apply to dormant alfalfa at least 90 days before harvest to avoid yield reductions in the first cutting.

Remarks A methylated seed oil plus ammonium sulfate or urea ammonium nitrate is required for burndown activity. See label for more information on adjuvants and tank mixes.

Caution Do not exceed 2 oz/a per cropping season. Sharpen can cause leaf necrosis on alfalfa but new growth will be normal and usually yield is not reduced.

Site of action Group 14: Protoporphyrinogen oxidase (PPO) inhibitor

Chemical family Pyrimidindione

terbacil (Sinbar WDG)

Rate 0.4 to 1.2 lb ai/a (0.5 to 1.5 lbs/a Sinbar WDG)

Time Apply to dormant alfalfa after frost but before January 1.

Remarks Apply as a broadcast spray to dormant alfalfa established 1 year or more. Use lower rate on coarse, sandy soils or soils low in organic matter.

Caution Do not use on sand, loamy sand, or gravelly soil. Do not use on soils with less than 1% organic matter. Do not apply on snow-covered or frozen ground. Do not replant treated areas to any crop within 2 years after last application.

Site of action Group 5: photosystem II inhibitor

Chemical family Uracil

trifluralin (Treflan HF or Treflan TR-10)

Rate 2 lb ai/a

Time Apply before weeds emerge.

Remarks Trifluralin must be activated by a single rain or overhead sprinkler irrigation of at least 0.5 inch, or by furrow irrigation that thoroughly wets beds between furrows. If not activated within 3 days, mechanically incorporate trifluralin with equipment that won't damage alfalfa. May be applied during dormancy or during the growing season after a cutting. Apply before weed seeds germinate; trifluralin will not control established weeds. If downy brome and other winter annual grasses are targets, apply immediately after a cutting between August 1 and October 1.

Caution Do not cut for hay or graze within 21 days after application. Apply no more than 2 lb ai/a per growing season. Note recropping restrictions. In the year after application, plant only those crops for which trifluralin is registered as a preplant treatment, or crop may be injured.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Annual Grasses and Broadleaf Weeds in Established Stands

flumioxazin (Chateau)

Rate 0.6375 lb ai/a (4 oz/a Chateau)

Time Apply preemergence to the weeds.

Remarks Applications should be made as soon as possible after cutting and removing alfalfa to minimize crop injury. Flumioxazin will burn treated leaves and stems. A second application can be made 60 days after the first application. Gives only fair control of many annual grasses. Apply with paraquat to burn down weeds when applying after the last harvest in the fall or when alfalfa is dormant.

Caution Do not apply harvest or graze within 25 days of application. Do not make second application within 60 days of the first application. Do not exceed 8 oz of Chateau during a single growing season.

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

Chemical family N-phenylphthalimide

imazamox (Raptor)

Rate 0.031 to 0.047 lb ai/a (4 to 6 oz/a Raptor)

Time Apply postemergence to actively growing weeds before they are 3 inches tall or across, and the alfalfa has less than 3 inches of regrowth.

Remarks May be applied to established alfalfa in the fall or winter, or in the spring to dormant or semi-dormant alfalfa, or between cuttings. Adding an adjuvant (nonionic surfactant or crop oil concentrate) and a liquid fertilizer or ammonium sulfate solution is required. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not exceed 6 oz product/a per season. Note recropping restrictions before using. Some crops cannot be planted within 26 months of application. Only rotational crops harvested at maturity may be used for feed or forage.

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

Chemical family Imidazolinone

imazethapyr (Pursuit)

Rate 0.047 to 0.094 lb ai/a (3 to 6 oz/a Pursuit)

Time Apply to established alfalfa in the fall, in the spring to dormant or semidormant alfalfa (less than 3 inches of regrowth), or between cuttings, and when most weeds are actively growing and 1 to 3 inches tall or across.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate) and a liquid fertilizer solution is required. Temporary height reduction or slight leaf yellowing may occur soon after application. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not feed, graze, or harvest alfalfa for 30 days after applying. Note recropping restrictions before use. Some rotation crops cannot be planted within 40 months of application. Only rotation crops harvested at maturity may be used for feed or food.

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

Chemical family Imidazolinone

Dodder Control

glyphosate

Rate 0.0625 to 0.075 lb ae/a

Time Apply as a spot treatment to actively growing dodder in non-Roundup Ready alfalfa.

Remarks A properly calibrated sprayer is required to make an accurate application.

Caution Do not spray more than 10% of the field to be harvested. If applied incorrectly, alfalfa will be injured or killed in treated areas. Do not graze or harvest within 14 days after application.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

pendimethalin (Prowl H₂O)

Rate 1.9 to 3.8 lb ai/a (2 to 4 quarts/a Prowl H₂O)

Time Apply to established alfalfa between January 15 and April 30, but before dodder germinates.

Remarks Controls most annual grasses and, in addition to dodder, certain broadleaf weeds as they germinate. For optimum dodder control, use 3 to 4 quarts/a product.

Caution Do not apply to seedling alfalfa. Do not exceed 4 quarts/a of product per year. Do not harvest for forage or hay for at least 50 days after application. Refer to label for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Herbicide Effectiveness on Weeds in Forage Alfalfa

Weed family	trifluralin (Treflan)	benefin (Balan)	EPTC	diuron (Karmex)	terbacil (Sinbar WDG)	metribuzin (Sencor)	hexazinone (Velpar)	norflurazon (Solicam)	pronamide (Kerb)	2,4-DB	paraquat (Gramoxone)	imazethapyr (Pursuit)	bromoxynil (Buctril)	sethoxydim (Poast)	clethodim (Select 2EC, etc.)	pendimethalin (Prowl H ₂ O)
Broadleaves																
Mustard, blue	P	P	P	G	P	G	E	—	F-G	P	—	—	F-H	P	P	P
Mustard, tansy	P	P	P	E	E	F-G	E	E	G	E	G	E	G	P	P	P
Mustard, tumble	P	P	F-G	E	E	E	E	E	G	E	E	E	G	P	P	—
Mustard, wild	P	P	P	E	E	E	E	—	G	E	E	E	G	P	P	—
Pennycress, field	P	P	P	E	E	E	E	—	G	—	E	E	—	P	P	—
Shepherdspurse	P	P	F-G	E	E	E	E	E	G	—	E	E	F-G	P	P	E
Composite																
Cocklebur	P	P	P	F	G	G	E	—	P	G	F	G	—	P	P	—
Dandelion	P	P	P	—	F-G	P-F	F-G	—	P	F	F	P	P	P	P	P
Lettuce, prickly	P	P	P	E	E	E	E	—	P	E	E	P	F	P	P	P
Sowthistle	P	P	P	G-E	E	G	E	—	P	G	E	P	F-G	P	P	—
Sunflower	P	P	P	F	G	F-G	—	—	P	G	E	G	—	P	P	—
Grasses																
Barnyardgrass	E	E	E	E	E	G	E	E	E	P	E	F-G	P	E	E	E
Brome, downy	E	E	G-E	F	E	G	E	E	E	P	E	P	P	P	P	E
Foxtail	E	E	E	E	E	G	E	E	E	P	E	F-G	P	E	E	E
Grain, volunteer	F-G	F-G	G	P-F	F-G	P-F	E	—	G	P	E	P	P	G	G	—
Oat, wild	F	F	G	P	—	F-G	P	—	F-G	P	F-G	F	P	G	G	G
Quackgrass	P	P	F-G	P	F	P-F	F	—	G	P	F	P	P	F	F	P
Sandbur	G	G-E	G-E	G-E	G	G	E	—	E	P	E	—	P	G	G	G
Miscellaneous																
Chickweed	G	G	G	E	E	E	E	G	G	P	G	—	P	P	P	G
Dodder	P	P	P	P	P	P	P	P	F-G	P	—	P	—	P	P	E
Knotweed	G	G	F	P	E	G	—	—	G	P	G	—	F	P	P	G
Kochia	G-E	G-E	P	E	G-E	G	—	—	F	G-E	G	G	E	P	P	G
Lambsquarters	G-E	G-E	G	E	E	E	E	F	G	E	E	F	G	P	P	G-E
Nightshade	P	P	G	—	E	P	—	G	G	G	E	E	G	P	P	F
Pigweed	G-E	G-E	G	E	E	E	E	F	P	E	E	E	F-G	P	P	G
Purslane	G	G	G	E	G-E	G	—	—	G	G	E	G	F	P	P	G
Thistle, Russian	G-E	G	P	G-E	G-E	F-G	—	—	G	E	E	—	G	P	P	—
E = excellent G = good F = fair P = poor or no control (—) = limited information Response of weeds to any of the listed herbicides may be altered by growing conditions, weed populations, type of irrigation, genetic variations of weeds, soil type, pH, organic matter, time of application, and application rate. An example is the E rating given for barnyardgrass control with paraquat. Paraquat will control most annual weeds when they are small, but paraquat is applied in the winter when alfalfa is dormant and summer annual weeds are not growing. Ratings may vary from season to season and from site to site within the area. Weed control generally decreases as the season progresses. See herbicide label for applicability to other weeds.																

Perennial Weed Control—Quackgrass, Field Bindweed, Canada Thistle, Johnsongrass, etc.

glyphosate

Rate 2.25 to 3.75 lb ae/a. For nonsodded quackgrass, use 0.75 to 1.5 lb ae/a. For sodded quackgrass, use 1.5 to 2.25 lb ae/a.

Time Apply preplant to full-grown weeds at least 10 days before planting the crop or as a spot treatment in the crop. Refer to label for growth stage of perennial weeds.

Remarks Use highest rate on field bindweed.

Caution Do not apply if weed is stressed from drought, weather, or maturity. Rain within 6 hours after application may reduce effectiveness. Control weed escapes the following years. If used as a spot treatment in the growing crop, do not treat more than 10% of the field. Do not harvest or graze within 14 days after treatment.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Preharvest Weed Control in Declining Alfalfa Stands

glyphosate

Rate Up to 1.5 lb ae/a

Time Apply when weeds are actively growing, prior to last cutting in alfalfa stand where crop destruction is acceptable.

Remarks Not all glyphosate formulations have this use on the label. Apply to declining alfalfa stands before the last cutting and rotating out of alfalfa. Treated crop and weeds can be fed to livestock. For satisfactory weed control, till deeply after treatment.

Caution Preharvest interval is 36 hours. Alfalfa will be severely injured or killed. Do not use on alfalfa grown for seed.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Other Registered Herbicides

MCPA (several trade names)

Rate 0.5 lbs ai/a (1 pint/a of 4 lb formulations)

Time Apply in late fall after first frost when alfalfa is dormant and temperatures are above 40°F.

Remarks Foliar application in winter to control winter annual broadleaf weeds. Selectivity depends on complete dormancy of alfalfa.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

Alfalfa Seed

Tim Prather

Revised March 2019

Note Several herbicides labeled for alfalfa grown for seed are not registered for alfalfa grown for forage.

Annual Grass and Broadleaf Weeds in New Seedlings

benefin (Balan DF)

Rate 1.2 to 1.5 lb ai/a (2 to 2.5 lb/a Balan DF)

Time Apply before planting to a clean, clod-free, soil surface and incorporate 2 to 3 inches deep within 4 hours after application.

Remarks Use 2 lb/a Balan DF on coarse to medium soils and up to 2.5 lb/a Balan DF on fine textured soils. Avoid overlapping spray.

Caution Do not plant wheat, barley, rye, other domestic grasses, or onions for 10 months after application. Do not plant milo (grain sorghum), corn, oats, sugar beets, other root crops, or spinach for 12 months after application.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

EPTC (Eptam 7E)

Rate 2 to 3.9 lb ai/a (2.3 to 4.5 pints/a Eptam 7E)

Time Apply before planting and incorporate immediately and thoroughly into soil.

Remarks Use lower rate on sandy soils, higher rate on silty and clay soils, quackgrass, and nutsedge. Incorporate 2 to 3 inches deep with power-drive rotary tiller for band or broadcast application, or set tandem disk 4 to 6 inches deep and use twice, at right angles for broadcast application.

Caution Crop may be injured temporarily. Do not use if a grass or grain companion crop is to be planted with the alfalfa.

Site of action Group 8: lipid synthesis inhibitor but not an ACCase inhibitor

Chemical family Thiocarbamate

imazamox (Raptor, Vulture)

Rate 0.03125 to 0.047 lb ai/a (4 to 6 oz/a Raptor or Vulture)

Time Apply after seedling alfalfa has at least two fully expanded trifoliolate leaves, and when the most weeds are 1 to 3 inches tall or across, and before alfalfa buds form.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate), and a liquid fertilizer or ammonium sulfate solution enhances weed control. Temporary height reduction or leaf yellowing may occur soon after application. Weeds under stress are harder to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Note recropping restrictions before using. Some crops cannot be planted within 26 months of application.

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

Chemical family Imidazolinone

imazethapyr (Pursuit)

Rate 0.047 to 0.094 lb ai/a (3 to 6 oz/a Pursuit)

Time Apply after seedling alfalfa has reached second trifoliolate growth stage and when most weeds are actively growing, and 1 to 3 inches tall or wide

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate) and a liquid fertilizer solution is required. Temporary height reduction or slight leaf yellowing may occur soon after application. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not feed, graze or harvest alfalfa for 30 days after application. Consult recropping restrictions before using. Some rotation crops cannot be planted within 40 months of application. Only rotational crops harvested at maturity may be used for feed or food.

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

Chemical family Imidazolinone

pendimethalin (Prowl H2O)

Rate 0.475 to 0.95 lb ai/a (1 to 2 pints/a of Prowl)

Time Apply to alfalfa with two trifoliolate leaves, but before it is 6 inches tall, between January 15 and April 30, and before weeds emerge.

Remarks Controls most annual grasses and certain broadleaf weeds, in addition to dodder, as they germinate. Processed seed must be labeled "Not for human or animal consumption" at the processing plant, and all seed screenings must be disposed so that they cannot be distributed or used for food or feed. For optimum dodder control, use 3 to 4 quarts/a of Prowl H₂O.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

trifluralin (Treflan HFP)

Rate 0.5 to 0.75 lb ai/a (1 to 1.5 pints/a Treflan HFP)

Time Before planting, apply and thoroughly incorporate into the top 2 to 3 inches of soil.

Remarks Use lower rates on coarse and medium soils, higher rates on fine soils.

Caution Some crop stand reduction and stunting may occur with this use. Do not plant sugar beets, red beets, spinach, proso millet, corn, sorghum, oats, or annual or perennial grass crops or grass mixtures for 12 months after a spring application or 14 months after a fall application. Moldboard plowing 12 inches deep before planting reduces the possibility of crop injury. If land has not been irrigated, do not plant these crops for 18 months after a spring application or 20 months after a fall application.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Annual Broadleaf Weeds in New Stands

2,4-DB (Butyrac 200)

Rate 0.5 to 1.5 lb ae/a (1 to 3 quarts/a Butyrac 200 or Butoxone 200)

Time Apply postemergence to small seedling weeds less than 3 inches tall, and when alfalfa seedlings have two to four trifoliate leaves.

Remarks Controls broadleaf weeds only, not grasses. Use higher rate in low-humidity areas. Using 2,4-DB is progressively more damaging to alfalfa as it matures. Certain annual broadleaf weeds such as smartweed, prostrate knotweed, redroot pigweed, and chickweed are resistant.

Caution Do not graze seedling alfalfa within 60 days after application.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

bromoxynil (Buctril 4EC)

Rate 0.25 to 0.375 lb ai/a (0.5 to 0.75 quart/a) or 0.5 lb ai/a (1 quart/a) when applied through sprinkler irrigation

Time Apply in fall or spring when alfalfa has at least two trifoliate leaves, and when weeds listed as susceptible or moderately susceptible have no more than four leaves, and are no more than 2 inches tall or 1 inch wide.

Remarks For broadleaf weeds only. Crop may be stunted temporarily, but yields should not drop.

Caution Do not treat when temperature exceeds or is expected to exceed 70°F in the 3 days after application by ground, or exceeds 85°F if applied through sprinkler irrigation systems; crop injury may be unacceptable. Do not add a surfactant or crop oil because crop injury may increase. Do not cut for feed or graze for 30 days after application.

Site of action Group 6: photosystem II inhibitor

Chemical family Nitrile

Annual Grass Weeds in New Stands

clethodim (Select 2EC, Select Max, Section Three, Intensity or Intensity One)

Rate Select, Select 2EC, or Intensity: use 0.094 to 0.125 lb ai/a (6 to 8 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product). Section Three: use 0.094 to 0.24 lb ai/a (4 to 10.5 fl oz/a product).

Time Apply to actively growing annual or perennial grasses at growth stage listed on label.

Remarks For grass control only. Refer to label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier at 1% v/v in the finished spray volume. Clethodim is most effective on actively growing grasses before they reach maximum size indicated on label. For best results in irrigated alfalfa, apply within 2 to 4 days after irrigation. Use at least 8 oz/a of Select or 17 oz/a of Select Max or 6.67 fl oz/a of Section Three to control annual bluegrass.

Caution Control may be erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for

forage or hay. Do not exceed 32 fl oz/a of Select or 64 fl oz/a of Select Max or 21.33 fl oz/a Section Three.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

fluazifop (Fusilade DX)

Rate 0.125 to 0.188 lb ai/a (0.5 to 0.75 pints/a product)

Time Apply to actively growing grasses, particularly quackgrass, when susceptible grasses are in labeled growth stage.

Remarks Controls grasses only. Special local needs labels OR-040006, ID-950006, and WA-040007. Add a crop oil concentrate at 0.5% to 1% concentration, or a nonionic surfactant at 0.25% to 0.5% concentration. Results often are erratic on grasses stressed from lack of vigor, drought, high temperatures, low fertility, or other factors. More mature grasses and quackgrass can be controlled, but may require two applications. Will not control annual bluegrass or any of the fine fescues. Fluazifop is often weak on foxtails and perennial bluegrass.

Caution Do not feed treated forage to livestock. No part of the treated field, including seed, seed screenings, hay, forage, or stubble may be used for human or animal feed.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Aryloxyphenoxypropionate

quizalofop (Assure II)

Rate 0.034 to 0.0825 lb ai/a (5 to 12 oz/a Assure II)

Time Apply to actively growing annual or perennial grasses at growth stage listed on label.

Remarks See label for specific herbicide rates, weed species, and weed size. Under arid conditions, use higher rate for the target grass weed. Always include a nonphytotoxic crop oil concentrate at 1% v/v or a nonionic surfactant at 0.25% v/v. Crop oil concentrate is preferred in arid areas. Will not control annual bluegrass or fine fescue. Control may be reduced on grasses stressed from lack of moisture, cold weather, herbicide injury, and insect injury or disease.

Caution Do not apply within 14 days of anticipated bloom. Do not use any part of crop (seed, sprouts, screenings, hay, forage, etc.) for animal or human consumption. Do not exceed two applications, or 0.17 lb ai/a (25 oz/a product) per season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Aryloxyphenoxypropionate

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses at growth stage listed on label.

Remarks Controls grasses only. See label for specific herbicide rates and weed species and size. Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/a. Sethoxydim is most effective on actively growing grasses before they have been cut, but before they reach the maximum size indicated on the label. Larger, more mature grasses can be controlled, but two applications may be required. Will not control annual bluegrass or any of the fine fescues.

Caution Control often is erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other

factors. Do not apply if rain is expected within 1 hour after application. Do not exceed 0.94 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

Summer Annual Grasses in Established Stands

clethodim (Select 2EC, Select Max, Intensity, or Intensity One)

Rate Select 2EC, or Intensity: use 0.094 to 0.125 lb ai/a (6 to 8 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product).

Time Apply to actively growing annual or perennial grasses in the labeled growth stage.

Remarks For grass control only. See label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier at 1% v/v in the finished spray volume. Adding ammonium sulfate improves control of difficult-to-control grasses. Clethodim is most effective on actively growing grasses before they reach maximum size indicated on label. Use higher rate under heavy grass pressure and/or if annual bluegrass is more mature.

Caution Control may be erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for forage or hay. Do not exceed 0.5 lb ai/a per season (32 fl oz/a of Select or 64 fl oz/a of Select Max).

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

fluazifop (Fusilade DX)

Rate 0.125 to 0.188 lb ai/a (0.5 to 0.75 pints/a product)

Time Apply to actively growing, susceptible grasses in the labeled growth stage.

Remarks Special local needs labels OR-040006, ID-950006, and WA-040007. Add a crop oil concentrate at 0.5% to 1% concentration or a nonionic surfactant at 0.25% to 0.5% concentration. Results often are erratic on grasses stressed from lack of vigor, drought, high temperatures, low fertility, or other factors. More mature grasses and quackgrass can be controlled but may require two applications. Will not control annual bluegrass or any of the fine fescues. Fluazifop is often weak on foxtails and perennial bluegrass.

Caution Do not feed treated forage to livestock.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Aryloxyphenoxypropionate

quizalofop (Assure II)

Rate 0.034 to 0.825 lb ai/a (5 to 12 oz/a Assure II)

Time Apply to actively growing annual or perennial grasses in the labeled growth stage.

Remarks See label for specific herbicide rates, weed species, and weed size. Under arid conditions, use higher rate for the target grass weed. Always include a nonphytotoxic crop oil concentrate at 1% v/v or a nonionic surfactant at 0.25% v/v. Crop oil concentrate is preferred in arid areas. Will not control annual bluegrass or fine fescue. Control may be reduced on grasses

stressed from lack of moisture, cold, herbicide injury, or insect injury or disease.

Caution Do not apply within 14 days of anticipated bloom. Do not use any part of crop (seed, sprouts, screenings, hay, forage, etc.) for animal or human consumption. Do not exceed two applications or 0.17 lb ai/a (25 oz/a product) per season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Aryloxyphenoxypropionate

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses at growth stage listed on the label.

Remarks See label for specific herbicide rates, weed species, and weed size. Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/a of alfalfa treated. Sethoxydim is most effective on actively growing grasses before they have been cut, and before they reach the maximum size indicated on the label. Larger, more mature grasses can be controlled, but two applications may be required. Will not control annual bluegrass or any of the fine fescues.

Caution Control often is erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not exceed 1.22 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCCase) inhibitor

Chemical family Cyclohexanedione

trifluralin (Treflan TR-10)

Rate 2 lb ai/a (20 lb/a Treflan TR-10)

Time Apply before weeds emerge.

Remarks Within 3 days, trifluralin must be activated by a single rain or overhead sprinkler irrigation of 0.5 inch after application, or it must be mechanically incorporated with equipment that will ensure thorough soil mixing with minimal damage to the alfalfa. Will not control emerged weeds.

Caution If established alfalfa is to be rotated to another crop the year after application, plant only those crops for which trifluralin can be applied as a preplant treatment, or injury may result.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Quackgrass, Volunteer Grains, and Annual Grasses in New or Established Stands

clethodim (Select 2EC, Select Max, Intensity, or Intensity One)

Rate Select 2EC, or Intensity: use 0.094 to 0.25 lb ai/a (6 to 16 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product).

Time Apply to actively growing annual or perennial grasses in the labeled growth stage.

Remarks Controls grass only, but is weak on quackgrass. Refer to label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier, at 1% v/v, in the finished spray volume. Adding ammonium sulfate improves control of difficult-to-control grasses. Most effective on actively growing grasses before they reach the maximum size

listed on label. For best results in irrigated alfalfa, apply within 2 to 4 days after irrigation. Use higher rate under heavy grass pressure and/or when annual bluegrass is more mature.

Caution Control may be erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for forage or hay. Do not exceed 0.5 lb ai/a per season (32 fl oz/a of Select 2EC or 64 fl oz/a of Select Max).

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

fluazifop (Fusilade DX)

Rate 0.125 to 0.188 lb ai/a (0.5 to 0.75 pints/a Fusilade DX)

Time Apply to actively growing, susceptible grasses in the labeled growth stage.

Remarks Special local needs labels OR-040006, ID-950006, and WA-040007. Add a crop oil concentrate at 0.5% to 1% concentration or a nonionic surfactant at 0.25% to 0.5% concentration. Results often are erratic on grasses stressed from lack of vigor, drought, high temperatures, low fertility, or other factors. More mature grasses and quackgrass can be controlled but may require two applications. Will not control annual bluegrass or any of the fine fescues. Fluazifop is often weak on foxtails and perennial bluegrass.

Caution Do not feed treated forage to livestock.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Aryloxyphenoxypropionate

pronamide (Kerb 50-W, Kerb SC)

Rate 0.5 to 2 lb ai/a (1 to 4 lb/a 50-W; 1.2 to 4.8 pints/a SC)

Time Apply October through early December.

Remarks Results are best if applied under cool conditions (55°F or cooler) and followed by rain or overhead irrigation. Use the higher rates for perennial grass control. On fields to be treated, remove residue by burning or tilling into the soil.

Caution **A restricted-use herbicide.** Apply on new plantings only after alfalfa has reached the first trifoliolate-leaf stage of growth. Do not apply preplant, preemergence, or in the seed-leaf stage. Do not graze treated fields or feed clippings and crop residues to livestock within 25 days of application (if less than 1.5 lb ai/a) or within 45 days (if 1.5 to 2 lb ai/a). Do not apply on frozen ground. Must be applied by certified applicators, or people directly under a certified applicator's direction. Kerb SC is registered for OR, WA, and ID under Special local needs labels.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Benzamide

quizalofop (Assure II)

Rate 0.034 to 0.0825 lb ai/a (5 to 12 oz/a Assure II)

Time Apply to actively growing annual or perennial grasses in the labeled growth stage.

Remarks See label for specific herbicide rates, weed species, and weed size. Under arid conditions, use higher rate for the target grass weed. Always include a nonphytotoxic crop oil concentrate at 1% v/v or a nonionic surfactant at 0.25% v/v. Crop oil concentrate is preferred in arid areas. Will not control annual bluegrass or fine fescue. Control may be reduced on grasses

stressed from lack of moisture, cold, herbicide injury, or insect injury or disease.

Caution Do not apply within 14 days of anticipated bloom. Do not use any part of crop (seed, sprouts, screenings, hay, forage, etc.) for animal or human consumption. Do not exceed two applications or 0.17 lb ai/a (25 oz/a product) per season.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Aryloxyphenoxypropionate

sethoxydim (Poast or Poast Plus)

Rate 0.19 to 0.47 lb ai/a (1 to 2.5 pints/a Poast)

Time Apply to actively growing annual or perennial grasses in the labeled growth stage.

Remarks See label for specific herbicide rates, weed species, and weed size. Always add a nonphytotoxic oil concentrate to spray tank at 2 pints/a. Most effective on actively growing grasses before they are cut or reach the maximum size indicated on label. Larger, more mature grasses can be controlled, but two applications may be required. Will not control annual bluegrass or any of the fine fescues.

Caution Control often is erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not exceed 1.22 lb ai/a in one season.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

Winter Annual Grasses and Broadleaf Weeds in Established Stands

asulam (Asulox)

Rate 1.24 to 1.5 lb ai/a (3 to 3.6 pints/a Asulox)

Time Apply when weeds are less than 3 inches tall.

Remarks SLN WA-100008, ID-130002, and OR-140002. Apply as a postemergent application. Symptoms are slow to develop and several weeks are needed for control.

Caution Do not disturb soil 7 days prior and 7 days after an application.

Site of action Group 18: inhibits DHP synthase

Chemical family Carbamate

carfentrazone (Aim EC)

Rate 0.008 to 0.04 lb ai/a (0.5 to 2.5 oz/a Aim EC)

Time Apply Aim EC in the fall after the crop is dormant or in the spring before spring growth starts.

Remarks Apply as a broadcast spray to dormant alfalfa that has been established for at least 1 year. See label for tank mixes. Use rates up to 2.5 oz in 10 gal of water for optimal control. Always add an adjuvant. See Aim EC label for recommended additives.

Caution Do not harvest stands grown for seed for 3 days after application. Do not apply more than 3.8 oz of Aim EC per year.

Site of Action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Triazolinone

diuron (Karmex or Direx 4L)

Rate 1.2 to 2.4 lb ai/a (1.5 to 3 lb/a product)

Time Apply at start of dormancy (late October through early December).

Remarks Apply as a broadcast spray to dormant alfalfa established more than 1 year. Not very effective on downy brome (cheatgrass) or volunteer cereals.

Caution Do not use on soils with less than 1% organic matter. Do not apply to snow-covered or frozen soil. Do not replant treated area to any crop within 2 year of application.

Site of action Group 7: photosystem II inhibitor

Chemical family Substituted urea

flumioxazin (Chateau)

Rate 0.1275 lb ai/a (4 oz/a Chateau)

Time Apply preemergence to the weeds.

Remarks Special local need labels WA-10003 and 120012. Applications should be made as soon as possible after cutting and removing alfalfa, to minimize crop injury. Flumioxazin will burn treated leaves and stems. A second application can be made 60 days after the first application. Will only give fair control of many annual grasses. If weeds are present when applications are made after the last harvest in the fall or when the alfalfa is dormant, apply with paraquat to burn down weeds present.

Caution Do not harvest or graze within 25 days of application. Do not make second application within 60 days of the first application. Do not exceed 8 oz of Chateau during a single growing season.

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

Chemical family N-phenylphthalimide

hexazinone (Velpar DF and L)

Rate 1 to 1.5 lb ai/a (1.33 to 2 lb/a Velpar DF; 4 to 6 pints/a L)

Time Apply in fall after crop is dormant and before spring growth exceeds 2 inches.

Remarks See supplemental label for Walla Walla county growers. Use lower rate on coarse, sandy soils low in organic matter. Apply to alfalfa established at least one growing season. Results are best if applied before, or soon after, weeds emerge (before weeds are 2 inches tall or across). If weeds are emerged, use a surfactant.

Caution A restricted-use herbicide in WA for the protection of groundwater. Do not graze or harvest (cut for hay) within 30 days after application. Do not apply to alfalfa growing under stress from insect, disease, winter injury, or other factors. Do not use on fields with sandy loam or loamy sands having less than 1% organic matter. Very heavy rain or more than 0.5 inch of irrigation soon after application may result in crop injury or herbicide nonperformance. Hexazinone persists in soil up to 24 months. Read label for crop rotation restrictions and other cautions.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

hexazinone + diuron (Velpar Alfamax Gold DG)

Rate (0.231 to 0.462 lb ai/a hexazinone + 0.55 to 1.12 lb ai/a diuron (16 to 32 oz/a product)

Time Apply in fall after crop is dormant and before spring growth exceeds 2 inches.

Remarks Apply to alfalfa established for at least one year.

Caution A restricted-use herbicide in WA for the protection of groundwater. Do not graze or harvest (cut for hay) within 30 days after application. Do not apply to alfalfa growing under stress from insect, disease, winter injury, or other factors. Do not use on fields with sandy loam or loamy sands having less than 1% organic matter. Very heavy rain or more than 0.5 inch of irrigation soon after application may result in crop injury or herbicide nonperformance. Hexazinone persists in soil up to 24 months. Read label for crop rotation restrictions and other cautions.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

imazamox (Raptor, Vulture)

Rate 0.03125 to 0.047 lb ai/a (4 to 6 oz/a Raptor or Vulture)

Time Apply to established alfalfa in the fall, in the spring to dormant or semidormant alfalfa (less than 3 inches of regrowth), and when most weeds are 1 to 3 inches tall or across, and before alfalfa buds form.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate), and a liquid fertilizer solution or ammonium sulfate solution enhances weed control. Temporary height reduction or leaf yellowing may occur soon after application. Weeds under stress are harder to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Before using, note recropping restrictions. Some crops cannot be planted within 26 months of application.

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

Chemical family Imidazolinone

imazethapyr (Pursuit)

Rate 0.047 to 0.094 lb ai/a (3 to 6 oz/a Pursuit)

Time Apply to established alfalfa in the fall, in spring to dormant or semidormant alfalfa (less than 3 inches of regrowth), and when most weeds are actively growing and 1 to 3 inches tall or across.

Remarks Adding an adjuvant (nonionic surfactant or crop oil concentrate), and a liquid fertilizer solution is required. Temporary height reduction or slight leaf yellowing may occur soon after application. Weeds under stress are less susceptible to control. Apply at least 1 hour before rain or overhead irrigation.

Caution Do not feed, graze, or harvest alfalfa for 30 days after application. See recropping restrictions before use. Some crops cannot be planted within 40 months of application. Use only rotational crops harvested at maturity for feed or food.

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

Chemical family Imidazolinone

metribuzin (Dimetric EXT, TriCor 75 DF, TriCor 4F)

Rate 0.25 to 1 lb ai/a (0.33 to 1.33 lb/a DF; 0.5 to 2 pints/a 4F)

Time Apply in fall after crop is dormant and before spring growth starts.

Remarks Consult label for the product used. Broadcast spray dormant alfalfa established 1 year or more. Use the 0.25-lb rate of Sencor if common chickweed is the only target.

Caution Do not use on sand. Do not use Sencor on soils with a pH greater than 8.2. Do not apply on snow-covered or frozen ground. Use lower rates on coarse, sandy soils or soils low in organic matter. Do not graze or harvest within 28 days after application. Stunting and chlorosis may occur, particularly in nondormant alfalfa. Stress (which may be caused in part by low fertility, disease, insects, overcutting, drought, or frost) may increase the possibility of crop injury. Avoid overlapping because injury may occur. See herbicide label for recropping recommendations.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

norflurazon (Solicam DF)

Rate 1 to 2 lb ai/a (1.27 to 2.58 lb/a Solicam DF)

Time Apply no earlier than 5 months after crop emerges, or to dormant alfalfa before weeds emerge.

Remarks Use lower rates on coarse and medium soils, higher rate on fine soils. At least 0.5 inch of overhead moisture is needed to move herbicide into soil. Fall or winter application is recommended in nonirrigated areas with less than 15 inches annual moisture (rain and snow combined), or less than 4 inches of spring rain. Does not control established weeds. Established weeds or weeds that emerge before activation may be controlled with a labeled postemergence herbicide.

Caution Do not apply to seedling alfalfa earlier than 5 months after planting. Do not exceed 2 lb ai/a per year. Note rotation restrictions. Before crop rotation, bioassay soils that contain more than 65% sand. Rotation crops can be planted if no signs of phytotoxicity are observed in bioassay plants for 4 months after emergence.

Site of action Group 12: bleaching; inhibitor of carotenoid biosynthesis

Chemical family Pyridazinone

paraquat (Gramoxone SL 2.0, Parazone 3L)

Rate Firestorm: use 0.49 to 1 lb ai/a (1.3 to 2.7 pints/a product). Gramoxone Inteon: use 0.5 to 0.75 lb ai/a (2 to 3 pints/a product). Add nonionic surfactant with at least 75% surface-active agent at 16 to 32 fl oz/100 gal, or crop oil concentrate with 15 to 20% approved emulsifier at 1 gal/100 gal spray mix.

Time Apply after seed harvest when crop is dormant, before spring growth starts.

Remarks Apply soon after weeds germinate. Alfalfa should be dormant, and regrowth following harvest not more than 2 inches high. Control decreases as weed size increases. Use 20 gal/a or more of water carrier for ground application. Paraquat is a contact herbicide. Combining with one of the residual herbicides usually gives knockdown plus residual control. SLN labels available for OR (120014, 140009, 180005), WA (120009, 130011, 180003), and ID (120002, 140004 and 180003).

Caution A restricted-use herbicide. Do not pasture animals in treated fields. Do not graze, cut, or harvest within 42 days of application. Do not apply more than once per season. Follow safety precautions on the labels.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

pendimethalin (Prowl or Stealth)

Rate Prowl H₂O: use 0.95 to 3.8 lb ai/a (1 to 4 quarts/a product). Prowl 3.3EC and Stealth: use 1 to 4 lb ai/a (1.2 to 4.8 quarts/a product).

Time Apply to established alfalfa between January 15 and April 30 but before dodder germinates.

Remarks Active special local needs labels include ID-060016 and OR-070027 for Stealth. Controls most annual grasses and certain broadleaf weeds, in addition to dodder, as they germinate. Processed seed must be labeled "Not for human or animal consumption" at the processing plant, and all seed screenings must be disposed of in a way that they cannot be distributed or used for food or feed. For optimum dodder control, use 3 to 4 quarts/a of Prowl H₂O or 3 to 4.8 quarts/a of Prowl 3.3 or Stealth.

Caution Do not apply this rate to seedling alfalfa. Do not graze or harvest alfalfa for hay after application. Do not use screenings from seed processing as feed for livestock. Do not use harvested seed for sprouting. Refer to main labels for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

simazine (Simazine 4L)

Washington only

Rate 0.8 to 1.6 lb ai/a (0.8 to 1.6 quarts/a)

Time Apply to alfalfa in fall, after harvest but before ground freezes.

Remarks Special local needs labels WA-900040 and WA-090015. Broadcast spray on alfalfa established 1 year or more. Do not apply to frozen ground. Apply only once per year. Processed seed must be labeled "Not for human or animal consumption" at the processing plant, and all seed screenings must be disposed of in a way that they cannot be distributed or used for food or feed.

Caution Do not use on sand, loamy sand, or gravelly soil. Do not use seed for sprouting. Do not graze treated area or cut for hay after treatment. Do not cultivate before or after simazine application. Do not plant any crop except corn the year after application, or crop may be injured.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

S-metolachlor (Dual Magnum)

Oregon only

Rate 2.5 to 3.2 lb ai/a (2.65 to 3.332 pints/a Dual Magnum)

Time Apply and incorporate prior to weed emergence.

Remarks SLN OR-040007. This is an indemnified label that is available at www.farmassist.com. Users of this product assume all risk of crop injury, crop yield reduction and crop loss, and release Syngenta Crop Protection from all liability. Incorporate metolachlor uniformly in the top 3 inches of the soil by cross tillage (twice over the field).

Caution Do not use tailwater from first flood, or furrow irrigation of treated fields to treat nontarget crops, unless 0.5 inch of rainfall has occurred between application and the first irrigation. No portion of the crop may be used or distributed for food or feed for 1 year after application. All seed screenings must be disposed of in such a manner that the screenings cannot be distributed for food or feed purposes.

Site of action Group 15: inhibits very long chain fatty acid synthesis

Chemical family Chloroacetamide

terbacil (Sinbar)

Rate 0.4 to 1.2 lb ai/a (0.5 to 1.5 lb/a Sinbar)

Time Apply to dormant alfalfa after frost, before January 1.

Remarks Broadcast spray on dormant alfalfa established 1 year or more. Use lower rate on coarse, sandy soils, or on soils low in organic matter.

Caution Do not use on sand, loamy sand, or gravelly soil. Do not use on soils containing less than 1% organic matter. Do not apply on snow-covered or frozen ground. Do not replant treated areas to any crop within 2 years of last application.

Site of action Group 5: photosystem II inhibitor

Chemical family Uracil

Dodder and Other Weeds in Established Stands

pendimethalin (Prowl 3.3, Prowl H₂O)

Rate 2 to 4 lb ai/a (2.4 to 4.8 quarts/a Prowl 3.3)

Time Apply to established alfalfa between January 15 and April 30, but before dodder germinates.

Remarks Controls most annual grasses and, in addition to dodder, certain broadleaf weeds as they germinate. Processed seed must be labeled "Not for human or animal consumption" at the processing plant, and all seed screenings must be disposed of in a way that they cannot be distributed or used for food or feed.

Caution Do not apply to seedling alfalfa. Do not graze or harvest alfalfa for hay after application. Do not use screenings from seed processing as feed for livestock. Do not use harvested seed for sprouting.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pronamide (Kerb 50-W)

Rate 1.5 to 2 lb ai/a (3 to 6 lb/a 50W). Use 1.5 to 2 lb ai/a in furrow-irrigated or rill-irrigated fields and 1.5 lb ai/a in sprinkler-irrigated fields.

Time Apply in spring before dodder germinates.

Remarks On furrow-irrigated or rill-irrigated fields, follow a shallow incorporation with irrigation within 7 days. On sprinkler-irrigated fields, follow application with 0.5 to 1 inch of water within 1 to 3 days. Seldom is dodder controlled 100%. Patrol fields to find dodder patches, then spot-treat them.

Caution A restricted-use herbicide. Follow application with a shallow irrigation. When sprinkler irrigation is used, irrigate within 3 days; with furrow systems, irrigate within 7 days. Do not graze treated fields or harvest for forage.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Benzamide

trifluralin (Treflan TR-10)

Rate 3 to 4 lb ai/a (30 to 40 lb/a Treflan TR-10 granules)

Time Apply before dodder germinates, in late winter or spring. The surface-applied granules must be activated by a single rain or overhead sprinkler irrigation of at least 0.5 inch within 3 days of application. Otherwise, incorporate with equipment that ensures thorough soil mixing with minimal damage to the alfalfa.

Remarks Special local needs labels ID-910001, OR-900019 (A and B), and WA-900016. Use only on alfalfa grown for seed. Seed must be labeled at the processing plant "Not for human or animal consumption." Seed screenings from alfalfa treated with more than 20 lb/a Treflan TR-10 must be disposed of in a way that prevents recovery for food or feed.

Caution Do not use on seedling alfalfa. Do not graze or harvest treated alfalfa for hay. When treated alfalfa will be rotated to another crop in the year after application, plant only those crops to which trifluralin can be applied as a preplant treatment.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Spot Treatment of Dodder

glyphosate (several trade names)

Rate 0.5 lb ae/a

Time Apply to actively growing dodder.

Remarks Research has shown that lower rates will control dodder.

Caution Do not spray more than 10% of field to be harvested. Alfalfa will be injured or killed in treated areas. Do not graze or harvest within 14 days after application.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Nightshade and Dodder in Established Stands

ethalfluralin (Sonalan HFP)

Rate 1.5 to 1.7 lb ai/a (4 to 4.5 pints/a) before nightshade germinates; 1.5 lb ai/a (4 pints/a) before dodder germinates

Time Apply before nightshade germinates and thoroughly incorporate into the top 2 to 3 inches of soil. Apply again in the spring at 1.5 lb ai/a (4 pints/a), before dodder germinates.

Remarks Special local needs labels ID-950020, OR-940037, and WA-940018. In Oregon, use only on alfalfa grown for seed in Malheur, Umatilla, Morrow, Josephine, and Jackson counties by members of the Oregon Alfalfa Seed Growers Assn., Gardena Alfalfa Seed Growers Assn., Inc., and Josephine Growers Cooperative Assn. For best results, herbicide should be activated within 2 days after application. For dodder control, herbicide may be activated by rain, irrigation, or mechanical incorporation, but do not mechanically incorporate more than 1 inch deep.

Caution Do not apply the year before rotating to another crop. Do not apply to seedling alfalfa (up to six-true-leaf stage) or to soils that are wet, cloddy, or subject to prolonged flooding.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

Perennial Weed Control (Quackgrass, Field Bindweed, Canada Thistle, Johnsongrass, etc.)

glyphosate (several trade names)

Rate 2.25 to 3.75 lb ae/a. For nonsodded quackgrass, use 0.75 to 1.5 lb ae/a. For sodded quackgrass, use 1.5 to 2.25 lb ae/a.

Time Apply preplant to full-grown weeds at least 10 days before planting crop or as a spot treatment in the crop. See label for growth stage of perennial weeds.

Remarks Use highest rate on field bindweed.

Caution Do not apply to weeds stressed by drought, weather, or maturity. Rain within 6 hours after application may reduce effectiveness. Control weed escapes the following years. If used as a spot treatment in the growing crop, do not treat more than 10% of the field. Do not harvest or graze within 14 days after treatment.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Harvest Aid

paraquat (Gramoxone Inteon, Parazone 3L)

Rate

Time Apply after seed harvest when crop is dormant, before spring growth starts.

Remarks Use 20 gal/a or more of water carrier for ground application. Paraquat is a contact herbicide. Combining with one of the residual herbicides usually gives knockdown plus residual control. SLN labels for Gramoxone and Parazone for OR (120014, 140009, 180005), and WA (120009, 130011, 180003).

Caution A restricted-use herbicide. Do not pasture animals in treated fields. Do not graze, cut, or harvest within 42 days of application. Do not apply more than once per season. Follow safety precautions on the labels.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

Birdsfoot Trefoil

Tim Prather

Revised March 2018

2,4-DB (Butyrac 200 or Butoxone 200)

Rate 0.5 lb ae/a to 1.5 lb ae/a (1 to 3 quarts/a Butyrac 200 or Butoxone 200)

Time Apply after trefoil has at least two true leaves.

Remarks Controls certain annual broadleaf weeds in new stands. Weeds should be small at the time of application.

Caution Observe the same precautions with 2,4-DB as for 2,4-D. Leaves in trefoil might distort for several weeks after application, lowering production. This treatment damages established stands. Do not graze or feed treated forage for 60 days after treatment.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

benefin (Balan DF)

Rate 1.2 to 1.5 lb ai/a (2 to 2.5 lb/a Balan DF)

Time Apply up to 10 weeks preplant. Do not apply after seeding.

Remarks For preemergent control of annual grasses and broadleaf weeds in new plantings. Use 2 lb/a Balan DF on coarse to medium soils and up to 2.5 lb/a Balan DF on fine textured soils. Use double cross-disking or a rototiller to incorporate herbicide immediately after application.

Caution Avoid spray overlaps. Do not plant wheat, barley, rye, grasses, or onions for 10 months after application. Wait 12 months before seeding corn, oats, red beets, root crops, or spinach.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

carfentrazone (Aim EC)

Rate 0.008 to 0.04 lb ai/a (0.5 to 2.5 oz/a Aim EC)

Time Apply Aim EC in the fall after the crop is dormant or in the spring before spring growth starts.

Remarks Apply as a broadcast spray to dormant trefoil that has been established for at least 1 year. See label for tank mixes. Use rates up to 2.5 oz/a in 10 gal of water for optimal control. Always add an adjuvant. See Aim EC label for recommended additives.

Caution Do not harvest stands grown for seed for 3 days after application. Do not apply more than 2.5 oz of Aim EC per year.

Site of Action Group 14: protoporphyrinogen oxidase (PPO) inhibitor

Chemical family Triazolinone

clethodim (Select 2EC, Select Max, Section Three, Intensity, or Intensity One)

Rate Select 2EC, or Intensity: use 0.094 to 0.25 lb ai/a (6 to 16 fl oz/a product). Section Three: use 0.094 to 0.24 lb ai/a (4 to 10.5 fl oz/a product). Select Max or Intensity One: use 0.07 to 0.24 lb ai/a (9 to 32 fl oz/a product).

Time Apply to actively growing annual or perennial grasses at growth stage listed on label.

Remarks For grass control only. Weak on quackgrass. See label for specific weed species and weed size. Always add a crop oil concentrate containing at least 15% emulsifier, at 1% v/v, in the finished spray volume. Adding ammonium sulfate improves control of difficult-to-control grasses. Clethodim is most effective on actively growing grasses before they reach the maximum size indicated on label. Use the higher rate under heavy grass pressure and/or when annual bluegrass is more mature.

Caution Control may be erratic if grasses are stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors, or if grasses are larger than indicated on label. Do not apply if rain is expected within 1 hour after application. Do not apply within 15 days of grazing, feeding, or harvesting for forage or hay. Do not exceed 32 fl oz/a of Select 2EC or 64 fl oz/a of Select Max or 21.3 fl oz/a Section Three.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

diuron (Karmex, Direx 4L or others)

Western Oregon only

Rate 1.6 lb ai/a (1.6 quarts/a product)

Time Apply after trefoil is dormant, in late October to early December.

Remarks Controls annual grasses and broadleaf weeds in established trefoil. Use mechanical agitation.

Caution Apply only on stands that are at least 1 year old. Diuron is a soil sterilant at high rates, so take care to avoid double applications. Do not apply to sand, loamy sand and gravelly soils nor when organic matter is less than 1%. Do not apply to frozen ground.

Site of action Group 7: photosystem II inhibitor

Chemical family Substituted urea

EPTC (Eptam 7E)

Rate 2 to 3.9 lb ai/a (2.25 to 4.5 pints/a Eptam 7E)

Time Prior to planting, apply to seedbed before final disking and harrowing.

Remarks Preemergence control of annual grass and broadleaf weeds in new plantings. Apply to seedbeds dry enough to permit thorough mixing by disking in two directions immediately after spraying. Seeding can be right after herbicide incorporation.

Caution Avoid contact with clothing.

Site of action Group 8: lipid synthesis inhibitor but not an ACCase inhibitor

Chemical family Thiocarbamate

glyphosate (several trade names)

Rate 2.25 to 3.75 lb ae/a

Time Apply preplant to full-grown weeds at least 10 days before planting the crop. (Refer to label for growth stage of perennial weeds.)

Remarks Controls weeds before trefoil establishes. Use highest rate on field bindweed.

Caution Do not apply to weeds stressed by drought, weather, or maturity. Rain within 6 hours after application may reduce effectiveness. Control weed escapes the next year.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

pronamide (Kerb 50-W)

Rate 0.5 to 2.0 lb ai/a (1 to 4 lb/a 50-W;)

Time Apply in fall after trefoil has three to four trifoliate leaves but before soil freezes. December applications are preferred.

Remarks Controls annual grasses and volunteer cereals. Use higher rate for established grasses. Does not control broadleaf weeds in the composite family.

Caution **A restricted-use herbicide.** Do not graze treated field or harvest for forage within 120 days after treatment. Soil residues of pronamide persist; therefore, do not plant cereals or a grass crop immediately following clovers that were winter killed. Do not apply to frozen soil.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Benzamide

sethoxydim (Poast Plus)

Rate 0.28 to 0.47 lb ai/a (1.5 to 3.75 pints/a Poast Plus)

Time To control grasses listed on label. Apply to actively growing grasses at the appropriate stage as listed on the label.

Remarks Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/a.

Caution Do not apply to drought-stressed grass or grass that has gone through an extended dry period. Do not allow grazing until 7 days after application, and do not cut for dry hay until 14 days after application. Do not apply more than 9.75 pints per season.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

Clover Seed

Andrew Hulting

Revised March 2018

Preplant

benefin (Balan DF)

Rate 1.2 to 1.5 lb ai/a (2 to 2.5 lb/a Balan DF)

Time Before planting clover, benefin must be incorporated into the top 2 to 3 inches of the seedbed.

Remarks Controls annual grasses and certain annual broadleaf weeds. Application rates are based on soil texture. Use the 2.5 lb/a rate on fine clay soils, use the lower 2 lb/a rate on coarse sandy soils.

Caution Weed control may vary if incorporation is delayed more than 4 hours after application. Do not apply benefin to soils that are subject to prolonged flooding, because poor weed control may result. In arid, irrigated areas, do not rotate to a small grain or other grass crop for 10 months to avoid crop injury due to herbicide carryover. See label for additional crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

EPTC (Eptam 7E or Eptam 20G)

Rate 2 to 4 lb ai/a (2.25 to 4.5 pints/a Eptam 7-E or 15 to 20 lb/a Eptam 20-G)

Time Apply to a clean, residue-free seedbed before final disking and harrowing. Immediately incorporate into the top 2 to 3 inches of soil to prevent losing the herbicide. Whenever possible, apply and incorporate in the same operation. Incorporation in two directions is recommended for heavy soils and perennial grass weed control. Clovers may be seeded any time after EPTC is incorporated into the soil.

Remarks Controls annual and perennial grasses (e.g., quackgrass and common and German velvetgrasses) and certain broadleaf weeds.

Caution Temporary crop stunting and sealing of the first leaves will occur if clover germination conditions are not optimum. Do not use if a grass or small-grain nurse crop is to be planted with the clover. Do not use on white clover.

Site of action Group 8: lipid synthesis inhibitor but not an ACCase inhibitor

Chemical family Thiocarbamate

Established, soil residual

pendimethalin (several trade names)

Oregon and Idaho only

Rate 0.95 to 3.8 lb ai/a

Time Apply to established clover before weeds emerge and before clover is more than 6 inches high. Herbicide is most effective when incorporated into the weed germination zone by rain or irrigation within 7 days of application.

Remarks Special local needs labels ID-140003 and OR-070025 (for Stealth). Controls dodder, most annual grasses, and certain broadleaf weeds as they germinate, but will not control established weeds.

Caution Do not apply to seedling clover. Do not feed or graze clover after applying. Do not cut treated clover for hay or forage. Do not use harvested seed for sprouting. The seed producer must give a copy of the label to the seed conditioner. Processed seed must be labeled "Not for human or animal consumption." Refer to main labels for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pronamide (several trade names)

Rate 0.5 to 2 lb ai/a

Time Apply after clover reaches the trifoliolate leaf stage. Results are best when applied under cool conditions (soil temperature of 55°F or cooler) with rain following. Apply before soil freezes, and to fields where crop residues have been removed or evenly dispersed.

Remarks Controls annual grasses and volunteer cereals in new or established stands. Use higher rate for well-established grasses or volunteer grains. Does not control groundsel, hawksbeard, mayweed, and other members of the *Asteraceae* family.

Caution A restricted-use herbicide. Do not graze treated field, or harvest for forage, for 120 days after treatment. Do not plant field to cereals or to a grass crop immediately following clovers that were winter killed. See labels for crop rotation restrictions.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Benzamide

Dormant and semi-dormant applications

diuron (several trade names)

Western Oregon, red clover only

Rate 1.6 lb ai/a

Time Apply when red clover is semi-dormant, from October 15 to December 15.

Remarks Controls annual grass and broadleaf weeds such as annual bluegrass, chickweed, hawksbeard, rattail fescue, annual ryegrass, and seedling velvetgrass.

Caution Apply to red clover only. Stands should be established at least 9 months and in vigorous condition. Do not replant to any crop within 1 year after application to limit potential for rotational crop injury.

Site of action Group 7: photosystem II inhibitor

Chemical family Substituted urea

oxyfluorfen (Goal 2XL)

Oregon (OR-050028) and Idaho (ID-100004) only, red and white clover

Rate 0.03 to 0.09 lb ai/a (2 to 6 fl oz/a Goal 2XL)

Time Apply to established dormant clover from December 1 to February 15.

Remarks Controls broadleaf weeds including common mallow, groundsel, filaree, henbit, and speedwell.

Caution Apply to red and white clover for seed only. Apply preemergence or up to six-leaf stage of weeds. Do not feed or graze clover after applying. Do not cut treated clover for hay or forage. Do not use harvested seed for sprouting. Processed seed must be labeled “not for human or animal consumption.” Do not rotate to a small grain crop for 10 months, to avoid crop injury due to herbicide carryover. See label for additional crop rotation restrictions.

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

Chemical family Diphenylether

pelargonic acid (Scythe)

Rate Apply a 3% to 10% solution (v/v) in a 75 to 200 gal/a spray solution.

Time Apply when clover is dormant to control actively growing weeds. All partially green foliage will be killed or stunted, but activity may be limited with cool weather after application.

Remarks Use higher rates to control perennial weed species or when maximum vegetative burndown is desired. Adequate spray coverage is essential to maximize activity. Scythe is not translocated throughout plants, and is a nonselective contact material.

Caution Do not apply Scythe through any type of irrigation equipment. There are no grazing, feeding, or plant back restrictions associated with Scythe applications.

Site of action Group 26: unknown

Established, postemergence grass control

clethodim (several trade names)

Rate 0.094 to 0.25 lb ai/a

Time Apply to actively growing annual or perennial grasses at the appropriate stage of grass growth as indicated on label.

Remarks For grass weed control only. See label for specific rates, weed species, and weed size. Always add a crop oil concentrate at 1% v/v in the finished spray volume. Control may be erratic on grasses stressed by conditions such as drought, temperature extremes, and insect and herbicide damage. Do not apply if rain is expected within 1 hour of application.

Caution Do not exceed 0.25 lb ai/a of clethodim per season. Adding fertilizer to spray solution is not recommended. Preharvest interval is 15 days. Do not use on clover when soil pH is 5.5 or less. See individual labels for restrictions on livestock grazing and feeding, and cutting for forage or hay.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

sethoxydim (several trade names)

Rate 0.19 to 0.47 lb ai/a

Time Apply to actively growing annual or perennial grasses at growth stage listed on label.

Remarks For grass control only. Most effective on actively growing grasses. See labels for specific rates, weed species, and weed size. Will not control annual bluegrass or fine fescues, and is weak on downy brome and quackgrass. Always add a crop oil concentrate at 2 pints/a.

Caution Control may be erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not exceed 1.2 lb ai/a per season. See individual labels

for restrictions on livestock grazing and feeding, and cutting for forage or hay.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Cyclohexanedione

fluzifop (Fusilade DX)

Idaho (ID-950006) only

Rate 0.125 to 0.188 lb ai/a (8.0 to 12.0 oz/a Fusilade DX)

Time Apply to actively growing quackgrass in clover grown for seed.

Remarks Make two applications to quackgrass. Apply the first when quackgrass is 6 inches tall and the second 2 to 3 weeks later, but before the quackgrass is 10 inches tall. Always apply fluzifop with a crop oil concentrate at 1% v/v.

Caution Do not graze or feed treated forage and screenings to livestock. Do not use seed from treated plants for food, feed, or oil. All processed clover seed must be tagged “not for human or animal consumption.” The grower is responsible for informing the processing facility that the clover was treated with fluzifop.

Site of action Group 1: acetyl CoA carboxylase (ACCase) inhibitor

Chemical family Aryloxyphenoxy propionate

Established clover, postemergence broadleaf control

bentazon (several trade names)

Oregon and Washington only

Rate Up to 1 lb ai/a

Time Apply in spring to young, actively growing weeds in crimson, red, and white clover grown for seed in Washington and Oregon.

Remarks Controls certain broadleaf weeds and sedges soon after emergence. For consistent control, always add an adjuvant. See labels for recommended additives. Some clover leaf burning may occur, but symptoms generally are outgrown within 10 days of treatment. A second application may be made 5 to 14 days following the first.

Caution Thorough coverage is necessary for adequate weed control. Do not apply to stressed clover. Do not graze livestock or harvest forage or hay for at least 36 days after treatment. Do not exceed 2 lbs ai/a per year of bentazon.

Site of action Group 6: photosystem II inhibitor

Chemical family Benzothiadiazole

carfentrazone (Aim EC)

Rate 0.008 to 0.04 lb ai/a (0.5 to 2.5 oz/a Aim EC)

Time Apply Aim EC in the fall after the crop is dormant or in the spring before spring growth starts.

Remarks Apply as a broadcast spray to dormant clover that has been established for at least 1 year. May be tank mixed with other herbicides labeled for use in clover grown for seed. Use rates up to 2.5 oz in 10 gal of water for optimal control. Always add an adjuvant. See Aim EC label for recommended additives.

Caution Do not harvest stands grown for seed for 3 days after application. Do not apply more than 3.8 oz of Aim EC per year.

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

Chemical family Triazolinone

MCPA amine (several trade names)

Rate See individual product labels for appropriate rate, but generally 0.23 to 0.46 lb ae/a

Time Apply to arrowleaf, crimson, red and white clover (except Dutch). Treat seedling stands after they have 2 or more true leaves (trifoliolate stage). Apply in late fall or early spring to established stands when weeds are small and clover is semi-dormant, before active growth starts.

Remarks To control broadleaf weeds in seedling and established stands of clover.

Caution Older, established clover stands may show stem twisting injury after application, which may reduce growth. Do not apply to Dutch white clover or sweet clover. The air temperature at time of application should be above 40°F to maximize weed control efficacy. Do not forage or graze treated areas for 7 days after treatment and review individual product labels for additional feeding and grazing restrictions.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

Established clover, postemergence grass and broadleaf control

imazamox (Raptor) + bentazon (Basagran 5L)

Oregon and Washington only

Rate 0.04 lb ai/a (5 fl oz/a Raptor) + 0.25 to 0.5 lb ai/a (0.4 to 0.8 pints/a Basagran 5L)

Time Apply when crimson, red or white clover has at least two trifoliolate leaves and most weeds are 1 to 3 inches tall. Imazamox applications to clover grown for seed must be made before bloom.

Remarks Applications of imazamox to clover grown for seed require adding surfactant, nitrogen fertilizer, and Basagran 5L herbicide. Use a nonionic surfactant with at least 80% ai at 0.25% v/v (1 quart/100 gal spray solution). Apply to red, white, and crimson clover only.

Caution Application of more than 16 fl oz/a of Basagran in the tank mix may reduce grass control. When using Raptor plus Basagran 5L, always follow the more restrictive label. Do not apply Raptor more than once per growing season. Imazamox use on crimson, red, or white clover may cause crop injury or loss when applied at the 5 oz/a rate to stressed clover. See additional use cautions on Raptor label including crop rotation intervals.

Site of action (imazamox) Group 2: acetolactate synthase (ALS) inhibitor; (bentazon) Group 6: photosystem II inhibitor

Chemical family (imazamox) Imidazolinone; (bentazon) Benzothiadiazole

imazethapyr (several trade names)

Rate 0.05 to 0.094 lb ai/a

Time Apply to seedling clover that has at least two to three trifoliolate leaves, and when most weeds are 1 to 3 inches tall. Imazethapyr may be applied to established clover in the fall, and in spring to dormant or semi-dormant clover less than 3 inches tall. Imazethapyr applications to clover grown for seed must be made before bloom.

Remarks Applications of imazethapyr to clover grown for seed require adding surfactant and nitrogen fertilizer. Use a nonionic

surfactant with at least 80% ai at 0.25% v/v (1 quart/100 gal spray solution).

Caution Do not feed, graze, or harvest clover within 30 days of applying imazethapyr.

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

Chemical family Imidazolinone

paraquat (several trade names)

Rate 0.26 to 0.78 lb ai/a

Time Apply to fall-planted, newly established, or well-established stands between November 15 and January 15, when crop is dormant and before spring growth starts.

Remarks To control winter annual grasses and broadleaf weeds in red and white clover. Add 1 to 2 pints of a nonionic surfactant or 1 gallon crop oil concentrate per 100 gal water. For dense stands of grass, paraquat plus pronamide provides better control than paraquat alone. Green foliage on crop at time of application will be burned.

Caution **A restricted-use herbicide.** Do not graze or harvest treated forage for 60 days after applying. Do not apply more than once per season. When applying to fall-planted red clover in its first winter, or to red clover planted with a nurse crop the previous spring use the lowest labeled rate. Do not apply if re-growth after grazing or cutting is more than 2 inches tall.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

Preharvest foliage desiccation

carfentrazone (Aim EC)

Rate 0.016 to 0.06 lb ai/a (2.0 to 3.8 oz/a Aim EC)

Time Apply Aim EC alone or with other labeled herbicides for desiccation of clover seed crops.

Remarks Apply at a minimum application volume of 35 gal/a. Always add an adjuvant. See Aim EC label for minimum recommended additives.

Caution Do not harvest stands grown for seed for 3 days after application. Do not apply more than 3.8 oz of Aim EC per year.

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

Chemical family Triazolinone

diquat (several trade names)

Rate 0.37 to 0.5 lb ai/a

Time For preharvest foliage desiccation, when clover seeds are mature.

Remarks Seed crops only. Desiccation is complete in 3 to 10 days.

Caution Do not graze or feed treated forage to livestock. Do not use seed from treated plants for food, feed, or oil.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

paraquat (Firestorm)

Idaho (ID-080009) only

Rate 0.64 to 1.0 lb ai/a (1.7 to 2.7 pints/a Firestorm)

Time For preharvest foliage desiccation, when clover seeds are mature. Do not harvest clover seed until at least 4 days after application.

Remarks Do not make more than two applications per year.

Caution A **restricted-use herbicide**. Do not graze or feed treated forage and screenings to livestock. Do not use seed from treated plants for food, feed, or oil. All processed clover seed must be tagged "Not for human consumption." The grower is responsible for informing the processing facility that the clover was treated with paraquat. Do not apply Firestorm through any type of irrigation equipment.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium