

# SECTION C.

## CEREAL GRAIN CROPS

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## Introduction

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### Suggested weed management practices

1. Plant crop seed that is certified free from weed seed. Otherwise, you might introduce new weed problems to a field.
2. Reduce weed seed population in the soil by:
  - Encouraging weed seed germination by using shallow cultivation, or any other method that will bring the seed into moisture in the top 0.5 inch of soil.
  - Controlling weeds before they set seed.
3. Eradicate perennial weeds. Eradicate small patches before they spread. Use cultural, mechanical, and chemical methods as appropriate.
4. Rotate crops.
  - If winter annual weeds are increasing, rotate to a spring-seeded crop. A spring cereal such as barley will produce well, and weeds such as jointed goatgrass and downy brome will be less of a problem. Moreover, many winter annual broadleaf weeds will not be a problem in a spring-seeded crop.
  - In areas where more diverse crop rotations are possible, planting alternate crops, such as pulse or oil seed crops, is even more effective for controlling certain weed populations than planting spring-seeded cereals.
5. Control weeds along edges of fields.
  - Keep weeds along edges of fields and other idle areas from maturing and producing seed. Some of these weed seeds are likely to move into the field. Any number of methods, including mowing, spraying with a herbicide, or cultivating can be effective.
  - Establishing a perennial grass cover is very effective in controlling most weeds. After establishment, weed control often requires minimal additional inputs.

### Herbicides

1. Use this handbook as a guide to help select an herbicide treatment, then study the herbicide label(s) for appropriate use.
2. Control weeds as soon after germination as possible and stop early weed competition with crops.
3. Avoid using an herbicide if the grain crop is under stress.

### Important information about herbicides

Herbicides may be water-soluble, oil soluble, or water suspensions. Those with the first two properties are formulated as water-soluble concentrates or as emulsifiable concentrates. They require little agitation to keep them evenly distributed in the spray tank. However, water suspension herbicides require additional attention as follows:

Continuous mechanical agitation in the tank is needed to keep wettable powders (WP), liquid suspensions (4L), flowables (4F), water-dispersible granules (WDG), or dry flowables (DF) in suspension. If it is necessary to shut down the application equipment with spray suspensions in the tank, use the following procedures:

1. Place equipment where flushed herbicide will not damage desired vegetation.
2. Shut off valve from spray tank to boom.
3. Flush booms and nozzles with clean water to remove the suspended material.

It is difficult to get the settled material redispersed when you start up again. Do the following:

1. Run the agitator for a few minutes.
2. Shut off equipment and check for caked material at the bottom of the tank.
3. When satisfied dispersion is complete, continue spraying.

## Directions and notes for applying herbicides

1. Use at least 20 gal/A water carrier for ground application and 5 gal/A water for aerial application (unless stated differently on the label) to ensure even distribution of the spray solution.
2. Avoid applying to wheat seeded less than 1.5 inches deep. If the wheat develops roots in the herbicide zone, the wheat plants can be damaged.
3. Apply only to recommended soil types. Precipitation can move the herbicide deeper in coarse soil types, and crop damage can result.
4. Do not apply to frozen soil. If the soil is frozen, rain or thawing could move the herbicide laterally, causing crop injury from herbicide concentration in some areas and lack of weed control in other areas. However, application can be made if the soil frosts at night and thaws during the day.
5. Do not apply to cracked soil; the herbicide may move down the cracks into the root zone of small grains.
6. Clods and crop residue reduce herbicide effectiveness as weeds escape from under clods and residue intercepts the spray.

**Note** If reseeding is necessary due to crop winterkill, reseed (increase seeding rate by 15%) without mechanical seedbed preparation. Cultivation could move the herbicide residue into the crop root zone. Use a deep furrow opener drill and seed at least 2 inches deep. The opener will move the surface soil out of the way and the seed will be planted below the herbicide residue. Do not reseed to any crop other than wheat. Crop may be injured in fields previously treated with metribuzin or other soil active herbicides such as diuron, flufenacet or pyroxasulfone.

## Application equipment

Selective herbicides to control weeds in small grains can often be applied by either ground or aerial equipment. See label for any restrictions.

Accurate application is essential for safe and effective weed control. Use equipment that is in excellent condition. Equipment must be properly calibrated. Applying more than the recommended dosage could injure the crop. Application must be within 5% of the recommended rate. If not, take steps to correct the equipment and recalibrate.

Uniform coverage is essential, so do not use less than the recommended gallonage of water carrier per acre. Continuous mechanical agitation is a must when using wettable powders, liquid suspensions, or water dispersible granules to keep the particles evenly dispersed in the spray solution.

### Caution!

The information provided in this handbook is not intended to be a complete guide to herbicide use. Before using any pesticide or herbicide product, you should read the label recommendations on the container. Before a chemical can be recommended for a specific use, it must be thoroughly tested. Following the recommendation on the manufacturer's label can prevent many problems arising from the improper use of a chemical.

# Barley

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## Preplant and Preemergence Weed Control

### carfentrazone (Aim EC)

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

**Time** Apply before, during, or after grain has been planted.

**Remarks** May be applied as a preplant burndown (up to 1 day before seeding), foliar broadcast or as a harvest-aid. Use a nonionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution) having at least 80% active ingredient. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v (2 to 4 gal/100 gal spray solution) or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to the NIS. Tank-mixes with other herbicides will increase spectrum of control. Apply to actively growing weeds not more than 4 inches tall, or rosettes 3 inches in diameter. Thorough coverage is essential for good control. To avoid significant crop injury, do not apply within 6 to 8 hours of rain or irrigation or when heavy dew is present. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use Aim EC with crop oil concentrates (COC), methylated seed oil (MSO), or silicone-based adjuvants. Do not exceed 0.031 lb ai/a (2 fl oz Aim EC or EW) per crop season. Do not harvest for forage within 7 days after application.

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

**Chemical family** Triazolinone

### glyphosate (several trade names)

**Rate** 0.375 to 0.75 lb ae/a

**Time** Apply before, during, or after planting barley but before barley emerges.

**Remarks** Prepare seedbeds as far ahead of application as possible to permit maximum weed emergence. Be aware that glyphosate is formulated as 3, 4, 4.17, 4.5, and 5 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Glyphosate may only be used as a spot treatment before heading in barley fields. Do not treat more than 10% of the field to be harvested. Some glyphosate products require adding a nonionic surfactant (NIS); be sure to check the product label. The addition of 1 to 2% ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal of water may increase the performance of glyphosate, particularly with hard water or when spraying during drought conditions. Restricted entry interval (REI) is 4 hours.

**Caution** Carefully check the entire field to ensure that no barley has begun to emerge. Do not allow glyphosate to drift off target.

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

**Chemical family** Organophosphorus

### paraquat (Gramoxone Inteon)

**Rate** 2 to 4 pints/a (0.25 to 1 lb ai/a Gramoxone Inteon 2SL)

**Time** Apply before, during, or after planting barley but before barley emerges.

**Remarks** It is essential to obtain complete coverage of target weeds to get good control. Results are best if a delay between tillage and planting allows weeds to emerge. Controls only annual weeds. Weeds 1 to 6 inches in height are the easiest to control. Always use a nonionic surfactant (NIS), crop oil concentrate (COC), or methylated seed oil (MSO) with the application. Restricted entry interval (REI) is 24 hours.

**Caution** Restricted-use herbicide. Do not mix or store in containers, spray tanks, nurse tanks or such systems made of aluminum or having aluminum fittings. May be fatal if swallowed or inhaled. See label for correct protective equipment. Applicators, mixers and loaders must wear long-sleeve shirt and long pants, shoes plus socks, protective eyewear (applicator), face shield (mixers and loaders), Category A chemical resistant gloves, chemical resistant apron (mixers and loaders), and a dust mist NIOSH-approved respirator with an N, R, P, or HE filter. Dry, dusty conditions will decrease herbicide's activity. Do not apply if barley has already emerged.

**Site of action** Group 22: photosystem I electron diversion

**Chemical family** Bipyridilium

## Wild Oats, Italian Ryegrass, and Other Grass Weeds

### fenoxaprop-p-ethyl (Tacoma, Doublecheck, and Parity)

**Rate** 0.04 to 0.083 lb ai/a (5.3 to 10.6 fl oz/a)

**Time** Apply from barley emergence up to the five-leaf stage but before the jointing stage, and when grass weeds are in the one-leaf (fully expanded) to advanced tillering stage. Windgrass will be controlled from emergence to 3 inches tall.

**Remarks** Use 5.3 fl oz/a for green foxtail, 6.4 fl oz/a for yellow foxtail and wild proso millet, and 10.6 fl oz/a for barnyardgrass, black-grass, windgrass, green foxtail and wild oat control. Low soil moisture, low humidity and temperatures above 85 °F several days prior, during or following application may reduce foxtail and wild oat control. Under cool, wet conditions, further crop safety can be obtained by tank mixing MCPA ester at recommended rates. In dense weed populations, a 15 to 20 gal/a spray volume is required for best control. Restricted entry interval (REI) is 24 hours.

**Caution** Always check the tank-mix partner label to determine if the addition of a surfactant is required. Do not tank mix with dicamba or 2,4-D; see label for herbicides approved for tank mixing. Do not apply if conditions might move spray from target area. Do not apply within 57 days of harvesting barley. Do not apply through any irrigation system. Rain or sprinkler irrigation within 1 hour after application may reduce wild oat control.

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

**Chemical family** Aryloxyphenoxy propionate

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### pinoxaden (Axial XL)

**Rate** 0.053 lb ai/a (16.4 oz/a Axial XL 0.42EC)

**Time** Apply to spring barley from the 2-leaf to pre-boot stage. Apply to wild oat from 1- to 6-leaf stage on the main stem but before the fourth tiller emerges. Apply to green foxtail, Italian ryegrass, barnyardgrass, wild-proso millet and windgrass from one- to five-leaf stage on the main stem but before third tiller emerges.

**Remarks** Use at least 5 gal/a water in aerial applications, 5 to 10 gal/a water in ground applications. Surfactant is not required with Axial XL formulation. Axial XL is rainfast 30 minutes after application. Make one application per season, not to exceed 16.4 fl oz/a. Restricted entry interval (REI) is 48 hours.

**Caution** Avoid applying in more than 10 gal/a water because grass control may be reduced. Do not apply through any type of irrigation system. Do not apply to a crop stressed by conditions such as frost, low fertility, drought, flooding, or disease or insect damage, because crop may be injured. Do not treat barley underseeded with legumes. Do not harvest grain or feed treated barley straw for 60 days following application.

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

**Chemical family** Phenylpyrazolin

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### pinoxaden + fluroxypyr (Axial Star)

**Rate** 0.054 lb ai/a pinoxaden and 0.093 ae/a fluroxypyr (16.4 fl oz/a Axial Star 1.15 EC)

**Time** Apply from the two-leaf to pre-boot stage

**Remarks** Apply to actively growing weeds. Axial Star may be tank mixed with several different broadleaf herbicides. Refer to the Axial Star label for the recommended list of broadleaf herbicides. Axial Star is rainfast 1 hour after application. Make one application per season. Axial Star is rainfast 1 hour after application. Restricted entry interval (REI) is 48 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not apply to a crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease damage, or insect damage or crop injury may result. Do not harvest grain or feed treated barley straw for 60 days following application. Do not graze livestock or harvest forage for hay from treated barley for 30 days after application.

**Site of action** (pinoxaden) Group 1: acetyl CoA carboxylase (ACCCase) inhibitor; (florasulam) Group 4: Synthetic auxin (fluroxypyr)

**Chemical family** (pinoxaden) Phenylpyrazolin; (fluroxypyr) Pyridine

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### triallate (Far-Go or Avadex MA)

**Rate** 1.25 to 1.5 lb ai/a (1.25 to 1.5 quart/a Far-Go 4EC or 12.5 to 15 lb/a Avadex MA 10G)

**Time** Apply preplant or postplant, and incorporate.

**Remarks** For proper incorporation, set incorporation implement to work the soil no deeper than 3 to 4 inches. Incorporation should be performed immediately after application. See Avadex Microactiv (MA) label for more specific incorporation instructions. Do not use disk implements for incorporation. Some stand thinning may occur on clay knobs or where wheat is dusted in, due to dry weather. Application to a field that is wet, lumpy, rough, or ridged will result in reduced wild oat control and crop thinning. If applied post-planting, cultivate with a flex

multiweeder or harrow, and follow with a second incorporation at right angles, adjusting incorporation depth so seeds are not disturbed. Do not graze treated areas. Do not apply on barley underseeded to legumes. Some stand thinning may occur on clay knobs or where wheat is dusted in, due to dry weather. Restricted entry interval (REI) is 12 hours.

**Caution** Only one application per growing season and must not exceed 1.5 qts/a of Far-Go or 15 lbs/a of Avadex.

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

**Chemical family** Thiocarbamate

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### triallate (Avadex MA) followed by diuron (Karmex or Direx)

**Rate** 1.25 lb ai/a triallate (12.5 lb/a Avadex MA) followed by 1.2 to 1.6 lb ai/a diuron (1.5 to 2 lb/a of 80% DF)

**Time** Apply triallate before or after seeding, and incorporate immediately, no deeper than 3 to 4 inches; do not use disk implements for incorporation. Apply diuron preemergence after rain settles soil.

**Remarks** Use diuron only in drill-planted winter barley, in western Oregon and western Washington. Triallate is not effective against broadleaf weeds. Do not graze treated areas or replant diuron-treated area to any crop for 1 year. Restricted entry interval (REI) is 12 hours for triallate and diuron.

**Site of action** (triallate) Group 8: lipid synthesis inhibitor; (diuron) Group 7: photosystem II inhibitor

**Chemical family** (triallate) thiocarbamate; (diuron) substituted urea

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### Annual Grass and Broadleaf Weeds

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#### diuron (Karmex or Direx)

**Rate** 1.2 to 1.6 lb ai/a (1.5 to 2 lb/a of the 80% DF)

**Time** Apply as soon after drill planting as possible, but before barley emerges.

**Remarks** For use in western Oregon and western Washington in winter barley. Make a single application of 1.5 to 2 lbs/a as soon as possible, but before barley emergence. A smooth, moist seedbed and moisture after treatment will enhance weed control. Restricted entry interval (REI) is 12 hours.

**Caution** Unless otherwise directed, do not use on spring barley. Do not replant treated areas to any crop within 1 year after the last application because injury to the subsequent crop may result.

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

**Chemical family** Substituted urea

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#### metribuzin (several trade names)

**Rate** 0.75 to 8 oz ai/a (1 to 10.66 oz/a of the 75DF or 1.5 to 16 fl oz/a of the 4F)

**Time** Apply low rates (0.75 to 3 oz ai/a) when barley is in two-leaf to four-tiller growth stage. Apply 3 to 8 oz ai/a when barley has more than four tillers and secondary roots are longer than 1 inch, but before jointing growth stage.

**Remarks** May be used on spring and winter barley. Best control is on weeds less than 2 inches tall. Do not apply more than 8 oz ai/a in 1 year. Application rate also depends on organic matter

content. If applying sequentially, allow at least 21 days between applications. At least 0.5 inch rain or irrigation is required within 2 to 3 weeks after application to move metribuzin into weed root zone. See label for more specific information. Restricted entry interval (REI) is 12 hours.

**Caution** Certain barley varieties should not be treated with metribuzin (refer to label). On irrigated cereals, do not apply more than 0.5 inch water for the first irrigation; in each additional irrigation, do not exceed 1 inch. Allow at least 14 days between the first and subsequent irrigations. Do not use on soils containing less than 0.75% organic matter. Do not rotate to wheat, barley, alfalfa or seed corn in the fall of the year following application, or in the spring of the following year. Do not apply through any irrigation system. Crop injury may occur if metribuzin is applied to frozen soil or crop still in winter dormancy.

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

**Chemical family** Triazinone

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## Annual Broadleaf Weeds

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### 2,4-D (several trade names)

**Rate** 0.25 to 1.25 lb ae/a

**Time** Apply when barley is fully tillered but before jointing.

**Remarks** Individual 2,4-D labels vary slightly on use rates and application timing. Check label to ensure proper rate and application timing. Higher rates are for fall-planted barley, and not spring-planted barley. Be aware that 2,4-D may be formulated with 3.74, 3.8, 5, 5.5, 5.6 and 6 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Preharvest interval is 14 days. Amine formulations require 6 hours before they are rainfast and LVE formulations require 1 hour. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not forage or graze treated grain fields within 2 weeks after treatment. Do not feed treated straw to livestock. Do not let 2,4-D drift off target. Check label for maximum amount allowed per crop cycle. Do not apply through any type of irrigation system.

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

**Chemical family** Phenoxy acetic acid

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### bicyclopyrone + bromoxynil (Taliner)

**Rate** 0.033 to 0.044 lb ai/a bicyclopyrone + 0.156 to 0.207 lb ae/a bromoxynil acid equivalent (13.7 to 18.2 fl oz/a Taliner)

**Time** Apply to barley from 2-leaf to pre-boot stage

**Remarks** Co-packed with CoAct+ additive which must be added at the rate specified on the label. Compatible with many commonly used tank-mix partners. Add a crop oil concentrate (COC) at 1% v/v of the finished spray volume. Although COC is the preferred adjuvant, NIS may be substituted at 0.25% v/v. When tank mixed with herbicides that have a built-in adjuvant, no additional adjuvant is needed. Rainfast in one hour. Restricted entry interval (REI) is 24 hours.

**Caution** Do not exceed more than 18.2 oz/a per year. Do not treat wheat underseeded with legumes. Do not graze livestock or harvest forage for hay from treated wheat or barley for a minimum of 30 days following application. Do not harvest grain for a minimum of 60 days following application. Do not feed treated wheat or barley straw to livestock for a minimum of 60

days following application. Follow label instructions on crop rotations. Do not apply through any irrigation system.

**Site of action** (bicyclopyrone) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (bicyclopyrone) Triketone; (bromoxynil) Nitrile

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### bromoxynil (several trade names)

**Rate** 0.25 to 0.5 lb ai/a

**Time** Apply after barley emergence and prior to the boot stage. Apply to the weeds up to the four-leaf stage, or 2 inches tall, or 1 inch diameter, whichever is first.

**Remarks** Do not graze for 45 days. Be aware that bromoxynil is formulated as 2 lb and 4 lb ai/gal; be sure to use the correct amount of herbicide. Bromoxynil is very compatible with many other broadleaf herbicides. Control is more consistent with tank-mixtures. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze treated fields within 45 days following application. Do not apply when crop is under moisture stress. The total cumulative rate must not exceed 2 pints/a per season.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

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### bromoxynil + fluroxypyr + MCPA (Carnivore)

**Rate** 0.21 to 0.312 lb ai/a bromoxynil, 0.084 to 0.125 lb ae/a fluroxypyr, 0.21 to 0.312 lb ae/a MCPA (1 to 1.5 pints/a Carnivore 4EC)

**Time** Apply when barley is in the 2-leaf stage up to and including flag leaf emergence. To suppress volunteer potatoes, apply before potato plants are 4 inches tall.

**Remarks** Apply 1 pint/a if seedlings of susceptible species are less than 4 inches tall. For seedlings 4 to 8 inches tall and volunteer potatoes apply 1.5 pints/a. Do not apply when crop canopy covers the weeds, or control will be poor. Rainfast within 1 hour after application. Restricted entry interval (REI) is 24 hours. Do not apply more than 2.4 pints/a per crop season.

**Caution** Do not allow mixture to drift off target. Do not apply within 40 days prior to harvesting grain, or within 14 days prior to cutting hay. Do not apply through any irrigation system.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (fluroxypyr and MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (fluroxypyr and MCPA) Phenoxy acetic acid

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### bromoxynil + MCPA (several trade names)

**Rate** 0.5 to 1 lb ai/a

**Time** Apply in spring when barley is in the 3-leaf stage but before it reaches boot stage. Application timing to weeds depends on weed species, but generally up to the 4-leaf stage or 2 inches tall, whichever comes first. If weed forms rosette, apply before weeds exceed 1.5 inch in diameter. Most effective when applied to weeds up to 2 inches tall or in diameter.

**Remarks** Use higher rate for larger or more resistant weeds. Be aware that bromoxynil + MCPA is formulated as 4 lb and 5 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Controls some large broadleaf weeds, but consistency declines with increasing weed size. Do not apply when crop is under moisture stress. Runoff of this product will be reduced by

avoiding applications when rainfall is forecasted to occur within 48 hours. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze treated fields for 45 days after application. Do not permit mixture to drift off target.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (MCPA) Phenoxy acetic acid

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### **bromoxynil + pyrasulfotole (Huskie)**

**Rate** 0.15 to 0.21 lb ai/a bromoxynil + 0.027 to 0.037 lb ai/a pyrasulfotole (11 to 15 oz/a Huskie 2.06EC)

**Time** Apply to actively growing barley after the one-leaf growth stage, up to flag leaf emergence. For best results, apply to young actively growing weeds.

**Remarks** Compatible with many commonly used tank-mix partners. Spray additives such as ammonium sulfate (AMS) at 0.5 to 1 lb/a, urea ammonium nitrate (UAN) at 1 to 2 quarts/a, or nonionic surfactant (NIS) at 0.25 to 0.5% v/v (1 to 2 qt/100 gal of spray solution) may be used especially under challenging conditions to optimize herbicidal activity. Apply to actively growing weeds alone or in a tank-mix with other herbicides. Rain within 1 hour after application may reduce weed control. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than once per season. Do not apply more than 15 fl oz/a per season. Check label for crop rotation guidelines. Preharvest interval is 25 days for forage and 60 days for straw or grain. Do not tank mix with tebuconazole fungicide. Do not apply this product with backpack or hand-held application equipment. Do not apply through sprinkler irrigation systems.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (pyrasulfotole) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor

**Chemical family** (bromoxynil) Nitrile; (pyrasulfotole) Pyrazole

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

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

**Time** Apply prior to planting up to the jointing stage, and to actively growing weeds up to 4 inches tall or 3 inches across.

**Remarks** Apply alone or as a tank-mix with other herbicides to emerged and actively growing weeds. Use higher rates on more mature weeds or dense vegetative growth. Use a nonionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution) with at least 80% active ingredient. When barley grows in very dry soil, a high-quality sprayable liquid nitrogen fertilizer (2 to 4% v/v or 2 to 4 gal/100 gal spray solution) may be used in addition to the NIS. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 2 fl oz/a per year. Tank-mixes with EC or ester formulations of other herbicides may increase leaf speckling. Do not use Aim with crop oil concentrate (COC), methylated seed oil (MSO), or silicone-based adjuvants. Do not make applications to foliage wet from dew, rain or irrigation. Increased crop injury may occur. Do not harvest for forage within 7 days after application.

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

**Chemical family** Triazolinone

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### **chlorsulfuron (Glean) + another broadleaf herbicide with a different site of action**

**Rate** 0.12 to 0.25 oz ai/a (0.17 to 0.33 oz/a Glean 75 DF). Do not use more than 0.33 oz/a in an 18-month period.

**Time** Apply in fall or spring any time after most weeds have emerged, and after crop is in two-leaf stage through second joint, but before boot stage.

**Remarks** Chlorsulfuron controls a wide range of broadleaf annual weeds, and inhibits Canada thistle, but does not control nightshade species. For best results, add a surfactant of at least 80% ai at 0.25 to 0.5% v/v (1 to 2 quarts/100 gal spray solution), unless otherwise specified, and apply to actively growing weeds. For specific weed problems, various tank-mixes are possible; see manufacturer's label for recommendations. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9. Chlorsulfuron can persist in soil. Follow label instructions carefully regarding crop rotations. Many crops may not be planted within 24 months or longer after application. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions, such as cold or freezing weather. Do not harvest grain sooner than 45 days after application. Do not apply this product through any irrigation system. Do not apply during fallow. Only make one application per season.

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

**Chemical family** Sulfonylurea

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### **chlorsulfuron + metsulfuron (Finesse) + another broadleaf herbicide with a different site of action**

**Rate** 0.15 to 0.3 oz ai/a fall (0.2 to 0.4 oz/a Finesse 75DF) or 0.15 to 0.23 oz ai/a spring (0.2 to 0.3 oz/a Finesse 75DF)

**Time** Apply after crop is in two-leaf through second-joint, but before boot stage.

**Remarks** Finesse controls a wide range of broadleaf weeds and inhibits Canada thistle. For best results, add a surfactant of at least 80% active ingredient at a rate of 0.125 to 0.5% v/v (0.5 to 2 quarts/100 gal spray solution). Do not use low rate or liquid nitrogen fertilizer as a substitute for nonionic surfactant (NIS). Various tank-mixes are possible for specific weed problems (consult label). Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9 because Finesse can persist in soil. Do not apply before barley emerges or crop will be injured. Carefully follow label instructions on crop rotations. Many crops may not be planted within 2 years or longer after application.

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

**Chemical family** (both) Sulfonylurea

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### **clopyralid (Stinger)**

**Rate** 0.09 to 0.125 lb ae/a (0.25 to 0.33 pint/a Stinger 3SC)

**Time** Apply to actively growing weeds when crop is in three-leaf to early boot growth stage. Only weeds emerged at application will be affected.

**Remarks** Effective on weeds in the sunflower and legume family such as common cocklebur, common groundsel, mayweed chamomile, salsify, pineappleweed, sunflower, clover, volunteer beans and lentils. Addition of an adjuvant is not usually

necessary. If a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient and do not exceed 0.125% v/v (1 pint/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at or following application may reduce weed control and increase risk of crop injury at all growth stages. Applications are rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the barley is underseeded with a legume. Do not harvest for hay. Do not plant alfalfa, asparagus, mint or onions within 10.5 months after application. Do not plant dry beans, lentils, peas, potatoes (including potatoes grown for seed), and broadleaf crops grown for seed, excluding *Brassica* (mustard) species for 18 months after application. Consult label for additional crop rotation restrictions related to annual precipitation. Do not exceed a total of 0.33 pt/a per year. Do not allow lactating dairy or meat animals to graze for 1 week after application. Do not harvest hay from treated grain fields. Do not apply by air during an air temperature inversion. Do not apply through any type of irrigation system.

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

**Chemical family** Pyridine

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### clopyralid + 2,4-D amine (Curtail or Commando)

**Rate** 0.095 to 0.126 lb ae/a clopyralid + 0.5 to 0.67 lb ae/a 2,4-D amine (2 to 2.66 pints/a Curtail or Commando 2.38 SC)

**Time** Apply in spring to young, actively growing barley once four leaves have unfolded on the main stem and tillering has begun, up to jointing stage (first node on stem detectable). Apply to weeds before exceeding 3 inches in height or diameter.

**Remarks** This combination is particularly effective on members of the sunflower family, including mayweed chamomile, sunflower and Canada thistle. Controlling tough winter annual weeds such as corn gromwell and fiddleneck requires tank mixing with other herbicides. Do not exceed 1.75 lb ae/a of 2,4-D per single crop year. Check labels for details on tank-mixtures. Bucril or Banvel tank mixes may be useful to broaden the annual weed control spectrum but may reduce control of perennials such as Canada thistle. Addition of an adjuvant is not usually necessary. If a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient and do not exceed 0.5% v/v (4 pints/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase risk of crop injury at all growth stages. Do not apply this product through any irrigation system. Applications are rainfast within 6 hours after application. Restricted entry interval (REI) is 48 hours.

**Caution** Do not apply if the barley is underseeded with a legume. Curtail and Commando can persist in soil. Do not plant wheat, barley, oats, field corn, or grasses within 30 days of applying. Do not rotate to canola, flax, or sugar beets within 5 months after application. Do not rotate to asparagus, *Brassica* (mustard) species grown for seed, cole crops, mint, onions, popcorn, or sweet corn for 12 months after application. Do not rotate to alfalfa, lentils, dry beans, peas, potatoes (including potatoes grown for seed), broadleaf seed crops (excluding *Brassica* species) or safflower for at least 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions with other crops.

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

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

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### clopyralid + fluroxypyr (WideMatch or Colt AS)

**Rate** 0.094 to 0.125 ae/a clopyralid + 0.094 to 0.125 ae/a fluroxypyr (1 to 1.33 pints/a WideMatch or Colt AS 1.5SC)

**Time** Apply to actively growing barley from the three-leaf stage up to and including flag leaf emergence. Apply when weeds are actively growing, but before weeds are 4 inches tall or vining. For volunteer potato suppression, apply before potato plants are 6 inches tall.

**Remarks** This combination will control a number of weed species. It is particularly effective on Canada thistle, mayweed chamomile, catchweed bedstraw, wild buckwheat, common groundsel, kochia, Russian thistle, nightshade species, and volunteer beans, lentils, peas, and potato. To obtain season-long control of perennial weeds such as Canada thistle, apply when the majority of the basal leaves have emerged from the soil up to the bud stage. For suppression of volunteer potatoes, apply before potato plants are 6 inches tall. May be applied in tank-mix combinations with labeled rates of other products. Do not apply more than 1.33 pints/a per growing season. Compatible with all grass herbicides. Frost 3 days before or after application may reduce weed control and crop tolerance. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the barley is underseeded with a legume. Residues of WideMatch and Colt AS in treated plant tissues that have not completely decayed, may affect succeeding susceptible crops. Do not harvest sooner than 40 days after application. Do not rotate to canola, cole crops (including *Brassica* species grown for seed), flax or sugar beets within 120 days after application. Do not rotate to alfalfa, asparagus, dry beans, mint, or onions for 12 months after application. Do not rotate to broadleaf crops grown for seed (excluding *Brassica* species), chickpeas, lentils, peas, or potatoes (including potatoes grown for seed) for at least 18 months after treatment. Carefully follow label rotation restrictions with other crops.

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

**Chemical family** (both) Pyridine

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### clopyralid + MCPA (Curtail M or Commando M)

**Rate** 0.083 to 0.111 lb ae/a clopyralid + 0.438 to 0.583 lb ae/a 2,4-D (1.75 to 2.33 pt/a Curtail M or Commando M 2.77SC)

**Time** Apply in spring to actively growing weeds after grain has three unfolded leaves on the main stem, up to jointing stage (first node on stem detectable). Do not apply after the boot stage.

**Remarks** Apply before weeds exceed 3 inches in height or diameter. For Canada thistle, apply after most basal leaves emerge but before bud stage. Addition of an adjuvant is not usually necessary; if a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient, and do not exceed 0.5% v/v (4 pints/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at or following application may reduce weed control and increase risk of crop injury at all growth stages. Applications are rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours. Do not apply more than 2.3 pints/a per year or make more than one application per year.

**Caution** Do not apply if the barley is underseeded with a legume. Do not tank mix with 2,4-D or dicamba unless risk of crop injury is acceptable. Do not apply this product through any irrigation system. Curtail M and Commando M can persist in soil. Do not plant wheat, barley, oats, field corn, or grasses within 30 days of applying. Do not rotate to canola, flax or sugar beets

within 5 months after application. Do not rotate to asparagus, *Brassica* species grown for seed, cole crops, mint, onions, popcorn, or sweet corn for 12 months after application. Do not rotate to alfalfa, lentils, dry beans, peas, potatoes (including potatoes grown for seed), broadleaf seed crops (excluding *Brassica* species), or safflower for at least 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions with other crops.

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

**Chemical family** (cloprialid) Pyridine; (MCPA) Phenoxy acetic acid

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### dicamba (Banvel, Clarity, or others)

**Rate** 0.06 to 0.125 lb ae/a (2 to 4 fl oz/a Clarity 4SC or Banvel 4SC)

**Time** Apply after weeds have emerged (2- to 3-leaf stage or less than 2 inches in diameter) but before spring barley exceeds the four-leaf stage, or before fall barley begins jointing.

**Remarks** In spring-seeded barley, do not exceed 3 fl oz/a; use 4 fl oz/a only on fall-seeded barley. Rainfall or irrigation occurring within 4 hours after postemergence application may reduce results. Restricted entry interval (REI) is 24 hours.

**Caution** Do not tankmix dicamba with 2,4-D in early season applications on spring barley. Do not apply this product through any irrigation system. To avoid injuring desirable crops, do not apply dicamba in the vicinity of sensitive species or if air temperature is expected to exceed 85°F. Do not harvest within 7 days after application.

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

**Chemical family** Benzoic acid

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### florasulam + MCPA ester (Orion)

**Rate** 0.0045 lb ai/a florasulam + 0.31 lb ai/a MCPA (17 fl oz/a Orion 2.373EC)

**Time** Apply from three-leaf barley growth stage up to jointing stage. Apply when weeds are actively growing. A later application, when crop is between jointing and boot stages, may control weeds emerging later. However, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage.

**Remarks** Only weeds that have emerged at the time of application will be controlled. An adjuvant may be added to optimize herbicidal activity under suboptimal conditions. Orion is rainfast within 4 hours after application. If foliage is wet at the time of application, control may be reduced. Extreme growing conditions such as drought or near-freezing temperatures before, during, or after application may reduce weed control and increase crop injury. Do not apply more than 17 fl oz Orion/a per growing season. Livestock may be grazed on treated crops 7 days following application. Do not apply within 60 days of barley harvest. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply this product through any irrigation system. Do not plant any type of corn for 3 months after application. Do not plant alfalfa, canola, chickpea, soybean, dry bean, pea (dry and succulent), flax, lentil, potato, safflower, sugar beet, or sunflower for 9 months after application.

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

**Chemical family** (florasulam) Triazolopyrimidine; (MCPA) Phenoxy acetic acid

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### florasulam + halauxifen (Quelex)

**Rate** 0.0047 lbs ai/a florasulam + 0.0047 lb ae/a halauxifen (0.75 oz/a Quelex)

**Time** Apply Quelex in the spring or fall early postemergence to the main flush of actively growing weeds in the 2 to 4 leaf stage or less than 4 inches tall. Quelex may be used as a preplant burn-down in the spring, summer, or fall when the majority of weed have emerged and are actively growing.

**Remarks** Do not tank mix any pesticide product containing glufosinate with Quelex. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than 0.75 oz Quelex/a per season. Preharvest interval is 60 days for grain, 21 days for forage, and 7 days for grazing.

**Site of action** (florasulam) Group 2: acetolactate synthesis (ALS) inhibitor; (halauxifen) Group 4: synthetic auxin.

**Chemical family** (florasulam) Triazolopyrimidine sulfonamide; (halauxifen) Arylpicolinate

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### fluroxypyr (Starane Ultra, Comet)

**Rate** 0.105 to 0.25 lb ae/a (0.3 to 0.7 pint/a Starane Ultra 2.8EC and 0.5 to 1.33 pints/a Comet 1.5EC)

**Time** Apply to actively growing barley from two-leaf stage up to and including flag leaf emergence. Apply to actively growing weeds up to 8 inches tall or vining.

**Remarks** May be tank mixed with other broadleaf weed herbicides registered for use in barley. Follow the most restrictive label statement of the tank-mix products used. Use 0.25 lb ae/a for volunteer potato control. Moisture on foliage at application may decrease control. Applications are rainfast after 1 hour. Optimum temperature range for herbicidal activity is 55°F to 75°F. Frost up to 3 days before, or 3 days after, may reduce weed control and crop tolerance. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than once per growing season. Do not use if barley is underseeded with a legume. Do not plant any crop other than wheat, barley, or oats for 120 days after application. Do not let livestock graze treated areas. Preharvest intervals are 7 days for forage, 14 days for hay, and 40 days for grain or straw.

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

**Chemical family** Pyridine

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### fluroxypyr + bromoxynil (Starane NXT)

**Rate** 0.06 to 0.125 lb ai/a fluroxypyr + 0.25 to 0.5 lb ai/a bromoxynil + (14 to 27.4 fl oz/a Starane NXT 2.91EC)

**Time** Apply to barley from three-leaf stage through flag leaf emergence. Apply to weeds up to 4 or 8 inches tall, depending on rate.

**Remarks** Compatible with all grass herbicides. Only weeds emerged at time of application will be controlled. Any crop may be planted 120 days after application. Applications are rainfast within 1 hour after application. Extreme growing conditions such as drought or near-freezing temperatures before, during, or after application may reduce weed control and increase crop injury. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply within 45 days of grain, hay or straw harvest and do not allow livestock to graze treated areas within 45 days after application.

**Site of action** (fluroxypyr) Group 4: synthetic auxin; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (fluroxypyr) Pyridine; (bromoxynil) Nitrile

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**fluroxypyr + florasulam (Starane Flex)**

**Rate** 0.878 lb ae/a fluroxypyr + 0.0044 lb ai/a florasulam (13.5 fl oz/a Starane Flex 0.875 EC)

**Time** Apply to actively growing barley from the three-leaf growth stage up to flag leaf emergence. Apply when susceptible weeds are less than 4 inches tall and are actively growing.

**Remarks** Only weeds that have emerged at the time of application will be controlled. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. Generally, this product does not require the use of an adjuvant to achieve satisfactory weed control. An adjuvant may be added when applications are made under conditions of cool temperature, low relative humidity or drought, or when a tank mix partner recommends the use of an adjuvant. Livestock may be grazed on treated crops 7 days following application. Applications are rainfast within 4 hours after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply to crops underseeded with legumes. Do not apply this product through any type of irrigation system. This product has potential to leach. Do not apply excessive irrigation. Do not apply within 60 days of harvest. Do not apply more than 13.5 fl oz/a of Starane Flex per growing season. Extreme growing conditions, such as drought or near freezing temperatures prior to, at, or following time of application, may reduce weed control and increase the risk of crop injury at all stages of growth.

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

**Chemical family** (fluroxypyr) Pyrimidine; (florasulam) Triazolopyrimidine

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**fluroxypyr + thifensulfuron-methyl (Sentrallas)**

**Rate** 1.12 to 2.24 oz ae/a fluroxypyr + 0.22 to 0.44 oz ai/a thifensulfuron-methyl (7 to 14 fl oz/a Sentrallas 24.9% OD)

**Time** Apply to actively growing barley after the crop is in the 2-leaf stage, but before the flag leaf is visible. Annual broadleaf weeds must be past the cotyledon stage and actively growing.

**Remarks** Tank-mix compatibility with many commonly used broadleaf and grass herbicides, fungicides, insecticides, liquid fertilizers, and spray adjuvants (see current product label for specific restrictions, precautions, and details). For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. To reduce potential of crop injury, tank mix with 2, 4-D ester and apply after the crop is in the tillering stage of growth. Thorough coverage of target weeds is essential. Rain-fast 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not exceed 14 fl oz/a when making a single application or 17.8 fl oz/a for the entire season. Do not apply through any type of irrigation system, to crops underseeded to legumes or grasses as injury to forage may result, and tank mix with Malathion because crop injury may result. Do not graze or harvest treated forage within 7 days of application, and do not harvest hay within 30 days of application or grain within 45 days of application.

**Site of action** Group 4: synthetic auxins (fluroxypyr) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (fluroxypyr) Pyridine carboxylic acid; (thifensulfuron-methyl) Sulfonylurea

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**fluroxypyr + thifensulfuron-methyl + metsulfuron-methyl (Travallas)**

**Rate** 1.12 to 1.92 oz ae/a fluroxypyr + 0.22 to 0.38 oz ai/a thifensulfuron-methyl + 0.022 to 0.038 oz ai/a metsulfuron-methyl (7 to 12 fl oz/a [10 to 12 fl oz/a in the states of Idaho, Oregon, and Washington only] Travallas 25.2% OD)

**Time** Apply to actively growing barley after the crop is in the 2-leaf stage, but before the flag leaf is visible. Annual broadleaf weeds must be past the cotyledon stage and actively growing.

**Remarks** Tank-mix compatibility with many commonly used broadleaf and grass herbicides, fungicides, insecticides, liquid fertilizers, and spray adjuvants (see current product label for specific restrictions, precautions, and details). Use of spray adjuvants are recommended and ammonium nitrogen fertilizer may be used. For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Thorough coverage of target weeds is essential. Rain-fast 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not exceed 12 fl oz/a (Idaho, Oregon, and Washington only). Do not make more than one application per season. Should not be used on soils having a pH above 7.9, because extended soil residual activity could extend crop rotation intervals beyond normal. See label for crop rotation intervals. Do not apply through any type of irrigation system, to crops underseeded to legumes or grasses as injury to forage may result, and tank-mix with malathion because crop injury may result. Do not graze or harvest treated forage within 7 days of application, and do not harvest hay within 30 days of application or grain within 45 days of application.

**Site of action** Group 4: synthetic auxins (fluroxypyr) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (fluroxypyr) Pyridine carboxylic acid; (thifensulfuron-methyl) & (metsulfuron-methyl) Sulfonylurea

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**MCPA (several trade names, MCPA Amine or MCPA Ester)**

**Rate** 0.25 to 0.5 lb ae/a

**Time** The 0.25 lb rate can be applied after the grain has four leaves. Higher rates can be applied after the grain is fully tillered, but before jointing.

**Remarks** Grazing interval varies by label from 7 to 14 days. Individual MCPA labels may vary slightly on use rates and grazing interval. Check label to ensure proper rate and application timing. Restricted entry interval (REI) is 12 hours for the MCPA ester formulation and 48 hours for the MCPA amine formulation.

**Caution** Do not let MCPA drift off target. Do not apply more than 0.75 lb ae/a per year. Do not apply this product through any type of irrigation system. Do not forage or graze meat animals on treated areas within 7 days of slaughter. Do not forage or graze dairy animals on treated areas within 7 days after treatment.

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

**Chemical family** Phenoxy acetic acid

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**MCPA + fluroxypyr + clopyralid (Hat Trick or Weld)**

**Rate** 0.34 to 0.45 lb ae/a MCPA + 0.096 to 0.128 lb ae/a fluroxypyr + 0.0946 to 0.128 lb ae/a clopyralid (1.5 to 2 pints/a Hat Trick 2.82EC) for Hat Trick herbicide or 0.22 to 0.44 lb ae/a MCPA + 0.08 to 0.16 lb ae/a fluroxypyr + 0.0625 to 0.125 lb ae/a clopyralid (1 to 2 pints/a Weld 2.89EC) for Weld herbicide.

**Time** Apply to actively growing wheat from the 3-leaf stage until wheat flag leaf emergence for Hat Trick herbicide and up to and including flag leaf emergence for Weld herbicide. Be sure to apply to actively growing weeds, but before weeds are 4 inches tall or vining. Consult the label for information about specific weeds.

**Remarks** This product is rainfast within 6 hours after application. If foliage is wet at the time of application, control may be decreased. Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase the risk of crop injury at all growth stages. The addition of an adjuvant may optimize herbicidal activity when applications are made at lower use rates/carrier volumes, under conditions of cool temperature, low humidity or drought, or to small, heavily pubescent kochia. Best control is achieved when kochia is a least 1 inch tall and not taller than 4 inches. Only weeds that have emerged at time of application will be controlled. This product is rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the spring wheat is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application. Do not harvest of grain and straw within 40 days of application. Refer to label for specific crop rotation restrictions. Do not apply more than 3.0 pints/a per year. Do not apply this product through any irrigation system.

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

**Chemical family** (MCPA) Phenoxy acetic acid, (fluroxypyr and clopyralid) Pyridine

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### **etsulfuron (Ally XP) + another broadleaf herbicide with a different site of action**

**Rate** 0.06 oz ai/a (0.1 oz/a Ally 60XP)

**Time** In non-irrigated barley apply postemergence after barley has two leaves, but before boot stage; see label for postemergence application timing when using tank mixes. In irrigated barley, apply after crop begins tillering, but before boot stage.

**Remarks** Metsulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle. For best results, add a surfactant of at least 60% active ingredient at 0.0625 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution). Apply to difficult-to-control weeds while they are actively growing and not more than 2 inches tall or wide. To broaden the spectrum of control, tank mix with a suitable registered herbicide such as 2,4-D, bromoxynil, dicamba, fluroxypyr or MCPA. Time application to coincide with recommendation for specific tank-mix partner. The first post-treatment irrigation should be delayed at 3 days after herbicide application and should not exceed 1 inch of water. May be tank-mixed with 2,4-D or glyphosate and applied as a harvest aid. Restricted entry interval (REI) is 4 hours.

**Caution** Do not harvest sooner than 10 days after application. Do not use on soils above pH 7.9. Metsulfuron can persist in soil. Carefully follow label instructions on crop rotations. Many crops cannot be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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### **metsulfuron + thifensulfuron + tribenuron (Ally Extra SG) + another broadleaf herbicide with a different site of action**

**Rate** 0.155 to 0.259 oz ai/a (0.3 to 0.5 oz/a Ally Extra 51.8SG)

**Time** Apply after the crop is in the 2-leaf stage, but before the flag leaf is visible. Apply to young, actively growing weeds in the spring summer or fall.

**Remarks** Ally Extra may be tank-mixed with other suitable registered herbicides. Use the 0.5 oz/a rate for heavy weed infestations. For best results use 2, 4-D or MCPA at 1/8 to 3/8 lb ai/a. Include a nonionic surfactant (NIS) having at least 60% active ingredient at 0.0625 to 0.5% v/v (0.5 to 4 pints/100 gal of spray solution). Rainfall or snowfall within the first 6 hours after application may result in reduced weed control. Restricted entry interval (REI) is 12 hours.

**Caution** Do not harvest sooner than 45 days after application. Do not use on soils above pH 7.9. Ally Extra can persist in soil. Carefully follow label instructions on crop rotations. Many crops cannot be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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### **pro sulfuron (Peak) + another broadleaf herbicide with a different site of action**

**Rate** 0.22 to 0.289 oz ai/a (0.38 to 0.5 oz/a Peak 57WDG)

**Time** Apply postemergence from crop emergence to before the second node is detectable in the jointing growth stage; see label for postemergence application timing when using tank-mixes.

**Remarks** Results are best when weeds are young and actively growing. If tank-mixing with another broadleaf herbicide, pro-sulfuron may be applied at 0.25 to 0.5 oz/a. Apply with nonionic surfactant (NIS) of at least 80% active ingredient at 1 to 2 qt/100 gal spray solution, or a crop oil concentrate (COC) of at least 12% emulsifier at 1 to 4 pints/a. Rainfall or overhead irrigation within 4 hours after application may reduce weed control. Do not apply if cold, wet conditions that stress barley are expected within 1 week after application. Restricted entry interval (REI) is 12 hours.

**Caution** Carefully follow crop rotation instructions on label. Do not let spray drift to non-target crops. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as freezing weather. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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### **saflufenacil (Sharpen)**

**Rate** 0.022 to 0.045 lb ai/a (1.0 to 2.0 fl oz/a Sharpen 2.85SC)

**Time** Apply for burndown or residual (use 2 fl oz) control of weeds early preplant to preemergence. Sequential applications may be made as needed prior to barley emergence.

**Remarks** Residual preemergence applications of Sharpen must be activated by at least 0.5 inch of rainfall or sprinkler irrigation prior to weed seedling emergence. Do not apply more than a

maximum cumulative amount of 4.0 oz/a Sharpen per cropping season. An adjuvant system is required for optimum broadleaf burndown activity. This includes methylated seed oil (MSO) at 1% v/v (1 gal/100 gal spray solution) plus ammonium sulfate (AMS) at 1 to 2% v/v (8.5 to 17 lb/100 gal spray solution) or urea ammonium nitrate at 1.25 to 2.5% v/v (1.25 to 2.5 gal/100 gal spray solution). Do not use nonionic surfactant (NIS) as a substitute for MSO. Performance will depend on amount of rainfall for activation, soil texture, and broadleaf species population. Rainfast with 1 hour of application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply to barely grown for malting purposes. Do not apply following barley emergence because crop injury will occur. Do not feed or graze for 30 days after application.

**Site of action** Group 14 Protoporphyrinogen IX oxidase (PPO) inhibitor

**Chemical family** Pyrimidinedione

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### **thifensulfuron (Harmony SG) + another broadleaf herbicide with a different site of action**

**Rate** 0.225 to 0.045 oz ai/a (0.45 to 0.9 oz/a Harmony 50 SG)

**Time** Apply after barley is in the 2-leaf stage but before the flag leaf is visible; see label for postemergence application timing when using tank-mixes.

**Remarks** For best results, add a surfactant with at least 60% nonionic surfactant (NIS) at 0.5 to 4 pt/100 gal of spray solution. Crop oil concentrate (COC) or modified seed oil (MSO) may be used at 1 gal/100 gal spray solution or 2 gal/100 gal spray solution under arid conditions. Apply when weeds are young and actively growing, temperature is 60°F or higher, and moisture is adequate before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Soybeans, field corn, safflower, wheat, barley, oats, and triticale may be planted anytime after application; any other crops may be planted 45 days after application. Sequential treatments may be made provided total amount applied to crop does not exceed 1.5 oz/a. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 4 hours.

**Caution** Do not let spray drift to adjacent crops or land. Do not apply during air temperature inversions. Thoroughly clean mixing and spraying equipment immediately after spraying. Do not harvest grain within 45 days after application. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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### **thifensulfuron + tribenuron (2:1 formulations) + another broadleaf herbicide with a different site of action**

**Rate** 0.15 to 0.3 oz ai/a thifensulfuron + 0.075 to 0.15 oz ai/a tribenuron

**Time** Apply after barley is in two-leaf stage but before flag leaf is visible.

**Remarks** This includes Harmony Extra SG, Harmony Extra XP, TNT Broadleaf and other generics. Be aware that, although they contain the same ratio of thifensulfuron to tribenuron, these products are formulated differently. Be sure to use the correct amount of herbicide. For best results, add a surfactant of at least 80% active ingredient at 0.25 to 0.5% v/v (1 to 2 qt/100 gal spray solution). In addition to a spray adjuvant, an ammonium

nitrogen fertilizer may be used. Apply when weeds are young and actively growing, and when conditions include temperatures of 60°F or higher and adequate soil moisture before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let this herbicide drift off target. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spray equipment. Wheat and barley may be planted any time after application. Sugar beets, winter rape, and canola may be planted 60 days after application. All other crops may be planted 45 days after application. Do not harvest grain within 45 days after application. Do not apply this product through any type of irrigation system.

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

**Chemical family** (both) Sulfonylurea

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### **thifensulfuron + tribenuron (1:1 formulations, Affinity BroadSpec and Edition BroadSpec) + another broadleaf herbicide with a different site of action**

**Rate** 0.1 to 0.25 oz ai/a thifensulfuron + 0.1 to 0.25 oz ai/a tribenuron (0.4 to 1 oz/a Affinity BroadSpec and Edition BroadSpec 50SG)

**Time** Apply after barley is in 2-leaf stage but before flag leaf is visible; see label for postemergence application timing when using tank-mixes.

**Remarks** Affinity BroadSpec and Edition BroadSpec are 1:1 formulations of thifensulfuron and tribenuron. Must be tank-mixed when applying 0.4 to 0.6 oz/a. Add a nonionic surfactant (NIS) at 0.0625 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution). Use with another broadleaf herbicide with a different site of action. Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 1.0 oz/a per crop season. Do not let this herbicide drift off target. Do not plant any crop except wheat, barley or triticale for 45 days after application. Sugar beets, winter rape, and canola cannot be planted until 60 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) Sulfonylurea

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### **thifensulfuron + tribenuron (4:1 formulations, Affinity TankMix and Edition TankMix) + another broadleaf herbicide with a different site of action**

**Rate** 0.015 to 0.025 lb ai/a thifensulfuron + 0.0038 to 0.0063 lb ai/a tribenuron (0.6 to 1 oz/a Affinity TankMix and Edition TankMix 50SG)

**Time** Apply after barley is in 2-leaf stage, but before flag leaf is visible; see label for postemergence application timing when using tank mixes.

**Remarks** Affinity TankMix and Edition TankMix are 4:1 formulations of thifensulfuron and tribenuron. Add a nonionic surfactant (NIS) at 0.25 to 0.5% v/v (1 to 2 qt/100 gal spray solution). Use with another broadleaf herbicide with a different site

of action. Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Sequential treatments may be made provided total amount applied to crop does not exceed 1.8 oz/a per year. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let this herbicide drift off target. Wheat, barley, and triticale may be planted any time after application. Sugar beets, winter rape, and canola may be planted 60 days after application. All other crops may be planted 45 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) Sulfonylurea

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**thifensulfuron + tribenuron + metsulfuron (Ally Extra SG) + another broadleaf herbicide with a different site of action**

**Rate** 0.005 to 0.0086 lb ai/a thifensulfuron + 0.0025 to 0.0042 lb ai/a tribenuron + 0.002 to 0.0034 metsulfuron lb ai/a (0.3 to 0.5 oz/a Ally Extra 48.2 SG)

**Time** Apply after the crop is in the 2-leaf stage, but before the flag leaf is visible; see label for postemergence application timing when using tank mixes.

**Remarks** Ally Extra may be tank mixed with other suitable registered herbicides. Include a nonionic surfactant (NIS) having at least 80% active ingredient at 0.125 to 0.25% v/v (0.5 to 1 qt/100 gal of spray solution). Rainfall or snowfall within the first 6 hours after application may result in reduced weed control. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use on soils above pH 7.9. Ally Extra can persist in soil. Carefully follow label instructions on crop rotations. Many crops cannot be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather.

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

**Chemical family** Sulfonylurea

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**triasulfuron (Amber) + another broadleaf herbicide with a different site of action**

**Rate** 0.013 to 0.026 lb ai/a (0.28 to 0.47 oz/a Amber 75DF)

**Time** Apply pre-boot at any growth stage; see label for postemergence application timing when using tank mixes.

**Remarks** Control is best when weeds are actively growing and 2 inches or less in height or diameter. Add a surfactant of at least 80% active ingredient at 0.25% to 0.5% v/v (1 to 2 quarts/100 gal spray solution). Use 0.35 to 0.47 oz/a if the weeds are at or above the maximum height. Restricted entry interval (REI) is 4 hours.

**Caution** Triasulfuron can persist in soil. Follow label instructions when rotating to barley. At these rates, wheat can be seeded immediately after application; all other crops require a field bioassay. Do not allow spray to drift to non-target crops. Do not apply when barley is stressed due to temperature extremes, excessive or too little moisture, disease, insects, or when extremes in temperature or rainfall are expected within one week of application. See label for use restrictions in sections of Washington and Oregon west of the Cascades. Do not apply as

tankmix or sequentially with malathion. Do not exceed 0.56 oz/a in one crop year. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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**triasulfuron + dicamba (Rave)**

**Rate** 0.022 triasulfuron + 0.138 lb ai/a dicamba (4 oz/a Rave 63.8 WDG)

**Time** Apply after emergence up to 4-leaf stage in spring barley, or up to jointing stage in winter barley.

**Remarks** Maximum use rate is 2 oz/a Rave in spring barley and 4 oz/a in winter barley. Include nonionic surfactant (NIS) at 0.125% to 0.25% v/v (0.5 to 1 quart/100 gal spray solution) when water is the carrier. Rave controls many broadleaf weeds and may be tank-mixed with Aim, Ally, Buctril, Bronate, MCPA, and 2,4-D. Rain within 4 hours of application may reduce herbicide effectiveness. Restricted entry interval (REI) is 24 hours.

**Caution** Washington growers must abide by all sulfonylurea aerial application rules. Do not let spray drift to non-target crops or desirable plants. Preharvest interval is 37 days for hay or grain. Do not apply within 4 hours of rain or sprinkler irrigation. Do not apply this product through any type of irrigation system.

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

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

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**tribenuron (Express SG) + another broadleaf herbicide with a different site of action**

**Rate** 0.0081 to 0.0156 lb ai/a (0.25 to 0.5 oz/a Express 50 SG)

**Time** Apply after barley is in 2-leaf stage but before flag leaf is visible; see label for postemergence application timing when using tank mixes.

**Remarks** Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. Controls only weeds that have emerged; therefore, apply when all or most of the weed have emerged. Can be tank mixed with 2, 4-D, MCP, Bromoxynil and others. See label for full list. Include a surfactant at 0.06 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution) with at least 60% nonionic surfactant (NIS). Crop oil concentrate (COC) or modified seed oil (MSO) may be used at 1% v/v (1 gal/100 gal spray solution) or under arid conditions use 2% v/v (2 gal/100 gal spray solution). See most recent grass herbicide label for tank-mix restrictions. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let spray drift to adjacent crops or land. Do not apply during an air temperature inversion. Thoroughly clean mixing and spraying equipment immediately after spraying. Do not apply to barley underseeded with another crop. Wheat and barley may be planted any time after application. Oats may be replanted 1 day later in soils with pH < 7.9. If pH is > 7.9, wait 7 days. Do not harvest grain within 45 days after application.

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

**Chemical family** Sulfonylurea

## Preharvest Weed Control

### 2,4-D (several trade names)

**Rate** 0.5 to 1 lb ae/a

**Time** Apply when barley is in hard dough stage to control weeds that will interfere with harvest.

**Remarks** Results are best when soil moisture is sufficient for active weed growth. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not let 2,4-D drift off target. The preharvest interval is 14 days. Maximum of 1.75 lb ae (3.6 pints/a) per crop cycle. Limited to one preharvest application per crop cycle. Do not apply to fields underseeded to legumes.

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

**Chemical family** Phenoxy acetic acid

### carfentrazone (Aim EC)

**Rate** Apply up to 0.031 lb ai/a (apply up to 2 fl oz/a Aim 2EC)

**Time** Apply when crop is mature, and grain has begun to dry down. Do not apply within 7 days of harvest.

**Remarks** Use MSO or COC at 1 to 2 % v/v (1 to 2 gal/100 gal of spray solution) for harvest aid. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v (2 to 4 gal/100 gal spray solution) or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to the NIS. Coverage is essential for satisfactory performance. Repeat application if necessary. Restricted entry interval (REI) is 12 hours.

**Caution** If applied as a tank-mixture, refer to the other product labels for restrictions on tank mixing, and follow all label precautions, instructions, and rotational cropping restrictions.

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

**Chemical family** Triazolone

### glyphosate (several trade names)

**Rate** 0.75 lb ae/a

**Time** Apply after feed barley is in hard dough stage (less than or equal to 20% moisture).

**Remarks** Use on feed barley only. Preharvest application is not recommended for barley grown for seed. Be aware that glyphosate is formulated as 3 lb, 4 lb, 4.17 lb, 4.5 lb, and 5 lb ae/gal; be sure to use the correct amount of herbicide. Do not exceed 0.75 lb ae/a per season. Add 0.5 to 1% v/v (2 to 4 qt/100 gal spray solution) nonionic surfactant (NIS). Apply in 3 to 10 gal/a by air or ground. Preharvest interval is 7 days. Restricted entry interval (REI) is 4 hours.

**Caution** Do not let glyphosate drift off target. Do not use on malt barley or barley grown for seed because a reduction in germination or vigor may occur.

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

**Chemical family** Glycine

### metsulfuron (Ally XP) + 2,4-D or glyphosate

**Rate** 0.0375 lb ai/a metsulfuron + 0.25 to 0.5 lb ae/a 2,4-D or 0.77 lb ae/a glyphosate (0.1 oz/a Ally 60XP)

**Time** Make applications after the crop has reached the hard dough stage, but no later than 10 days before harvest.

**Remarks** Used in combination with 2,4-D at 0.25 to 0.5 lb ai/a plus surfactant at 0.25 to 0.5% v/v (1 to 2 qt/100 gal spray solution) or glyphosate at 0.75 lb ae/a will typically aid in dry down of many broadleaf weeds. Weeds must be actively growing to be effective. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9. Metsulfuron can persist in soil. Carefully follow label instructions regarding crop rotations. Many crops cannot be planted within 2 years or longer after applying. Do not use with glyphosate on malt barley or barley grown for seed because a reduction in germination or vigor may occur.

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

**Chemical family** Sulfonylurea

### saflufenacil (Sharpen)

**Rate** 0.022 to 0.045 lb ai/a (1 to 2 fl oz/a Sharpen 2.85SC)

**Time** Apply only to barley that has reached physiological maturity (hard-dough stage; grain contains less than 30% moisture) or according to Extension Service recommendations in the use area. Allow up to 7 days for optimum desiccation effect depending on environmental conditions.

**Remarks** A methylated seed oil (MSO) plus ammonium-based adjuvant system is required for optimum desiccation activity and weed control. See label for more information on adjuvants and tank-mixes. Pre-harvest interval is 3 days. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than a maximum cumulative amount of 2.0 fl oz/a of Sharpen per cropping season from desiccation uses. Do not apply Sharpen on barley (all types) grown for seed production. Do not apply to barely grown for malting purposes.

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

**Chemical family** Pyrimidindione

# Oats

Don Morishita

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## Preplant and Preemergence Weed Control

### carfentrazone (Aim)

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

**Time** Apply before, during, or after oats have been planted.

**Remarks** May be applied as a preplant burndown (up to 1 day before seeding), foliar broadcast or as a harvest-aid. Use a nonionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution) having at least 80% active ingredient. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v (2 to 4 gal/100 gal spray solution) or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to the NIS. Tank mixing with other herbicides will increase spectrum of control. Apply to actively growing weeds not more than 4 inches tall, or rosettes 3 inches in diameter. Thorough coverage is essential for good control. To avoid significant crop response, do not apply within 6 to 8 hours of rain or irrigation. Restricted entry interval (REI) is 12 hr

**Caution** Do not use Aim EC with crop oil concentrates (COC), methylated seed oils (MSO), or silicone-based adjuvants. Do not exceed 0.031 lb ai/a (2 fl oz Aim EC) per crop season. Do not harvest for forage within 7 days after application.

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

**Chemical family** Triazolinone

### glyphosate (several trade names)

**Rate** 0.375 to 0.75 lb ae/A

**Time** Apply before, during, or after planting oats. Must be applied before oats emerge.

**Remarks** Prepare seedbeds as far ahead of application as possible to permit maximum weed emergence. Be aware that glyphosate is formulated as 3 lb, 4 lb, 4.17 lb, 4.5 lb, and 5 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Usually, the lowest rate can be used since the weeds are less than 1 inch tall. Glyphosate may be used only as a spot treatment in fields. Do not treat more than 10% of the field to be harvested. Some glyphosate products require adding a nonionic surfactant (NIS); be sure to check the product label. The addition of 1 to 2 percent ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal of spray solution may increase the performance of glyphosate particularly with hard water or spraying during drought conditions. Restricted entry interval (REI) is 4 hr

**Caution** Carefully check the entire field to ensure that no oats have begun to emerge. Do not let glyphosate drift off target. Do not apply glyphosate through any irrigation system.

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

**Chemical family** Organophosphorus

## Annual Grass and Broadleaf Weeds

### diuron (Karmex or Direx)

**Rate** 0.8 to 1.2 lb ai/a (1 to 1.5 lb/a of the 80% DF)

**Time** Fall-planted: apply after planting but before oats emerge. Spring-planted: apply after planting either before or after crop emerges, but within 6 weeks of planting.

**Remarks** Use west of the Cascades on fall-planted oats, east of the Cascades on spring-planted oats if average annual rainfall exceeds 16 inches. A smooth, moist seedbed and moisture after treatment aid weed control. Best results are usually obtained when application is made 3 to 4 weeks after planting. Do not replant to any crop within 1 year, or crop injury may result. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply through any type of irrigation system.

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

**Chemical family** Substituted urea

## Annual Broadleaf Weeds

### 2,4-D (several trade names)

**Rate** 0.24 to 0.94 lb ae/a

**Time** Apply after plants are fully tillered but before stems begin to joint.

**Remarks** Maximum use rates vary by individual 2,4-D label and formulation. Also, labels vary slightly on use rates and application timing. Check label to ensure proper rate and application timing. Do not apply before the tiller stage, nor during early boot through milk stage. Be aware that 2,4-D may be formulated with 3.74, 3.8, 5, 5.5, 5.6, and 6 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Preharvest interval is 14 days. Amine formulations require 6 hours before they are rainfast and LVE formulations require 1 hour. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not apply through any type of irrigation system. Do not forage or graze treated grain fields within 2 weeks after treatment. Do not feed treated straw to livestock. Not all 2,4-D is registered for this use. Check the 2,4-D label to determine whether it is registered for use on oats. Do not make more than one application per crop cycle. Check label for maximum amount allowed per crop cycle.

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

**Chemical family** Phenoxy acetic acid

### bromoxynil (several trade names)

**Rate** 0.25 to 0.5 lb ai/a

**Time** Apply from oat emergence up and prior to the boot stage. Apply to the weeds up to the four-leaf stage, or 2 inches tall, or 1 inch diameter, whichever is first.

**Remarks** More effective east of the Cascades. Do not graze for 45 days. Be aware that bromoxynil is formulated as 2 lb or 4 lb ai/gal; be sure to use the correct amount of herbicide. Bromoxynil

is very compatible with many other broadleaf herbicides. Do not apply when crops are under moisture stress or when crop canopy covers the weeds as poor weed control will result. Control is more consistent with tank mixtures. May use 0.5 lb ai/a with chemigation. Do not plant rotational crops within 30 days following herbicide application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze for 45 days after application.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

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**bromoxynil + MCPA (several trade names)**

**Rate** 0.5 to 1 lb ae/a

**Time** Apply to fall and spring oats from the 3-leaf to boot stage. Application timing to weeds depends on weed species, but generally up to the 4 leaf stage or 3 inches tall, whichever comes first. If weed forms rosette, apply before weeds exceed 2 inches in diameter. Most effective when applied to weeds up to 2 inches tall or in diameter.

**Remarks** Be aware that bromoxynil + MCPA is formulated as 4 lb and 5 lb ae/gal; be sure to use the correct amount of herbicide. Use higher rate for larger or more resistant weeds. Controls some large broadleaf weeds, but consistency declines. Be aware that bromoxynil + MCPA is formulated as both 4 lb and 5 lb ai/gal; be sure to use the correct amount of herbicide. Do not apply when crop is under moisture stress or when crop canopy covers the weeds as poor weed control will result. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Restricted entry interval (REI) is 24 hours.

**Caution** Do not permit mixture to drift off target. Do not graze treated fields for 45 days after application.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (MCPA) Phenoxy acetic acid

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**carfentrazone (Aim)**

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

**Time** Apply from prior to planting to the jointing stage of oat growth. For best performance, apply to actively growing weeds up to 4 inches tall or 3 inches across. May be applied as a pre-plant burndown up to 1 day before seeding. May also be used for preharvest burndown.

**Remarks** Include a nonionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution). A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to the NIS. Coverage is essential for good control. Aim may be tank mixed with other broadleaf herbicides. To avoid significant crop response, do not apply within 6 to 8 hours of rain or irrigation or if heavy dew is present. Consult label for more information. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 2 fl oz/a per year. Tank-mixes with EC or ester formulations of other herbicides may increase leaf speckling. Do not use Aim with crop oil concentrate (COC), methylated seed oil (MSO), or silicone-based adjuvants. Do not make applications to foliage wet from dew, rain, or irrigation. Increased crop injury may occur. Do not harvest for forage within 7 days after application.

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

**Chemical family** Triazolone

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**chlorsulfuron (Glean) + another broadleaf herbicide with a different mode of action**

*Spring oats only east of the Cascades; spring and winter oats west of the Cascades*

**Rate** 0.130 to 0.261 oz ai/a (0.17 to 0.33 oz/a Glean 75DF)

**Time** Apply postemergence after spring oats have two to three leaves and before the boot stage. Apply before weeds are 2 inches tall or wide.

**Remarks** Chlorsulfuron controls a wide range of broadleaf annuals and inhibits Canada thistle. It will not control night-shades. For best results, add a nonionic surfactant (NIS) of at least 80% ai at 0.25 to 0.5% v/v (1 to 2 quarts/100 gal spray solution), unless otherwise specified, and apply to actively growing weeds. Tank-mixes are possible for specific weed problems; see label recommendations. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9. See label for other pH restrictions. Chlorsulfuron can persist in soil. Carefully follow label instructions on crop rotations. Many crops may not be planted for 24 months or longer after applying. See label cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather. Do not harvest grain sooner than 45 days after application. Do not apply this product through any irrigation system.

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

**Chemical family** Sulfonylurea

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**clopyralid (Stinger)**

**Rate** 0.094 to 0.125 lb ae/a (0.25 to 0.33 pints/a Stinger3SC)

**Time** Apply from three-leaf up to early boot stage of growth. Apply to actively growing weeds. Only weeds emerged at the time of application will be affected.

**Remarks** Wheat, barley, oats, grasses, field corn, or sugar beets may be planted at any time after treatment. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the oat crop is underseeded with a legume. Do not harvest for hay. Do not plant alfalfa, asparagus, mint or onions within 10.5 months after application. Do not plant dry beans, lentils, peas, potatoes (including potatoes grown for seed), and broadleaf crops grown for seed, excluding *Brassica* species for 18 months after application. Consult label for additional crop rotation restrictions related to annual precipitation. Do not exceed a total of 0.33 pints/a per year. Do not apply by air during an air temperature inversion. Do not allow lactating dairy or meat animals to graze for 1 week after application. Do not harvest hay from treated grain fields. Do not apply through any type of irrigation system.

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

**Chemical family** Pyridine

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**clopyralid + fluroxypyr (WideMatch or Colt AS)**

**Rate** 0.094 to 0.125 ae/a clopyralid + 0.094 to 0.125 ae/a fluroxypyr (1 to 1.33 pints/a WideMatch or Colt AS 1.5SC)

**Time** Apply to actively growing oats from the 3-leaf crop growth stage up to and including flag leaf emergence. Apply when weeds are actively growing, but before weeds are 4 inches tall or vining. For volunteer potato suppression, apply before potato plants are 6 inches tall.

**Remarks** This combination will control a number of weed species. It is particularly effective on Canada thistle, mayweed chamomile, catchweed bedstraw, wild buckwheat, common groundsel, kochia, Russian thistle, nightshade species, and volunteer beans, lentils, peas, and potatoes. Frost 3 days before or after application may reduce weed control and crop tolerance. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the oat crop is underseeded with a legume. WideMatch and Colt AS residues in treated plant tissues that have not completely decayed may affect succeeding susceptible crops. Do not rotate to canola, cole crops (including *Brassica* species grown for seed), flax or sugar beets within 120 days after application. Do not rotate to alfalfa, asparagus, dry beans, mint, or onions for 12 months after application. Do not rotate to broadleaf crops grown for seed (excluding *Brassica* species), chickpeas, lentils, peas, or potatoes (including potatoes grown for seed) for at least 18 months after treatment. Carefully follow label rotation restrictions with other crops. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application.

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

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

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### dicamba (Banvel, Clarity, or others)

**Rate** 0.06 to 0.125 lb ae/a (2 to 4 fl oz/a Clarity or Banvel 4SC)

**Time** Winter oats: after spring growth starts but prior to the jointing stage. Spring oats: before they exceed the five-leaf stage.

**Remarks** Do not use east of the Cascades. Do not apply after oats begin to joint. May be tank mixed with MCPA amine or ester. Do not tank-mix with 2,4-D. Rainfall or irrigation occurring within 4 hours after postemergence application may reduce results. Restricted entry interval (REI) is 24 hours.

**Caution** Do not permit dicamba to drift off target. To avoid injuring desirable crops, do not apply dicamba in the vicinity of sensitive species or if air temperature is expected to exceed 85°F. Do not apply this product through any type of irrigation system. Do not harvest within 7 days after application. Do not feed to dairy stock before crop matures. Do not graze or harvest for dairy feed before crop matures. Do not apply this product through any irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application.

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

**Chemical family** Benzoic acid

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### florasulam + MCPA ester (Orion)

**Rate** 0.044 lb ai/a florasulam + 0.310 lb ae/a MCPA (17 fl oz/a Orion 2.373EC)

**Time** Apply from 3-leaf oat growth stage up to jointing stage. Apply when weeds are actively growing. A later application, when crop is between jointing and boot stages, may control weeds emerging later; however, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage.

**Remarks** An adjuvant may be added to optimize herbicidal activity under suboptimal conditions. If foliage is wet at the time of application, control may be reduced. Do not apply more than 17 fl oz Orion/a per growing season. Livestock may be grazed on treated crops 7 days following application. Do not apply within 60 days of oat harvest. Orion is rainfast within 4 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let Orion drift off target. Do not apply this product through any type of irrigation system. Do not plant any type of corn for 3 months after application. Do not plant alfalfa, canola, chickpea, soybean, dry bean, pea (dry and succulent), flax, lentil, potato, safflower, sugar beet, or sunflower for 9 months after application. Do not apply this product through any irrigation system. Do not apply within 60 days of wheat harvest

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

**Chemical family** (florasulam) Triazolopyrimidine; (MCPA) Phenoxy acetic acid

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### fluroxypyr (Starane Ultra, Comet)

**Rate** 0.105 to 0.25 lb ae/a (0.3 to 0.7 pints/a Starane Ultra 2.8EC and 0.5 to 1.33 pints/a Starane or Comet 1.5 EC)

**Time** Apply to actively growing oats from two-leaf growth stage up to and including flag leaf emergence.

**Remarks** May be tank mixed with other broadleaf weed herbicides registered for use in oats. Follow the most restrictive label statement of the tank-mix products used. Use the 1.33 pints/a rate for volunteer potato control. Applications are rainfast after 1 hour. Optimum temperature range for herbicidal activity is 55°F to 75°F. Frost up to 3 days before, or 3 days after, may reduce weed control and crop tolerance. Do not use this product in combination with fungicides containing strobilurin chemistry. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not use if oats are underseeded with a legume. Do not plant any crop other than wheat, barley, or oats for 120 days after application. Do not graze livestock on treated areas, or harvest treated forage within 7 days of application. Do not apply within 14 days before cutting for hay, or 40 days before harvesting grain or straw.

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

**Chemical family** Pyridine

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### fluroxypyr + bromoxynil (Starane NXT)

**Rate** 0.25 to 0.5 lb ai/a bromoxynil + 0.06 to 0.125 lb ai/a fluroxypyr (14 to 27.4 oz/a Starane NXT 2.91EC)

**Time** Apply to oat from three-leaf stage through flag leaf emergence. Apply to weeds up to 4 or 8 inches tall, depending on rate.

**Remarks** Any crop may be planted 120 days after application. Applications are rainfast within 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply to crops underseeded with legumes.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (fluroxypyr) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (fluroxypyr) Pyridine

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### fluroxypyr + florasulam (Starane Flex)

**Rate** 0.878 lb ae/a fluroxypyr + 0.0044 lb ai/a florasulam (13.5 fl oz/a Starane Flex 0.875 EC)

**Time** Apply to actively growing wheat from the three-leaf growth stage up to flag leaf emergence. Apply when susceptible weeds are less than 4 inches tall and are actively growing.

**Remarks** Only weeds emerged at time of application will be controlled. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and re-growth may occur. Generally, this product does not require the use of an

adjuvant to achieve satisfactory weed control. An adjuvant may be added when applications are made under conditions of cool temperature, low relative humidity or drought, or when a tank-mix partner recommends the use of an adjuvant. Livestock may be grazed on treated crops 7 days after application. Applications are rainfast within 4 hours after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than 27.4 fl oz of Starane NXT per season. Do not apply to crops underseeded with legumes. Do not apply this product through any type of irrigation system. Do not apply within 60 days of harvest. Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following time of application may reduce weed control and increase the risk of crop injury at all stages of growth.

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

**Chemical family** (fluroxypyr) Pyrimidine, (florasulam) Triazolopyrimidine

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### fluroxypyr + thifensulfuron-methyl (Sentrallas)

**Rate** 1.12 to 1.44 oz ae/a fluroxypyr + 0.22 to 0.28 oz ai/a thifensulfuron-methyl (7 to 9 fl oz/a (Sentrallas 24.9% OD))

**Time** Apply to actively growing spring oats after the crop is in the 3-leaf stage, but before jointing. Annual broadleaf weeds must be past the cotyledon stage and active growing.

**Remarks** Risk of injury is greatest when crop is in the 2 to 5 leaf stage. Tank mix compatibility with many commonly used broadleaf and grass herbicides, fungicides, insecticides, liquid fertilizers, and spray adjuvants (see current product label for specific restrictions, precautions, and details). For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Thorough coverage of target weeds is essential. Rain-fast 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not use on "Ogle", "Porter" or "Premier" varieties as crop injury may occur. Do not make more than one application per cropping season, and do not exceed 9 fl oz/A. Do not apply through any type of irrigation system, to crops underseeded to legumes or grasses as injury to forage may result, and tank mix with Malathion because crop injury may result. Do not graze or harvest treated forage within 7 days of application, and do not harvest hay within 30 days of application or grain within 45 days of application. Do not apply to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result.

**Site of action** Group 4: synthetic auxins (fluroxypyr) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (fluroxypyr) Pyridine carboxylic acid; (thifensulfuron-methyl) Sulfonylurea

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### MCPA (MCPA Amine or MCPA Ester)

**Rate** 0.25 to 0.75 lb ae/a for MCPA amine and 0.23 to 0.46 lb ae/a for MCPA ester

**Time** Apply to actively growing weeds when oats have three to five leaves, or up to early boot stage.

**Remarks** Individual MCPA labels may vary slightly on use rates, application timing, and grazing interval. This is particularly true with the amine, sodium salt and ester formulations. Check label to ensure proper rate and application timing. If underseeded with legumes, MCPA amine use rate is 0.125 to 0.25 lb ae/A.

Do not apply more than 0.75 lb ae/a per year. Restricted entry interval (REI) is 12 hours for the MCPA ester formulation and 48 hours for the MCPA amine formulation.

**Caution** Grazing interval varies with specific product label. Do not allow MCPA to drift off target. Do not apply more than 0.75 lb ae/a per year. Do not apply this product through any type of irrigation system. Do not forage or graze meat animals on treated areas within 7 days of slaughter. Do not forage or graze dairy animals on treated areas within 7 days after treatment.

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

**Chemical family** Phenoxy acetic acid

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### MCPA + fluroxypyr + clopyralid (Hat Trick)

**Rate** 0.34 to 0.45 lb ae/a MCPA + 0.096 to 0.128 lb ae/a fluroxypyr + 0.096 to 0.128 lb ae/a clopyralid (1.5 to 2 pints/a Hat Trick 2.82EC)

**Time** Apply this product until oat flag leaf emergence, and to actively growing weeds. For best results, refer to label for application timing based on weed species.

**Remarks** If foliage is wet at the time of application, control may be decreased. Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase the risk of crop injury at all growth stages. The addition of an adjuvant may optimize herbicidal activity when applications are made at lower use rates/carrier volumes, under conditions of cool temperature, low humidity, or drought, or to small, heavily pubescent kochia. Only weeds that have emerged at time of application will be controlled. This product is rain-fast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the oat crop is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application. Do not harvest within 40 days of application. Refer to label for specific crop rotation restrictions. Do not apply more than 3.0 pints/a per year.

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

**Chemical family** (MCPA) Phenoxy acetic acid, (fluroxypyr and clopyralid) Pyridine

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### MCPA + fluroxypyr + clopyralid (Weld)

**Rate** 0.22 to 0.44 lb ae/a MCPA + 0.08 to 0.16 lb ae/a fluroxypyr + 0.0625 to 0.125 lb ae/a clopyralid (1 to 2 pints/a Weld 2.89EC)

**Time** Apply to actively growing oat from the 3 leaf stage up to and including flag leaf emergence. Be sure to apply to actively growing weeds, but before weeds are 4 inches tall or vining. Only weeds that have emerged at the time of application will be controlled. Consult the label for information about specific weeds.

**Remarks** This product is rainfast within 6 hours after application. For young succulent growth of susceptible weed species less than 4 inches tall, apply 1 to 1.5 pints/A. Best control of kochia is achieved when kochia is a least 1 inch tall and not taller than 4 inches. The addition of an adjuvant may optimize herbicidal activity when applications are made at lower use rates/carrier volumes, under conditions of cool temperature, low humidity, or drought, or to small, heavily pubescent kochia. Extreme growing conditions such as drought or near-freezing temperatures before, during, or after application may reduce weed control and increase crop injury. Rainfast within 6 hours of application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the cereal crop is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application. Refer to label for specific crop rotation restrictions. Refer to label for specific crop rotation restrictions.

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

**Chemical family** MCPA) Phenoxy acetic acid, (fluroxypyr and clopyralid) Pyridine

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### mesotrione (Callisto)

**Rate** 0.094 to 0.188 lb ai/a (3 to 6 fl oz/a Callisto 4FL)

**Time** Apply preemergence (6 fl oz/a) or postemergence (3 fl oz/a).

**Remarks** Follow the rate recommendations depending on application timing. For postemergence applications, weeds should be less than 5 inches tall. Addition of a crop oil concentrate (COC) at 1% v/v or a nonionic surfactant (NIS) at 0.25% v/v is recommended. Urea ammonium nitrate (UAN) at 2.5% v/v or ammonium sulfate (AMS) at 8.5 lb/100 gal spray solution may be added for improved weed control. Addition of COC or NIS can increase injury potential. Tank mixing other pesticides with Callisto applied postemergence may increase crop injury risk. Avoid adding pesticides with emulsifiable concentrate (EC) formulations. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not graze or feed forage from treated areas within 30 days following application. Do not harvest oats within 50 days after application. Do not apply more than once per year.

**Site of action** Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor

**Chemical family** Triketone

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### saflufenacil (Sharpen)

**Rate** 0.022 to 0.045 lb ai/a (1.0 to 2.0 oz/a Sharpen 2.85SC)

**Time** Apply for burndown or residual control of weeds early preplant to preemergence. Sequential applications may be made as needed prior to oat emergence.

**Remarks** Residual preemergence applications of Sharpen must be activated by at least 0.5 inch of rainfall or sprinkler irrigation prior to weed seedling emergence. Do not apply more than a maximum cumulative amount of 4.0 oz/a Sharpen per cropping season. An adjuvant system is required for optimum broadleaf burndown activity. This includes methylated seed oil at 1% v/v (1 gal/100 gal spray solution) plus ammonium sulfate (AMS) at 1 to 2% w/v (8.5 to 17 lb/100 gal spray solution) or urea ammonium nitrate (UAN) at 1.25 to 2.5% v/v (1.25 to 2.5 gal/100 gal spray solution). Do not use nonionic surfactant (NIS) as a substitute for methylated seed oil (MSO). Performance will depend on amount of rainfall for activation, soil texture, and broadleaf species population. Rainfast with 1 hour of application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not apply following oat emergence or crop injury will occur. Do not feed or graze for 30 days after application.

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

**Chemical family** Pyrimidinedione

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### thifensulfuron (Harmony SG) + another broadleaf herbicide with a different mode of action

**Rate** 0.225 to 0.045 oz ai/a (0.45 to 0.6 oz/a Harmony 50SG)

**Time** Apply after the crop is in the 2-leaf stage of winter oats and 3-leaf stage of spring oats, but before flag leaf is visible.

**Remarks** Do not make more than one application of Harmony ST per crop season on oats. For best results, add a nonionic surfactant (NIS) of at least 60% ai at 0.5 to 2 quarts/100 gal spray solution. Crop oil concentrate (COC) or modified seed oil (MSO) may be used in place of NIS. Apply at 1% v/v (1 gal/100 gal spray solution). Apply to young, actively growing weeds when temperature is 60°F or higher and soil moisture is adequate before, during, and immediately after treatment. Sequential treatments may be made provided total amount applied to crop does not exceed 1.5 oz/a. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on "Ogle", "Porter", or "Premier" varieties because crop injury may occur. Do not apply this product through any type of irrigation system. Do not harvest grain within 45 days after application.

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

**Chemical family** Sulfonylurea

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### thifensulfuron + tribenuron (2:1 formulations) + another broadleaf herbicide with a different mode of action

**Rate** 0.149 to 0.2 oz ai/a thifensulfuron + 0.074 to 0.1 oz ai/a tribenuron (0.45 to 0.6 oz/a Harmony Extra 50SG)

**Time** Apply after the crop is in the three-leaf stage but before jointing.

**Remarks** This includes Harmony Extra SG, Harmony Extra XP, TNT Broadleaf and other generics. Be aware that these products are formulated differently. Be sure to use the correct amount of herbicide. For best results add a nonionic surfactant (NIS) of at least 80% ai at 1 to 2 quarts/100 gal spray solution. At least 60% ai at 0.06 to 0.50% v/v (½ pt to 4 pints/100 gal of spray solution). In addition to a spray adjuvant, an ammonium nitrogen fertilizer may be used. Apply to young, actively growing weeds when temperature is 60°F or higher and soil moisture is adequate before, during, and immediately after treatment. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use on "Ogle", "Porter", or "Premier" varieties because crop injury may occur. Do not let this herbicide drift off target. Do not apply this product through any type of irrigation system. Do not plant any crop except wheat or barley for 45 days after application. Sugar beets, winter rape, and canola cannot be planted until 60 days after application. Do not harvest grain within 45 days after application. Do not apply this product through any type of irrigation system.

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

**Chemical family** (both) sulfonylurea

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### thifensulfuron + tribenuron (1:1 formulations, Affinity BroadSpec and Edition BroadSpec) + another broadleaf herbicide with a different mode of action

**Rate** 0.1 oz ai/a thifensulfuron + 0.1 oz ai/a tribenuron (0.4 oz/a Affinity BroadSpec 50SG)

**Time** Apply after the crop is in the three-leaf stage but before jointing.

**Remarks** Affinity BroadSpec and Edition BroadSpec are 1:1 formulations of thifensulfuron and tribenuron. For best results add a nonionic surfactant (NIS) of at least 80% ai at 0.0625 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution). Apply to young, actively growing weeds when temperature is 60°F or higher and soil moisture is adequate before, during, and immediately after treatment. When applying 0.4 to 0.6 oz/a, Affinity BroadSpec must be used in combination with other registered broadleaf herbicides. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use on “Ogle”, “Porter”, or “Premier” varieties because crop injury may occur. Do not let this herbicide drift off target. Do not apply this product through any type of irrigation system. Do not plant any crop except wheat or barley for 45 days after application. Sugar beets, winter rape, and canola cannot be planted until 60 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) sulfonylurea

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**thifensulfuron + tribenuron (4:1 formulations, Affinity TankMix and Edition TankMix) + another broadleaf herbicide with a different mode of action**

**Rate** 0.3 to 0.025 lb ai/a thifensulfuron + 0.075 to 0.0063 lb ai/a tribenuron (0.6 to 0.75 oz/a Affinity TankMix 50SG)

**Time** Apply after the crop is in the three-leaf stage but before jointing.

**Remarks** Affinity TankMix and Edition TankMix are 4:1 formulations of thifensulfuron and tribenuron. Apply after the crop is in the 3-leaf stage but before jointing and when weeds are young, actively growing, when air temperature is 60°F or higher and soil moisture is adequate before, during, and immediately after treatment. For best results add a nonionic surfactant (NIS) of at least 60% ai at 1 to 2 quarts/100 gal spray solution or crop oil concentrate (COC) or methylated seed oil (MSO) at 1% v/v or 2% v/v (1 to 2 gal/100 gal spray solution) under arid conditions. Sequential treatments may be made provided that the total amount applied to the crop does not exceed 1.8 oz/a per year. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use on “Ogle”, “Porter”, or “Premier” varieties because crop injury may occur. Do not apply this product through any type of irrigation system. Do not let this herbicide drift off target. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) Sulfonylurea

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**tribenuron (Express SG) + another broadleaf herbicide with a different mode of action**

**Rate** 0.0078 ai/a (0.2 oz/a Express 50SG)

**Time** Apply after oat is in three-leaf stage but before flag leaf is visible.

**Remarks** Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. Controls

only weeds that have emerged; therefore, apply when all or most of the weed have emerged. Can be tank mixed with 2, 4-D, MCP, Bromoxynil and others. See label for full list. Include a surfactant at 0.06 to 0.5% v/v (0.5 to 4 pints/ 100 gal spray solution) with at least 60% nonionic surfactant (NIS). Crop oil concentrate (COC) or modified seed oil (MSO) may be used at 1% v/v (1 gal/100 gal spray solution) or under arid conditions use 2% v/v (2 gal/100 gal spray solution). See most recent grass herbicide label for tank-mix restrictions. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use on “Ogle”, “Porter”, or “Premier” varieties because crop injury may occur. Do not apply this product through any type of irrigation system. Do not let spray drift to adjacent crops or land. Do not apply during an air temperature inversion. Thoroughly clean mixing and spraying equipment immediately after spraying. Wheat and barley may be planted any time after application. Oats may be replanted 1 day later in soils with pH <7.9. If pH is >7.9, wait 7 days. Do not apply to oats underseeded with another crop. Do not harvest grain within 45 days after application.

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

**Chemical family** Sulfonylurea

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**Preharvest Weed Control**

**2,4-D (several trade names)**

**Rate** 0.5 to 1 lb ae/a

**Time** Apply when oats are in hard dough stage, to control weeds that will interfere with harvest.

**Remarks** Results will be best when soil moisture is sufficient for active weed growth. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not permit 2,4-D to drift off target. The preharvest interval is 14 days. Maximum of 1.75 lb ae/a (3.6 pints/a) per crop cycle. Limited to one preharvest application per crop cycle. Do not apply to fields underseeded to legumes.

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

**Chemical family** Phenoxy acetic acid

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**carfentrazone (Aim)**

**Rate** Apply up to 0.031 lb ai/a (2 fl oz/a Aim 2EC)

**Time** Apply when crop is mature and grain is in hard dough stage, to control weeds that will interfere with harvest. Do not apply within 7 days of harvest.

**Remarks** Use MSO or COC at 1 to 2% v/v (1 to 2 gallons/100 gal of spray solution) for harvest aid. Coverage is essential for satisfactory performance. Repeat application if necessary. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 0.031 lb ai/a (2 fl oz/A) per season for all Aim applications. There is a 3 day preharvest interval. If applied as a tank-mixture, refer to the other product's label for restrictions on tank mixing and observe all label precautions, instructions, and rotational cropping restrictions. Do not apply this product through any irrigation system.

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

**Chemical family** Triazolinone

# Winter Wheat—Nonirrigated, East of the Cascades

Drew Lyon

Revised March 2019

## Downy Brome

### flufenacet + metribuzin (Axiom DF)

*Suppression only*

**Rate** 0.136 to 0.34 lb/a flufenacet and 0.034 to 0.085 lb/a metribuzin (4 to 10 oz/a Axiom DF)

**Time** Apply from wheat germination to the two-leaf growth stage.

**Remarks** For best results: 1) plant wheat after the first flush of weeds has emerged and is destroyed by tillage; or, in no-till winter wheat, apply a nonselective herbicide to control emerged weeds at or before planting; 2) apply Axiom before the weeds' one-leaf stage; and 3) use the highest specified rate depending on soil texture. Less than 0.5 inch of rainfall or irrigation within two weeks following application may result in reduced weed control.

**Caution** Winter wheat must be planted at least 1.5 inches deep. Certain wheat varieties are sensitive to Axiom; see label. Do not exceed 10 oz/a Axiom DF per season.

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

**Chemical family** (flufenacet) oxyacetamide; (metribuzin) triazine

### mesosulfuron (Osprey)

**Rate** 0.013 lb ai/a (4.75 oz/a Osprey)

**Time** Apply to winter wheat from wheat emergence to the two-node stage. For downy brome, apply from one-leaf to two-tiller growth stage. See label for application timing and weed size.

**Remarks** Treat heavy infestations before they compete with the crop. A recommended adjuvant must be tank mixed with Osprey as specified on the label. Do not apply Osprey more than once per crop year.

**Caution** For winter wheat only.

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

**Chemical family** Sulfonylurea

### metribuzin (various trade names)

*Suppression only*

**Rate** 0.094 to 0.38 lb ai/a (2 to 8 oz/a of the 75% DF)

**Time** Apply when wheat is tillering and has developed one-inch secondary roots.

**Remarks** Plant the seed at least 1.5 inches deep and increase seeding rate by 10%. Do not apply after wheat begins to joint. Follow label regarding soil type and organic matter. Apply metribuzin when the crop is healthy and actively growing. Metribuzin may be applied more than once per crop season. Allow at least 21 days between applications if wheat is actively growing, or allow 45 days between applications if wheat is growing in adverse conditions, has entered dormancy, or is stressed due to frost damage, disease, drought, or excessive moisture. Do not graze treated fields for 14 days after application or harvest grain within 21 days after last application.

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

**Chemical family** Triazine

### metribuzin (various trade names) + chlorsulfuron + metsulfuron (Finesse Cereal and Fallow)

**Rate** 0.07 to 0.28 lb ai/a metribuzin (1.5 to 6 oz/a of the 75% DF) + 0.23 to 0.3 oz ai/a Finesse Cereal and Fallow (0.3 to 0.4 oz/a Finesse Cereal and Fallow)

**Time** Apply when wheat is tillering and has developed two-inch secondary roots.

**Remarks** Plant seed at least 1.5 inches deep and increase the seeding rate by 10%. Do not apply after wheat begins to joint. Follow the label regarding soil type and organic matter. Do not apply more than once per crop. Do not graze treated fields for 14 days after application.

**Caution** Do not use on soils above pH 7.9. Finesse Cereal and Fallow can persist in soil. Carefully follow label instructions on crop rotations. Many crops may not be planted for 2 years or longer after applying.

**Site of action** (metribuzin) Group 5: photosystem II inhibitor; (chlorsulfuron and metsulfuron) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (metribuzin) triazine; (chlorsulfuron and metsulfuron) sulfonylurea

### propoxycarbazone (Olympus)

**Rate** 0.026 to 0.039 lb ai/a (0.6 to 0.9 oz/a Olympus) plus 0.25 to 0.5% nonionic surfactant

**Time** Apply preplant, preemergence, or postemergence. Preplant and preemergence use limited to 0.6 oz/a rate, which only provides suppression of downy brome. Apply postemergence applications to wheat after the 2-leaf stage begins, but before jointing begins. May be applied in fall or spring, or sequentially. Base application timing on crop stage, not weed stage. Suppression only with spring applications and fall applications of 0.6 oz Olympus/a; control with fall applications of 0.9 oz Olympus/a.

**Remarks** Do not exceed 1.2 oz/a Olympus per crop year. When applying with fluid fertilizer, spray solution should not be composed of more than 50% liquid nitrogen, and should not exceed 30 lb of actual nitrogen per acre. If applying with liquid nitrogen, use a nonionic surfactant at a maximum of 0.25% v/v.

**Caution** Do not use with organosilicone-based surfactants.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

### pyroxsulam (PowerFlex HL)

**Rate** 0.016 lb ai/a (2.0 oz/a PowerFlex HL)

**Time** Apply in either fall or spring to actively growing winter wheat from the three-leaf to jointing stage and after most weeds have emerged. Apply with a nonionic surfactant (0.25% to 0.50% v/v) and ammonium sulfate (1.5 lb/a).

**Remarks** When applying with fluid fertilizer, spray solution should not be composed of more than 50% liquid nitrogen, and should not exceed 30 lb of actual nitrogen per acre. If applying with liquid nitrogen, use a nonionic surfactant at a maximum of

0.25% v/v, instead of crop oil concentrate. Suppression only of downy brome with spring applications.

**Caution** For winter wheat only. Do not mix with products containing dicamba or amine formulations of 2,4-D or MCPA or organophosphate insecticides. Consult label for crop rotation restrictions.

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

**Chemical family** Triazolopyrimidine sulfonamide

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### sulfosulfuron (Outrider)

**Rate** 0.031 lb ai/a (0.67 oz/a product) plus 0.5% nonionic surfactant

**Time** Apply to wheat preplant (supplemental label), preemergence, or up to jointing stage of growth. For best control of brome species, apply fall postemergence when brome is in two- to three-leaf stage. To suppress brome species in spring, apply up to five-tiller growth stage.

**Remarks** Early spring applications should be when brome has recovered from cold weather, when most foliage is green, not red or purple. Suppression only of downy brome with spring applications.

**Caution** Do not use within 60 days of crop emergence if an organophosphate insecticide has been applied in-furrow. Do not tank mix with malathion. Do not plant any crop other than wheat for 1 year after application.

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

**Chemical family** Sulfonylurea

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### triallate (Far-Go or Avadex)

*Suppression only*

**Rate** 1.25 to 1.5 lb ai/a (1.25-1.5 quarts/a Far-Go)

**Time** Apply preplant and incorporate.

**Remarks** Incorporate lightly in two directions at right angles. Some stand thinning may occur on clay knobs or where wheat is dusted in, due to dry conditions. Do not graze.

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

**Chemical family** Thiocarbamate

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### trifluralin (Treflan and other trade names)

**Rate** 0.75 to 1.0 lb ai/a (1.5 to 2.0 pints/a Treflan)

**Time** Apply after final seedbed preparation any time from three weeks to immediately before planting with a deep-furrow drill, or after planting with a double-disk drill.

**Remarks** Incorporate within 24 hours after application, using a flexline harrow, in two directions, at right angles. Deep furrow seeding must follow preplant incorporation. Incorporation after planting must be shallow. See label for crop rotation limitations.

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

**Chemical family** Dinitroaniline

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### Italian Ryegrass and Rattail Fescue

#### flufenacet + metribuzin (Axiom DF)

**Rate** 0.136 to 0.34 lb/a flufenacet and 0.034 to 0.085 lb/a metribuzin (4 to 10 oz/a Axiom DF)

**Time** Apply from wheat germination to the two-leaf growth stage.

**Remarks** For best results: 1) Plant wheat after the first flush of weeds has emerged and is destroyed by tillage; or in no-till winter wheat, apply a nonselective herbicide to control emerged weeds at or before planting; 2) Apply Axiom before the weeds' one-leaf stage; 3) Use the highest specified rate depending on soil texture. Less than 0.5 inch of rainfall or irrigation within 2 weeks following application may result in reduced weed control. For optimum Italian ryegrass control, apply a spring postemergence grass herbicide such as Axial or Osprey.

**Caution** Winter wheat must be planted at least 1.5 inches deep. Certain wheat varieties are sensitive to Axiom; see label. Do not exceed 10 oz/a Axiom DF per season.

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

**Chemical family** (flufenacet) Oxyacetamide; (metribuzin) Triazine

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### pyroxasulfone (Zidua or Zidua SC)

**Rate** 0.053 to 0.093 lb ai/a (1.0 to 1.75 oz/a Zidua) preplant surface or preemergence; 0.037 to 0.106 lb ai/a (0.7 to 2.0 oz/a Zidua) delayed preemergence; 0.074 to 0.133 lb ai/a (1.0 to 2.5 oz/a Zidua) early postemergence

**Rate** 0.041 to 0.106 lb ai/a (1.25 to 3.25 oz/a Zidua SC) preplant surface or preemergence; 0.041 to 0.081 lb ai/a (1.25 to 2.5 oz/a Zidua SC) delayed preemergence; 0.057 to 0.130 lb ai/a (1.75 to 4 oz/a Zidua SC) early postemergence

**Time** Apply preplant surface or preemergence (supplemental label for Idaho, Montana, Oregon, and Washington only); or delayed preemergence as a broadcast spray to the soil surface when 80% of germinated wheat seeds have at least 0.5-inch long shoots up to wheat spiking; or early postemergence from wheat spiking up to 4 tillers.

**Remarks** Do not apply preplant surface or preemergence to coarse-textured soil. Wheat must be planted 1.0- to 1.5-inches deep when using preplant or preemergence applications. Otherwise, wheat must be planted 0.75 to 1.5 inches deep with good seed row closure and soil coverage to avoid injury. Activity may be reduced if crop residue soil cover exceeds 25%. Must be incorporated with rainfall or irrigation after application for optimal weed control. For herbicide resistance management, particularly for Italian ryegrass, apply a spring postemergence grass herbicide such as Axial or PowerFlex.

**Caution** Do not exceed a total of 2.5 oz/a of Zidua or 4 oz/a Zidua SC per season. Do not apply Zidua SC preemergence if 0.25 inch or more of rain is expected within 48 hours after application. Do not apply to Durum wheat. Do not apply preplant incorporated. Do not apply delayed preemergence to broadcast seeded wheat.

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

**Chemical family** Isoxazoline

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### pyroxasulfone + carfentrazone (Anthem Flex)

**Rate** 0.063 to 0.141 lb ai/a (2.0 to 4.5 oz/a Anthem Flex)

**Time** Apply 30 days preplant through fourth tiller. See label for application timing, soil type, and rate information.

**Remarks** For Italian ryegrass control. Apply preplant through preemergence only to soils with a CEC greater than 15, pH less than 7.5, and organic matter greater than 2%. If soils do not meet these requirements, Anthem Flex must be applied as a delayed

preemergence or postemergence treatment. Results are best when applied prior to weed emergence. Wheat must be planted a minimum of 1 inch deep. Must have a minimum of 0.4 inch of rain to activate. May be applied as a single treatment or sequential treatments. May be applied with other labeled herbicides. For herbicide resistance management, particularly for Italian ryegrass, apply a spring postemergence grass herbicide such as Axial or PowerFlex.

**Caution** Do not exceed a total of 4.5 oz of Anthem Flex per season. Do not apply to Durum wheat. See label for rotational restrictions. Do not make postemergence applications to foliage that is wet from dew, rain, or irrigation, as increased speckling may occur.

**Site of action** (pyroxasulfone) Group 15: inhibits very-long-chain fatty acid synthesis; (carfentrazone) Group 14: protoporphyrinogen oxidase inhibitor.

**Chemical family** (pyroxasulfone) Isoxazoline; (carfentrazone) Triazolinone

## Italian Ryegrass and Wild Oat

### clodinafop (Discover NG or other trade names)

**Rate** 0.05 to 0.063 lb ai/a (12.8 to 16 oz/a Discover NG)

**Time** Apply to winter wheat from the two-leaf to pre-boot stage. Do not apply to winter wheat in the fall. Apply to wild oat from one- to six- leaf stage but before fourth tiller emerges. Apply to Italian ryegrass from one- to five-leaf stage but before tillering.

**Remarks** Wheat is more susceptible to injury when temperatures 48 hours before or after application are below 40F. See label for crop rotation restrictions.

**Caution** Apply only once per season. Do not graze or feed forage from treated area for at least 30 days after application. Preharvest interval is 60 days. Do not apply to a crop stressed by conditions such as frost, low fertility, drought, flooding, or disease or insect damage, because crop may be injured.

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

**Chemical family** Aryloxyphenoxypropionate

### flucarbazone (Everest 3.0)

**Rate** 0.027 lb ai/a (2.0 oz/a Everest 3.0)

**Time** Apply to winter wheat from wheat emergence to 60 days prior to harvest. For Italian ryegrass and wild oat, application timing is from one-leaf to two-tiller stage. See label for application timing, weed size, and adjuvant use rate.

**Remarks** Do not graze livestock or harvest forage for hay from treated areas for a minimum of 30 days following application. Do not apply more than once per growing season. Mix with a non-ionic surfactant at 2 quarts/100 gal. May be applied by air. Follow adjuvant recommendation on the label.

**Caution** Preharvest interval is 60 days. Certain crops cannot be replanted within 4 to 24 months of treatment; see label for crop rotation restrictions.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

### mesosulfuron (Osprey)

**Rate** 0.009 to 0.013 lb ai/a (3.2 to 4.75 oz/a Osprey)

**Time** Apply to winter wheat from wheat emergence to the two-node stage. For Italian ryegrass and wild oat, apply from one-leaf

to two-tiller growth stage. See label for application timing and weed size.

**Remarks** Use the 4.75 oz/a rate for Italian ryegrass control. Treat heavy infestations before they compete with the crop. A recommended adjuvant must be tank mixed with Osprey as specified on the label. Do not apply Osprey more than once per crop year.

**Caution** For winter wheat only.

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

**Chemical family** Sulfonyleurea

### pinoxaden (Axial XL)

**Rate** 0.054 lb ai/a (16.4 oz/a Axial XL)

**Time** Apply to winter wheat from the two-leaf to pre-boot stage. Apply to wild oat from one- to six-leaf stage but before fourth tiller emerges. Apply to Italian ryegrass from one- to five-leaf stage but before third tiller emerges.

**Remarks** Use at least 5 gal/a water in aerial applications, 5 to 10 gal/a water in ground applications. Surfactant not required with Axial XL formulation.

**Caution** Avoid applying in more than 10 gal/a water or grass control may be reduced. Do not apply to a crop stressed by conditions such as frost, low fertility, drought, flooding, or disease or insect damage, because crop may be injured.

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

**Chemical family** Phenylpyrazolin

## Wild Oat

### fenoxaprop (various trade names)

**Rate** 0.0825 lb ai/a fenoxaprop (0.66 pints/a of 1EC)

**Time** Apply to wheat from emergence to 70 days prior to harvest. Apply to wild oat in the two-leaf to two-tiller stage of growth.

**Remarks** Low soil-moisture, low humidity, and high temperatures before herbicide application might slightly reduce wild oat control.

**Caution** Do not tank mix with other herbicides, surfactants, or liquid fertilizers unless specifically recommended on the label.

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

**Chemical family** Aryloxyphenoxy propionate

### trilalate (Far-Go or Avadex)

**Rate** 1.25 to 1.5 lb ai/a (1.25 to 1.5 quarts/a Far-Go)

**Time** Apply before or after seeding.

**Remarks** Incorporate shallowly in two directions at right angles. Some stand thinning may occur on clay knobs or where wheat is dusted in, due to dry weather. May not control spring-germinating wild oat. Do not graze.

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

**Chemical family** Thiocarbamate

## Wild Oat and Windgrass

### flucarbazone (Everest 3.0)

**Rate** 0.027 lb ai/a (2.0 oz/a Everest 3.0)

**Time** Apply to winter wheat from one-leaf to 60 days prior to harvest, and to actively growing grass weeds in the one-leaf to two-tiller growth stage. See label for application timing and weed size.

**Remarks** Do not graze livestock or harvest for age for hay from treated areas for a minimum of 30 days following application. Do not apply more than once per growing season. Mix with a nonionic surfactant at 0.25 to 0.5% v/v or a methylated seed oil at 1% v/v. May be applied by air.

**Caution** Preharvest interval is 60 days. Certain crops cannot be replanted within 4 to 24 months of treatment; see label for crop rotation restrictions.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

### flufenacet + metribuzin (Axiom DF)

**Rate** 0.136 to 0.34 lb/a flufenacet and 0.034 to 0.085 lb/a metribuzin (4 to 10 oz/a Axiom DF)

**Time** Apply from wheat germination to the two-leaf growth stage.

**Remarks** Provides only partial control. For best results: 1) plant wheat after the first flush of weeds has emerged and is destroyed by tillage; or, in no-till winter wheat, apply a nonselective herbicide to control emerged weeds at or before planting; 2) apply Axiom before the one-leaf stage of weeds; and 3) use the highest specified rate depending on soil texture. Less than 0.5 inch of rainfall or irrigation within two weeks following application may result in reduced weed control.

**Caution** Certain wheat varieties are sensitive to Axiom; see label.

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

**Chemical family** (flufenacet) Oxyacetamide; (metribuzin) Triazine

### mesosulfuron (Osprey)

**Rate** 0.009 to 0.013 lb ai/a (3.2 to 4.75 oz/a Osprey)

**Time** Apply to winter wheat from wheat emergence to the two-node stage. See label for application timing and weed size.

**Remarks** Use the 3.2 oz/a rate for wild oat and windgrass control and the 4.75 oz/a rate for blackgrass control. Treat heavy infestations before they compete with the crop. A recommended adjuvant must be tank mixed with Osprey as specified on the label. Do not apply Osprey more than once per crop year.

**Caution** For winter wheat only.

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

**Chemical family** Sulfonylurea

## Annual Grass Weeds

### Postemergence

#### quizalofop (Aggressor)

*CoAxium wheat with the AXigen trait only*

**Rate** 0.055 to 0.0825 lb ai/a (8 to 12 oz/a Aggressor)

**Time** Apply postemergence to CoAxium wheat with the AXigen trait after 4-leaf but prior to jointing. Apply when weeds are actively growing and before grasses exceed 4 to 5 leaves.

**Remarks** Applications must include a surfactant. Apply non-ionic surfactant at 0.25% v/v, crop oil concentrate up to 1% v/v or 2% under arid conditions, or methylated seed oil up to 1% v/v.

**Caution** Use only on CoAxium wheat varieties with the AXigen trait. Temporary height reduction or slight leaf yellowing may occur after application; effects can be more pronounced under environmental stress. Do not apply more than 16 oz/a per crop cycle or more than 12 oz/a in a single application. Do not make a second application within 14 days of the first application. Do not harvest treated wheat for forage or hay within 60 days of the last application. Do not tank mix with dimethylamine salt formulations of 2,4-D or MCPA. To prolong the utility of CoAxium wheat and the AXigen trait, do not use the CoAxium Wheat Production System for 2 consecutive crop cycles.

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

**Chemical family** Aryloxyphenoxypropionate

## Annual Grass and Broadleaf Weeds

### Postemergence

#### imazamox (Beyond)

*Clearfield wheat only*

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

**Time** Apply postemergence to Clearfield wheat, after tiller initiation but before jointing. In Clearfield Plus (2-gene) varieties, applications can be made from the 2-leaf stage (if nonionic surfactant is used) until the second joint is detected at the soil surface. May be applied in fall-winter or spring, for winter or spring annual weed control. Apply when most actively growing annual grass weeds are in the four- to five- leaf stage. Broadleaf weeds should be actively growing and less than 3 inches tall.

**Remarks** Adding a nonionic surfactant and a liquid nitrogen fertilizer or ammonium sulfate solution is required. For Clearfield Plus wheat varieties, crop oil concentrate or methylated seed oil may be substituted for nonionic surfactant after tiller initiation to increase weed control, but they may also increase crop response. Do not apply more than 8 oz/a per growing season.

**Caution** Use only on Clearfield wheat varieties. Temporary height reduction or slight leaf yellowing may occur after application; effects can be more pronounced under environmental stress. Do not tank mix with sulfonylurea herbicides due to potential crop response or weed control antagonism. Apply Beyond no more than 2 out of 4 years. Do not plant Clearfield wheat continually. There are no restrictions on feeding or grazing wheat forage and hay after applying Beyond. Some crops cannot be planted within 36 months of application. See label and supplemental label (Washington and selected counties in Idaho and Oregon) for crop rotation restrictions.

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

**Chemical family** Imidazolinone

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**pinoxaden + fluroxypyr (Axial Star)**

**Rate** 0.053 lb ai/a (pinoxaden) + 0.094 lb ai/a (fluroxypyr) (16.4 oz/a Axial Star)

**Time** Apply to spring barley from the two-leaf to pre-boot stage. Apply to wild oat from one- to six- leaf stage on the main stem but before the fourth tiller emerges. Apply to green foxtail and Italian ryegrass from one- to five- leaf stage on the main stem but before third tiller emerges.

**Remarks** Use at least 5 gal/a water in aerial applications, 8 to 10 gal/a water in ground applications. Surfactant is not required with Axial Star formulation. REI 48 hours. PHI 60 days. Axial Star at 16.4 oz/a may be tank mixed with Starane herbicide (or other equivalent herbicides) at 2.7 oz/a (See label for Idaho, Oregon and Washington).

**Caution** Avoid applying in more than 10 gal/a water because grass control may be reduced. Do not apply to a crop stressed by conditions such as frost, low fertility, drought, flooding, or disease or insect damage, because crop may be injured.

**Site of action** Group 1: acetyl CoA carboxylase (ACCase) inhibitor + Group 4: synthetic auxin

**Chemical family** (pinoxaden) Phenylpyrazolin; (fluroxypyr) Pyridine

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**pyroxsulam (PowerFlex HL)**

**Rate** 0.016 lb ai/a (2.0 oz/a PowerFlex HL)

**Time** Apply in either fall or spring to actively growing winter wheat from the three-leaf to jointing stage and after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (0.25% to 0.50% v/v) and ammonium sulfate (1.5 lb/a). When applying with fluid fertilizer, spray solution should not be composed of more than 50% liquid nitrogen and should not exceed 30 lb of actual nitrogen per acre. If applying with liquid nitrogen, use a non-ionic surfactant at a maximum of 0.25% v/v, instead of crop oil concentrate.

**Caution** For winter wheat only. Do not mix with products containing dicamba or amine formulations of 2,4-D or MCPA or organophosphate insecticides. Consult label for crop rotation restrictions.

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

**Chemical family** Triazolopyrimidine sulfonamide

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**pyroxsulam (TeamMate)**

**Rate** 0.0133 lb ai/a (1.0 oz/a TeamMate)

**Time** Apply to actively growing wheat from the three-leaf to jointing stage and after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (0.25% to 0.50% v/v) and ammonium sulfate (1.5 lb/a). Warm, moist growing conditions promote active weed growth and enhance activity of TeamMate. Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed and may regrow.

**Caution** Do not apply more than 1.0 oz/a per growing season. Do not apply within 60 days of harvest.

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

**Chemical family** Triazolopyrimidine sulfonamide

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**pyroxsulam + florasulam + fluroxypyr (GoldSky)**

**Rate** 0.10 lb ai/a (16 oz/a GoldSky)

**Time** Apply to actively growing wheat from 3-leaf to jointing stage after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (0.25 to 0.5% v/v) and ammonium sulfate (1.5 lb/a). Apply postemergence to the main flush of actively growing weeds according to target weed stage on label.

**Caution** Do not use with dicamba or amine formulations of 2,4-D or MCPA. Do not use an adjuvant when applying GoldSky in combination with emulsifiable (EC) formulations such as 2,4-D ester or MCPA ester products. Do not tank mix with organophosphate insecticides.

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

**Chemical family** (pyroxsulam) Triazolopyrimidine sulfonamide; (florasulam) Sulfonanilide; (fluroxypyr) Pyridine

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**pyroxsulam + fluroxypyr + clopyralid (PerfectMatch)**

**Rate** 0.013 lb ai/a pyroxsulam + 0.097 lb ae/a fluroxypyr + 0.097 lb ae/a clopyralid (1 pint/a PerfectMatch)

**Time** Apply to actively growing wheat from 3-leaf to jointing stage. Treat after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (0.25 to 0.5% v/v) and ammonium sulfate (1.5 lb/a). PerfectMatch works best when weeds are actively growing and not hardened off by cold weather or drought. PerfectMatch is rainfast within 4 hours after application.

**Caution** Do not apply more than 1 pint/a per growing season. Limit nonionic surfactant rate to 0.25% v/v when tank mixing with up to 6 fluid oz/a of EC formulated product per acre. Do not use any surfactant when total EC products exceed 6 fluid oz/a. Do not apply within 60 days of harvest.

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

**Chemical family** (pyroxsulam) Triazolopyrimidine sulfonamide; (fluroxypyr and clopyralid) Pyridine

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**Broadleaf Weeds****Preplant surface, preplant incorporated, or preemergence**

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**saflufenacil (Sharpen)**

**Rate** 0.022 to 0.045 lb ai/a (1.0 to 2.0 oz/a Sharpen)

**Time** Apply for burndown and/or residual control of weeds early preplant through preemergence. Sequential applications may be applied as needed before wheat emergence. Do not apply more than a maximum cumulative amount of 4.0 oz/a Sharpen per cropping season.

**Remarks** An adjuvant system is required for optimum broadleaf burndown activity.

**Caution** Do not apply after wheat emergence, because crop injury will occur.

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

**Chemical family** Pyrimidinedione

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## Preplant surface or preemergence

### halauxifen + florasulam (Quelex)

**Rate** 0.0035 to 0.0047 oz ae/a halauxifen + 0.0035 to 0.0047 oz ai/a florasulam (0.55 to 0.75 oz/a Quelex)

**Time** Apply as a burndown treatment to control emerged weeds prior to crop emergence.

**Remarks** Apply with a nonionic surfactant (0.2 to 0.5% v/v). If applied after seeding, do not apply if soil has begun cracking over the drill row due to emerging crop seedlings.

**Caution** Do not apply more than 0.75 oz/a Quelex per season.

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

**Chemical family** (halauxifen) Arylpicolinate; (florasulam) Triazolopyrimidine sulfonamide

## Fall-applied foliage and soil active

### linuron (Linex)

**Rate** 0.5 to 0.75 lb ai/a (1 to 1.5 pint/a Linex 4L)

**Time** Apply as a broadcast spray prior to emergence of wheat or to semi-dormant wheat plants after rain settles soil, to wheat seeded at least 1 inch deep.

**Remarks** Application to actively growing wheat may cause temporary yellowing (chlorosis) of wheat. Do not apply after wheat has reached the boot stage of maturity nor when maximum daily temperature exceeds 60°F. Do not apply to sand or loamy sand or soils with less than 1% organic matter. Any crop may be planted 4 months after application. Do not graze or feed immature plants to livestock. Do not use in combination with other pesticides (except as noted on label), surfactants, or nitrogen solution after wheat has emerged.

**Caution** Do not retreat field with a second application during the same crop year as injury to the crop may result. Recommended rates depend on the average annual rainfall.

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

**Chemical family** Substituted urea

## Fall- or spring-applied foliage and soil active

### chlorsulfuron (Glean XP)

**Rate** 0.127 to 0.25 oz ai/a postemergence (0.17 to 0.33 oz/a Glean). Do not exceed 0.33 oz/a Glean per use season.

**Time** Apply in fall or spring, any time after most weeds emerge. Avoid making preemergence applications or early postemergence application (2-4 leaf stage) before boot or early heading stage as crop injury may result. See label for postemergence application timing when using tank-mixes or sequential treatments.

**Remarks** Chlorsulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle. It will not control nightshades. For best results in postemergence applications, weeds should be actively growing, and a surfactant of at least 80% ai should be added at 1 to 2 quarts/100 gal. For specific weed problems, various tank-mixes are possible; see manufacturer's label for recommendations. There are no grazing restrictions for chlorsulfuron.

**Caution** Do not apply this product through any type of irrigation system. Do not use on soils above pH 7.9, as extended soil residual activity could extend crop rotation interval beyond normal. Carefully follow label instructions on crop rotations. Many crops may not be planted within 24 months or longer after

applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides as well as applications just before or during adverse conditions such as cold or dry weather conditions.

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

**Chemical family** Sulfonylurea

## chlorsulfuron + metsulfuron (Finesse Cereal and Fallow)

**Rate** 0.15 to 0.375 oz ai/a preplant or preemergence (0.2 to 0.5 oz/a Finesse Cereal and Fallow) or 0.15 to 0.3 oz ai/a postemergence (0.2 to 0.4 oz/a Finesse Cereal and Fallow)

**Time** Apply prior to planting or after planting, but before emergence. May also be applied postemergence after the crop has reached the 4-leaf stage, but before crop reaches boot stage. See label for postemergence application timing when using tank-mixes.

**Remarks** Finesse Cereal and Fallow controls a wide range of broadleaf weeds and inhibits Canada thistle. For best results with postemergence applications, weeds should be actively growing and herbicide should be applied with a surfactant of at least 80% ai at 1 to 2 quarts/100 gal. For specific weed problems, various tank-mixes are possible; see label for recommendations. There are no grazing restrictions for Finesse Cereal and Fallow.

**Caution** Do not use on soils above pH 7.9 (Finesse Cereal and Fallow can persist in soil) or below pH 5.0 (crop injury). Carefully follow label instructions regarding crop rotations. Many crops may not be planted within 24 months or longer after application. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold or freezing weather.

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

**Chemical family** Sulfonylurea

## diuron (Karmex or Direx)

**Rate** 0.8 to 1.2 lb ai/a (1 to 1.5 lb/a Karmex, 0.8 to 1.2 quart/a Direx)

**Time** Apply after wheat is established, as evidenced by a developing secondary root system.

**Remarks** Apply before November 15 or after February 1 when crop is actively growing. Do not apply after wheat begins jointing. Do not apply to sand or loamy sand soils, nor on gravelly or sandy loams with less than 1% organic matter. Do not apply to wheat planted less than 1 inch deep. Apply before weeds are 3 to 4 inches tall. Do not plant to any other crop within 12 months after application. Do not graze or feed treated forage.

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

**Chemical family** Substituted urea

## fluroxypyr + thifensulfuron + metsulfuron (Travallas)

**Rate** 1.12 to 1.92 oz ae/a fluroxypyr + 0.22 to 0.38 oz ai/a thifensulfuron + 0.022 to 0.038 oz ai/a metsulfuron [7 to 12 oz/a (10 to 12 oz/a in Idaho, Oregon, and Washington only) Travallas]

**Time** Apply to actively growing wheat after the crop is in the 2-leaf stage, but before the flag leaf is visible. Weeds must be past the cotyledon stage and actively growing.

**Remarks** For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Thorough coverage of target weeds is essential.

**Caution** Do not make more than one application per season. Should not be used on soils having pH above 7.9 because of extended soil residual activity. See label for crop rotation intervals. Do not harvest for hay within 30 days of application or for grain within 45 days of application.

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

**Chemical family** (fluroxypyr) Pyridine; (thifensulfuron and metsulfuron) Sulfonylurea

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### metribuzin (various trade names)

**Rate** 0.094 to 0.38 lb ai/a (2 to 8 oz/a of the 75% DF)

**Time** Apply when the wheat is tillering and has developed one-inch secondary roots.

**Remarks** Plant the seed at least 1 inch deep. Do not apply after the wheat begins to joint. Do not rotate any crop not listed on the product label for 18 month after application. See label regarding rate and soil type. Do not graze for 14 days after application.

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

**Chemical family** Triazinone

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### metribuzin—low rate (various trade names)

**Rate** 0.094 to 0.14 lb ai/a (2 to 3 oz/a of the 75% DF) in tank-mix with labeled broadleaf herbicide

**Time** Apply to wheat after the two- to three- leaf stage but not during winter dormancy.

**Remarks** See metribuzin label for acceptable tank-mix partners. Plant seed at least 1.5 inches deep. Apply before November 15 or after February 1. Heavy rains immediately after application may injure crop. Do not graze for 14 days after applying. If applying metribuzin sequentially, allow at least 45 days between applications except for spring split applications, which can be as close as 10 days apart.

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

**Chemical family** Triazinone

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### metsulfuron (Ally XP or other trade names)

**Rate** 0.06 oz ai/a (0.1 oz/a Ally XP)

**Time** Apply postemergence after wheat has two leaves but before boot stage once per use season. See label instructions for postemergence application timing when using tank-mixes.

**Remarks** Metsulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle. For best results, add a surfactant of at least 80% ai at 1 to 2 quarts/100 gal. Apply when weeds are less than 4 inches tall or in diameter and are actively growing. To broaden the spectrum of control, tank mix with a suitable registered herbicide such as 2,4-D.

**Caution** Do not use on soils above pH 7.9. Metsulfuron can persist in soil. Carefully follow label instructions on crop rotations. Many crops may not be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during conditions such as cold or freezing weather.

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

**Chemical family** Sulfonylurea

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### prosulfuron (Peak)

**Rate** 0.22 to 0.29 oz ai/a (0.38 to 0.5 oz/a Peak)

**Time** Apply postemergence from the three-leaf to second-joint stage of growth.

**Remarks** Results are best when weeds are young and actively growing. Apply with nonionic surfactant of at least 80% ai at 1 to 2 quarts/100 gal, or a crop oil concentrate of at least 12% emulsifier at 1 to 4 pints/a.

**Caution** Carefully follow label instructions on crop rotations. Do not let spray drift onto non-target crops. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold weather. Do not harvest grain until 60 days after application. Do not graze or feed forage until 30 days after application.

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

**Chemical family** Sulfonylurea

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### thifensulfuron + tribenuron + metsulfuron (Ally Extra or other trade names)

**Rate** 0.21 to 0.35 oz ai/a (0.3 to 0.5 oz/a Ally Extra) + 0.25% nonionic surfactant

**Time** After crop is in two-leaf stage but before flag leaf is visible.

**Remarks** Results are best on young, actively growing weeds. Six hours of dry weather are needed to allow the product to be sufficiently absorbed. Always include a spray adjuvant with application of this product.

**Caution** Metsulfuron can persist in soil. Carefully follow label instructions on crop rotations. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during conditions such as cold or freezing weather. Do not harvest sooner than 45 days after the last application.

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

**Chemical family** Sulfonylurea

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### triasulfuron (Amber)

**Rate** 0.21 to 0.35 oz ai/a (0.28 to 0.47 oz/a Amber) preemergence or postemergence

**Time** Apply in fall or spring when crop is between the two-leaf and pre-boot stage. See label for preemergence applications.

**Remarks** Triasulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle. For best results with postemergence applications, weeds should be actively growing and a surfactant of at least 80% ai should be added at 1 to 2 quarts/100 gal. No grazing restrictions for triasulfuron. Do not apply Amber to wheat that is stressed or when extremes in temperature or rain-fall are expected within one week of application.

**Caution** Triasulfuron can persist in soil. Carefully follow label instructions on crop rotations. Several crops may not be seeded for 24 months or longer after triasulfuron application. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before rain. Do not apply to snow-covered or frozen soil.

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

**Chemical family** Sulfonylurea

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**Fall- or spring-applied foliage active**

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**bicyclopyrone + bromoxynil (Talinor)**

**Rate** 0.033 to 0.044 lb ai/a bicyclopyrone + 0.156 to 0.207 lb ae/a bromoxynil (13.7 to 18.2 fl oz/a Talinor)

**Time** Apply to wheat from 2-leaf to pre-boot stage.

**Remarks** Co-packed with CoAct+ additive, which must be added at the rate specified on the label. Compatible with many commonly used tank-mix partners. Add a crop oil concentrate (COC) at 1% v/v of the finished spray volume. Although COC is the preferred adjuvant, NIS may be substituted at 0.25% v/v. When tank mixed with herbicides that have a built-in adjuvant, no additional adjuvant is needed.

**Caution** Rain occurring within 1 hour after application may reduce the efficacy of Talinor. Do not graze livestock or harvest forage for hay from treated wheat for a minimum of 30 days following application. Do not harvest grain for a minimum of 60 days following application. Do not feed treated wheat to livestock for a minimum of 60 days following application. Follow label instructions on crop rotations.

**Site of action** (bicyclopyrone) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (bicyclopyrone) Triketone; (bromoxynil) Nitrile

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**bromoxynil (various product names)**

**Rate** 0.38 to 0.5 lb ai/a

**Time** Apply after weeds germinate, but before they reach 1 inch.

**Remarks** Do not apply to weeds covered with heavy frost or ice. Do not graze for 45 days after application.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

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**carfentrazone (Aim EC)**

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

**Time** Apply to winter wheat from prior to planting to the jointing stage. For best performance, apply to actively growing weeds up to 4 inches high and to rosettes less than 3 inches across.

**Remarks** Apply alone or in a tank-mix with other herbicides to actively growing weeds. Use higher rates on more mature weeds or dense vegetative growth. Use a nonionic surfactant with at least 80% ai at 0.25% v/v (2 pints/100 gal spray solution). The use of a high-quality sprayable liquid nitrogen fertilizer (2 to 4% v/v or 2 to 4 gal/100 gal spray solution) in addition to the nonionic surfactant is allowed

**Caution** Crop injury may increase with tank-mixtures of carfentrazone with other EC- or ester-formulated pesticides, or with crop oil concentrate, methylated seed oil, or silicone-based adjuvants, or when Aim EC is applied at rates above 0.016 lb ai/a (1 fl oz/a Aim EC). Do not harvest for forage within 7 days of application.

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

**Chemical family** Triazolinone

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**fluroxypyr (Starane Ultra or other trade names)**

**Rate** 0.105 to 0.245 lb ae/a (0.3 to 0.7 pint/a Starane Ultra)

**Time** Apply to actively growing wheat from the two-leaf up to and including flag-leaf emergence.

**Remarks** Apply to actively growing weeds under eight inches tall. Controls only weeds emerged at time of treatment.

**Caution** Do not exceed 40 gal/a total spray volume. Do not apply more than 0.7 pint/a per season. Preharvest interval is 40 days.

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

**Chemical family** Pyridine

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**fluroxypyr + thifensulfuron (Sentrallas)**

**Rate** 1.12 to 2.24 oz ae/a fluroxypyr + 0.22 to 0.44 oz ai/a thifensulfuron (7 to 14 oz/a Sentrallas)

**Time** Apply to actively growing wheat after the crop is in the 2-leaf stage, but before the flag leaf is visible. Weeds must be past the cotyledon stage and actively growing.

**Remarks** For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Thorough coverage of target weeds is essential.

**Caution** Do not exceed 14 oz/a in a single application or 17.8 oz/a for the entire season. Do not tank mix with malathion because crop injury may result. Do not harvest for hay within 30 days of application or for grain within 45 days of application.

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

**Chemical family** (fluroxypyr) pyridine; (thifensulfuron) sulfonylurea

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**fluroxypyr + thifensulfuron + tribenuron (Supremacy)**

**Rate** 1.0 to 1.88 oz ae/a fluroxypyr + 0.18 to 0.34 oz ai/a thifensulfuron + 0.06 to 0.11 oz ai/a tribenuron (4 to 7.5 oz/a Supremacy)

**Time** Apply to actively growing wheat after the crop is in the 2-leaf stage, but before the flag leaf is visible.

**Remarks** For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Always use a surfactant, unless tank mixing with at least 8 oz/a of an EC herbicide formulation. See label for specific adjuvant rates.

**Caution** Do not use more than 12.5 oz/a per growing season.

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

**Chemical family** (fluroxypyr) pyridine; (thifensulfuron and tribenuron) sulfonylurea

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**halauxifen + florasulam (Quelex)**

**Rate** 0.0047 oz ae/a halauxifen + 0.0047 oz ai/a florasulam (0.75 oz/a Quelex)

**Time** Apply to actively growing wheat from the 2-leaf stage to flag leaf emergence.

**Remarks** For best results, apply to actively growing weeds in the 2- to 4-leaf stage or less than 4 inches tall. Apply in a spray volume of 10 gallons per acre or more. Use a nonionic surfactant (0.2 to 0.5% v/v) or crop oil concentrate or methylated seed oil

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(0.5 to 1.0% v/v) unless applied with an emulsifiable concentrate (EC) such as 2,4-D ester.

**Caution** Do not apply more than 0.75 oz/a Quelex per season. Preharvest interval is 60 days for grain, 21 days for forage, and 7 days for grazing.

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

**Chemical family** (halauxifen) Arylpicolinate; (florasulam) Triazolopyrimidine sulfonamide.

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### pyrasulfotole + bromoxynil (Huskie)

**Rate** 0.027 to 0.036 lb ai/a pyrasulfotole 0.15 to 0.21 lb ai/a bromoxynil (11 to 15 oz/a Huskie)

**Time** Apply to active growing wheat after the one-leaf growth stage up to flag leaf emergence.

**Remarks** Compatible with many commonly used tank-mix partners. Spray additives such as ammonium sulfate, urea ammonium nitrate, or nonionic surfactant may be used, especially under challenging conditions, to optimize herbicidal activity. Apply alone or in a tank-mix with other herbicides to actively growing weeds.

**Caution** Rain within 1 hour after application may reduce control. Do not apply more than once per season. Preharvest interval is 25 days for forage and 60 days for straw or grain. Follow label instructions on crop rotations.

**Site of action** (pyrasulfotole) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (pyrasulfotole) Pyrazole; (bromoxynil) Nitriole

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### thifensulfuron (Harmony SG with TotalSol)

**Rate** 0.23 to 0.45 oz ai/a (0.45 to 0.9 oz/a Harmony SG) + 0.25% nonionic surfactant

**Time** After crop is in two-leaf stage but before flag leaf is visible.

**Remarks** Results are best when weeds are young and actively growing. This product should not be applied to crops that are stressed by severe weather conditions (cold temperatures, drought including low levels of subsoil moisture, water saturated soil, disease, or insect damage) as crop injury may result. Sequential treatments may be made if the Harmony SG total does not exceed 1.5 oz/a.

**Caution** Do not let spray drift to adjacent crops or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean chemical from mixing and spraying equipment. Do not plant any crop other than wheat, barley, field corn, triticale, or oats within 45 days after application.

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

**Chemical family** Sulfonylurea

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### thifensulfuron + tribenuron (Harmony Extra or other trade names)

**Rate** 0.23 to 0.45 oz ai/a (0.45 to 0.9 oz/a Harmony Extra SG with TotalSol) + 0.25% nonionic surfactant

**Time** After crop is in two-leaf stage but before flag leaf is visible.

**Remarks** Results are best if weeds are young and actively growing. This product should not be applied to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result.

Do not let spray drift onto adjacent crops or land. Refer to most recent grass herbicide label to determine tank-mix restrictions.

**Caution** Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spray equipment. Wheat, barley, and oats may be replanted any time after application. After application, sugar beets, winter rape, and canola can be planted in 60 days, all other crops can be planted in 45 days.

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

**Chemical family** (both) Sulfonylurea

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### thifensulfuron + tribenuron (Affinity BroadSpec or other trade names)

**Rate** 0.4 to 1.0 oz/a Affinity BroadSpec, or 0.6 to 1.0 oz/a Affinity TankMix + 0.25% nonionic surfactant

**Time** Apply after wheat is in two-leaf stage but before flag leaf is visible.

**Remarks** Results are best if weeds are young and actively growing. These products should not be applied to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result. Refer to most recent grass herbicide label to determine tank-mix restrictions. Do not harvest wheat sooner than 45 days after the last application.

**Caution** Do not let this herbicide drift off target. For crop rotation intervals see the label.

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

**Chemical family** (both) Sulfonylurea

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### tribenuron (Express or other trade names)

**Rate** 0.13 to 0.25 oz ai/a (0.25 to 0.5 oz/a Express) + 0.25% nonionic surfactant

**Time** After crop is in two-leaf stage but before flag leaf is visible.

**Remarks** Results are best if weeds are young and actively growing. This product should not be applied to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result.

**Caution** Do not allow spray to drift to adjacent crops or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spraying equipment. For crop rotation intervals see the label.

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

**Chemical family** Sulfonylurea

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### Spring-applied foliage active

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#### 2,4-D (various trade names)

**Rate** 0.25 to 0.5 lb ae/a

**Time** Apply in spring after wheat crop is fully tillered, but before boot stage of growth (usually 4 to 8 inches tall) but not forming joints in the stem. Do not apply in fall.

**Remarks** Do not graze within two weeks after application. Do not harvest for hay or grain within 14 days after application.

**Caution** Do not let 2,4-D drift off target.

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

**Chemical family** Phenoxy acetic acid

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**bromoxynil + fluroxypyr (Starane NXT)**

**Rate** 0.25 to 0.5 lb ai/a bromoxynil + 0.06 to 0.125 lb ai/a fluroxypyr (14 to 27.4 oz/a Starane NXT)

**Time** Apply to wheat from three-leaf stage up to flag leaf emergence. Apply to weeds up to 4 or 8 inches tall, depending on rate.

**Remarks** Compatible with all grass herbicides. Any crop may be planted 120 days after application. Do not graze treated areas within 45 days of application. Do not apply within 45 days of hay, grain or straw harvest.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (fluroxypyr) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (fluroxypyr) Pyridine

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**bromoxynil + MCPA (various trade names)**

**Rate** 0.25 to 0.5 lb ai/a bromoxynil + 0.25 to 0.5 lb ae/a MCPA

**Time** Apply in spring after wheat has at least three leaves but before it begins to boot.

**Remarks** Do not graze for 45 days.

**Caution** Do not allow MCPA to drift off target.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (MCPA) Phenoxy acetic acid

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

**Rate** 0.095 to 0.126 lb ae/a clopyralid + 0.5 to 0.67 lb ae/a 2,4-D amine (2 to 2.66 pints/a Curtail)

**Time** Apply in the spring to young, actively growing weeds after grain has begun tillering up to jointing stage (first node on stem detectable).

**Remarks** Curtail is particularly effective on members of the sunflower family such as Canada thistle and mayweed. Control of tough winter annual weeds such as corn gromwell and fiddleneck requires tank mixing with other herbicides. Check the Curtail label for details on mixtures. For Canada thistle, apply after most basal leaves emerge but before bud stage.

**Caution** For crop rotational intervals see the label. Wait 30 days after application to plant wheat, barley, oats, grasses, or field corn. Do not plant sugar beets for 15 months after treatment. Do not rotate to beans, lentils, peas, potatoes, or broadleaf seed crops for at least 18 months after treatment, depending on annual precipitation. Carefully follow label's rotation restrictions for many other crops. Follow grazing restrictions on label.

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

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

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**clopyralid + fluroxypyr (WideMatch)**

**Rate** 0.094 to 0.125 lb ae/a clopyralid + 0.094 to 0.125 lb ae/a fluroxypyr (1 to 1.33 pints/a WideMatch)

**Time** Apply to actively growing wheat from the three-leaf crop stage up to and including flag leaf emergence. Apply when weeds are actively growing but before they are vining or 8 inches tall.

**Remarks** WideMatch is particularly effective on members of the sunflower family such as Canada thistle and mayweed. May be applied in tank-mixes with labeled rates of other products. Apply to weeds up to 4 to 8 inches tall, depending on rate. Tank mix with

MCPA, thifensulfuron (Harmony GT), or 2,4-D. Compatible with all grass herbicides.

**Caution** See label and supplemental labels for crop rotation restrictions.

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

**Chemical family** (both) Pyridine

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**dicamba (Banvel, Clarity, or other trade names)**

**Rate** 0.062 to 0.125 lb ae/a (2 to 4 oz/a product)

**Time** Application may be made before, during or after planting small grains.

**Remarks** Treated wheat may grow semi-prostrate after application, but this normally does not affect yield. There is no waiting period between treatment and grazing for non-lactating dairy animals. For lactating dairy animals see the label.

**Caution** Do not let dicamba drift off target.

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

**Chemical family** Benzoic acid

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**dicamba (Banvel, Clarity, or other trade names) + 2,4-D or MCPA**

**Rate** 0.062 to 0.125 lb ae/a dicamba + 0.25 to 0.375 lb ae/a 2,4-D or MCPA

**Time** Apply in spring after wheat has at least four tillers and 12 leaves but before it begins to joint. Do not apply in fall.

**Remarks** Treated wheat may grow semi-prostrate for a while, but normally yield is not affected. See label for grazing restrictions.

**Caution** Do not let these combinations drift off target.

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

**Chemical family** (2,4-D and MCPA) Phenoxy acetic acid; (dicamba) Benzoic acid

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**florasulam + fluroxypyr (Starane Flex)**

**Rate** 0.004 lb ai/a florasulam + 0.088 lb ae/a fluroxypyr (13.5 oz/a Starane Flex)

**Time** Apply to actively growing wheat from the three-leaf to flag leaf emergence. Apply when susceptible broadleaf weeds are actively growing and less than 4 inches tall.

**Remarks** Only weeds emerged at treatment will be controlled. Best results are obtained from application made to seedling weeds.

**Caution** Plant only wheat, barley, or oats within 120 days after application. See label for other crop intervals. Do not apply more than once per season. Preharvest interval is 60 days.

**Site of action** Group 2: acetolactate synthase inhibitor + Group 4: synthetic auxin

**Chemical family** (florasulam) Triazolopyrimidine sulfonamide; (fluroxypyr) Pyridine

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**florasulam + MCPA ester (Orion)**

**Rate** 0.0044 lb florasulam + 0.31 lb MCPA ester/a (17 oz/a Orion)

**Time** Apply early postemergence to actively growing weeds and wheat from the three-leaf crop growth stage up to the jointing stage. A later application when the crop is between the jointing

and boot stage may be used to control later emerging weeds; however, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage.

**Remarks** An adjuvant may be added to optimize herbicidal activity under suboptimal conditions. Do not apply more than 17 oz/a Orion per growing season. Livestock may be grazed on treated crops 7 days following application. Do not apply within 60 days of crop harvest. Only weeds emerged at the time of application will be controlled. Follow label instructions on crop rotation restrictions.

**Caution** If foliage is wet at the time of application, control may be decreased. Orion is rainfast within 4 hours after application.

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

**Chemical family** (florasulam) Triazolopyrimidine sulfonamide; (MCPA ester) Phenoxy acetic acid

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### MCPA (various trade names)

**Rate** 0.5 to 1 lb ae/a

**Time** Apply in spring after wheat has at least three tillers and nine leaves up to boot stage.

**Remarks** Do not apply in fall.

**Caution** Do not let MCPA drift off target.

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

**Chemical family** Phenoxy acetic acid

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### Volunteer (Feral) Rye, Ropewick Treatment

#### glyphosate (various trade names)

**Rate** 33 to 75% solution (2 to 12 quarts formulated herbicide + 1 gal water)

**Time** Ropewick after volunteer rye heads and is 6 inches above wheat, but before wheat heads.

**Remarks** Apply at least 35 days before harvest.

**Caution** Do not let herbicide solution contact desirable vegetation.

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

**Chemical family** None generally accepted

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### Preharvest Treatment

#### 2,4-D (various trade names)

**Rate** 0.5 lb ae/a

**Time** Apply when grain is in the dough stage.

**Remarks** To control weeds that will interfere with harvest or to suppress perennial weeds.

**Caution** Do not apply to fields underseeded to legumes. Do not graze treated grain field within 14 days after treatment.

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

**Chemical family** Phenoxy acetic acid

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### carfentrazone (Aim EC)

**Rate** 0.016 to 0.031 lb ai/a (1 to 2 oz/a Aim EC)

**Time** Apply when crop is mature and the grain has begun to dry down.

**Remarks** A nonionic surfactant (NIS), methylated seed oil (MSO), or crop oil concentrate (COC) is required. Thorough coverage is essential for satisfactory performance. Re-treat if necessary.

**Caution** If applied as a tank-mixture, refer to the other product's label for restrictions on tank mixing, and observe all label precautions, instructions, and rotational cropping restrictions.

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

**Chemical family** Triazolinone

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### dicamba + 2,4-D (Weedmaster and other trade names)

**Rate** 0.25 lb ae/a dicamba + 0.5 to 1 lb ae/a 2,4-D

**Time** Apply when grain is in hard dough stage and no green remains in stem nodes.

**Remarks** To control weeds that will interfere with harvest, or to suppress perennial weeds.

**Caution** Do not apply to fields underseeded to legumes. Preharvest interval is 2 weeks.

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

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

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### glyphosate (various trade names)

**Rate** 0.38 to 0.75 lb ae/a (1 to 2 pints/a of a 3 lb ae/gal formulated herbicide)

**Time** Apply after wheat reaches hard dough stage and grain moisture is less than 30%. Apply at least 7 days before harvest.

**Remarks** To control annual and perennial weeds. Add 0.5% to 1% nonionic surfactant. Apply 3 to 10 gal/a by air or 10 to 20 gal/a by ground.

**Caution** Do not apply to wheat grown for seed.

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

**Chemical family** None generally accepted

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### saflufenacil (Sharpen)

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

**Time** Apply only to barley, wheat, and triticale that have reached physiological maturity (hard-dough stage; grain contains less than 30% moisture), or according to Extension Service recommendations in the use area. Allow 7 days for optimum desiccation effect depending on environmental conditions.

**Remarks** A methylated seed oil plus ammonium-based adjuvant system is required for optimum desiccation activity and weed control. See label for more information on adjuvants and tank-mixes.

**Caution** Do not apply more than a maximum cumulative amount of 2.0 oz/a of Sharpen per cropping season for desiccation purposes. Do not apply Sharpen on barley (all types), wheat (all types), or triticale grown for seed production.

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

**Chemical family** Pyrimidinedione

## Field Bindweed and Canada Thistle

### Summer fallow or postharvest

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#### 2,4-D amine

**Rate** 1.0 to 2.0 lb ae/a

**Time** Apply when weeds are in the bud to early bloom stage or while in good vegetative growth.

**Remarks** In the summer fallow year, cultivate until July 1, then let weeds re-grow to treatment stage. In the crop year, treat after harvest. Treat every year; skipping 1 year allows weeds to recover. Plant only labeled crops within 29 days following application. Do not apply more than 4 pints per acre per application. Make no more than two application per year.

**Caution** Do not let 2,4-D drift off target.

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

**Chemical family** Phenoxy acetic acid

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#### dicamba (Banvel, Clarity, or other trade names)

**Rate** 0.5 to 2 lb ae/a (1 to 4 pints/a product)

**Time** Apply to fallow land, wheat stubble, or land to be rotated to wheat.

**Remarks** Control is best when weeds are actively growing in or beyond the full bloom stage. Make follow-up applications in spring to control seedlings. See label for crop use and crop rotation restrictions and for tank-mix recommendations.

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

**Chemical family** Benzoic acid

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#### glyphosate (various trade names)

**Rate** 1.5 to 2.3 lb ae/a (2 to 3 quarts/a of a 3 lb ae/gal formulated herbicide)

**Time** Apply in the fallow year. Best control is obtained when treatment is made at late growth stages approaching maturity.

**Remarks** Be sure to treat weed escapes in following years. To suppress Canada thistle, apply 0.75 lb ae/a plus 0.5 to 1% nonionic surfactant in 3 to 10 gal/a water in late summer or fall after harvest, mowing, or tillage. Allow thistle rosettes to re-grow to at least 6 inches wide before treating.

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

**Chemical family** None generally accepted

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#### picloram (Tordon 22K or other trade names) + 2,4-D amine

**Rate** Suppression only: 0.125 to 0.25 lb ae/a picloram (0.5 to 1 pint/a Tordon 22K) + 0.5 to 1 lb ae/a 2,4-D. Spot treatment only: 0.25 to 1 lb ae/a picloram (1 to 4 pints/a Tordon 22K) + 1 to 2 lb ae/a 2,4-D.

**Time** In fallow, apply to actively growing plants in early bud to full bloom stage. Apply either early in the season or to re-growth following cultivation.

**Remarks** During crop year, treat soon after harvest when plants are still green and can easily be found. If picloram rate exceeds 0.25 lb ae/a, do not treat more than 10% of any given acreage per year. Do not apply by air if picloram rate exceeds 0.25 lb ae/a.

**Caution** **Restricted-use herbicide.** This treatment is likely to harm subsequent grain crop yield in treated areas for 1 year or

more. Do not let picloram drift off target. Do not use in diversified cropping areas.

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

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

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## Canada Thistle

### Summer fallow and postharvest

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#### clopyralid (Stinger)

**Rate** 0.125 to 0.250 lb ae/a (0.33 to 0.66 pint/a Stinger)

**Time** Apply to actively growing weeds from rosette up to bud stage.

**Remarks** Only weeds emerged at time of application will be affected.

**Caution** Do not rotate to beans, lentils, peas, potatoes, or broad-leaf seed crops for at least 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions on many other crops.

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

**Chemical family** Pyridine

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

**Rate** 0.095 to 0.19 lb ae/a clopyralid + 0.5 to 1 lb ae/a 2,4-D amine (2 to 4 pints/a Curtail)

**Time** Apply to actively growing thistles, after most basal leaves emerge but before bud stage.

**Remarks** For best results, wait at least 20 days before disturbing treated areas (cultivation, mowing, fertilization with shank-type applicators) to allow thorough translocation. Apply in enough total spray volume to ensure good coverage. To control perennial weeds, such as Canada thistle, use the 4 pints/a rate in fallow.

**Caution** Do not plant wheat, barley, oats, grasses, or field corn within 30 days of application. Do not plant sugar beets for 5 months after treatment. Do not rotate to beans, lentils, peas, potatoes, or broadleaf seed crops for up to 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions on many other crops.

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

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

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### In the crop

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

**Rate** 0.095 to 0.126 lb ae/a clopyralid + 0.5 to 0.67 lb ae/a 2,4-D amine (2 to 2.66 pints/a Curtail)

**Time** Apply in spring, after grain begins tillering, up to jointing stage (first node on stem detectable).

**Remarks** Apply after most of the weed's basal leaves have emerged, but before bud stage.

**Caution** Do not plant sugar beets for 5 months after treatment. Do not rotate to beans, lentils, peas, potatoes, or broadleaf seed crops for up to 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions on many other crops.

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

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

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**clopyralid + fluroxypyr (WideMatch)**

**Rate** 0.094 to 0.125 lb ae/a clopyralid + 0.094 to 0.125 lb ae/a fluroxypyr (1 to 1.33 pints/a WideMatch)

**Time** Apply in spring from three-leaf crop growth stage up to and including flag leaf emergence.

**Remarks** Apply from rosette to bud (pre-flower) stage of growth.

**Caution** Do not grow chickpeas, lentils, or potatoes for 18 months after application. See label and supplemental labels for other crop rotation restrictions.

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

**Chemical family** (both) pyridine

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**pyroxsulam + fluroxypyr + clopyralid (PerfectMatch)**

**Rate** 0.013 lb ai/a pyroxsulam + 0.097 lb ae/a fluroxypyr + 0.097 lb ae/a clopyralid (1 pint/a PerfectMatch)

**Time** Apply to actively growing wheat from 3-leaf to jointing stage. Treat after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (0.25 to 0.5% v/v) and ammonium sulfate (1.5 lb/a). PerfectMatch works best when weeds are actively growing and not hardened off by cold weather or drought. PerfectMatch is rainfast within 4 hours after application.

**Caution** Do not apply more than 1 pint/a per growing season. Limit nonionic surfactant rate to 0.25% v/v when tank mixing with up to 6 fluid oz/a of EC formulated product per acre. Do not use any surfactant when total EC products exceed 6 fluid oz/a. Do not apply within 60 days of harvest.

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

**Chemical family** (pyroxsulam) triazolopyrimidine sulfonamide; (fluroxypyr and clopyralid) pyridine

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**Quackgrass**

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**sulfosulfuron (Outrider)**

**Rate** 0.031 lb ai/a (0.67 oz/a product) plus 0.5% nonionic surfactant

**Time** Spring, postemergence to wheat and quackgrass up to the jointing stage of growth.

**Remarks** Apply in early spring when quackgrass has recovered from cold weather, when most foliage is green, not red or purple.

**Caution** Do not use within 60 days of crop emergence if an organophosphate insecticide has been applied in-furrow. Do not tank mix with malathion. Do not plant any crop other than wheat for 1 year after application.

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

**Chemical family** Sulfonylurea

# Winter Wheat—West of the Cascades

Andrew Hulting

Revised March 2019

## Preplant Broadleaf and Grass Weed Control

### flumioxazin (Valor EZ)

**Rate** 0.0637 lb ai/a (2.0 oz/a Valor EZ)

**Time** Valor may be applied for burndown and residual control of broadleaf, and certain grass weeds, preplant in no-till and minimum till winter wheat production systems where the residue from the previous crop has not been incorporated into the soil. Valor applied at 2.0 oz/a will control or suppress annual bluegrass, Italian ryegrass and annual brome species. To completely control emerged weeds, Valor should be tank mixed with an appropriate burndown herbicide such as glyphosate. Plant winter wheat no sooner than 14 days after an application of Valor.

**Remarks** Winter wheat must be planted a minimum of 1 inch deep to minimize the risk of crop injury from this product.

**Caution** Do not apply more than 2.0 oz/a of Valor in a single application, and do not apply more 2.0 oz/a in a single growing season. Do not provide supplemental irrigation to the winter wheat between the emergence and spike growth stages because crop injury may occur. Do not graze winter wheat until it is 5 inches in height following a preplant Valor application.

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

**Chemical family** N-phenylphthalimide

### saflufenacil (Sharpen powered by Kixor herbicide)

**Rate** 0.022-0.044 lb ai/a (1 to 2 oz/a Sharpen)

**Time** Sharpen may be applied for burndown and residual control of broadleaf weeds preplant surface, preplant incorporated or preemergence to winter wheat. Sequential applications may be made as needed prior to winter wheat emergence.

**Remarks** Sharpen does not control grass weed species. For optimum burndown efficacy use an MSO or COC adjuvant (1% v/v); when tank mixing with glyphosate the addition of AMS to the spray solution is recommended. Sharpen is rainfast 1 hour after application.

**Caution** See label for crop rotation intervals and emergency replanting intervals. Do not apply more than 4 oz/a (0.088 lb ai/a) of Sharpen per cropping season. Do not apply after winter wheat emergence, because crop injury will occur. Winter wheat may be fed, used as forage, or grazed 30 days after application.

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

**Chemical family** Uracil

## Wild Oat, Italian Ryegrass, and Other Grass Weeds

### clodinafop-propargyl (several trade names)

**Rate** 0.05 to 0.063 lb ai/a. Methylated seed oil may be added with clodinafop at 2 pints/100 gal of spray volume mixture.

**Time** Apply to winter wheat from the 2-leaf to preboot stage. Do not apply to winter wheat in the fall. Apply to wild oat with one

to six leaves on the main stem, and to Italian ryegrass with one to five leaves on the main stem.

**Remarks** Winter wheat is more susceptible to injury when temperatures 48 hours before or after application are below 40°F. See label for crop rotation restrictions.

**Caution** Apply only once per season. Do not graze or feed forage from treated areas for at least 30 days after application. Preharvest interval is 60 days. Do not apply to a crop stressed by conditions such as drought, frost, low fertility, or pest damage; crop may be injured.

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

**Chemical family** Aryloxyphenoxypropionate

### diuron (several trade names)

**Rate** 1.2 to 1.6 lb ai/a

**Time** Apply as soon as possible after planting. If wheat and weeds have emerged, apply before weeds are 3 to 4 inches tall.

**Remarks** Rain is required to activate chemical. Results are best if rain begins within 2 weeks of application. Winter wheat must be seeded more than 1.5 inches deep. Italian ryegrass has developed resistance to diuron in some fields in western Oregon. Diuron will control rattail fescue, susceptible annual bluegrass, and many broadleaf weeds but will not control wild oats.

**Caution** Crop may be injured if severe winter stress, disease, or insect damage follows application. Do not use on sand or loamy sand soils, on gravelly or sandy loams low in organic matter, or on thinly covered or exposed subsoil areas (clay knobs). Do not treat winter wheat planted less than 1 inch deep.

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

**Chemical family** Substituted urea

### diuron (several trade names) + chlorsulfuron + metsulfuron (several trade names)

**Rate** 0.8 to 1.2 lb ai/a diuron + 0.014 to 0.019 lb ai/a chlorsulfuron + metsulfuron

**Time** Apply pre- or post-emergence any time after winter wheat is in 2-leaf stage but before boot.

**Remarks** For best results, apply preemergence to Italian ryegrass. Do not use surfactants. This treatment is often ineffective on wild oat.

**Caution** See individual labels for crop rotation restrictions. Many crops may not be planted within 2 years or longer after application. Perennial and annual ryegrass and crimson clover may not be planted for 9 months; barley, and oats for 10 months; and red clover for 15 months after this tank-mix application. There are no restrictions on rotations to wheat, rye, or triticale.

**Site of action** (diuron) Group 7: photosystem II inhibitor; (chlorsulfuron and metsulfuron) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (diuron) substituted urea; (chlorsulfuron and metsulfuron) sulfonyleurea

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**fenoxaprop (several trade names)**

**Rate** 0.08 lb ai/a

**Time** Apply to winter wheat from emergence to 70 days before harvest. Apply to wild oat from the 2-leaf to 2-tiller stage of growth and to blackgrass from the 2-leaf through advanced tillering stages.

**Remarks** Blackgrass is very sensitive to fenoxaprop, but thorough coverage is needed to control well-tillered plants. Fenoxaprop will not control Italian ryegrass. See label for tank-mix options with broadleaf herbicides. Wild oat populations have developed resistance to fenoxaprop in some fields in Oregon. Fenoxaprop herbicides have the same mode of action as Achieve Liquid, Discover NG, NextStep NG, Axial XL, Select, Poast, Assure II, and Fusilade, so weed populations resistant to these herbicides may be cross-resistant to fenoxaprop and vice versa.

**Caution** Cool, wet conditions at application may temporarily yellow and/or stunt the winter wheat.

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

**Chemical family** Aryloxyphenoxypropionate

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**flucarbazone (Pre-Pare, Everest 2.0 and Sierra)**

**Rate** 0.009 lb ai/a (0.3 oz/a Pre-Pare) and/or 0.014 to 0.027 lb ai/a (0.5 to 1.0 oz/a Everest 2.0 or Sierra)

**Time** Pre-Pare may be tank mixed with glyphosate to improve burndown control of many grass and broadleaf weed species, and to provide soil residual weed control prior to planting winter wheat. Apply Everest 2.0 or Sierra postemergence to actively growing wild oats and Italian ryegrass that have one leaf to two tillers, and when winter wheat is between one-leaf and the beginning of jointing. An application of Pre-Pare may be followed by an in-crop application of Everest 2.0 or Sierra applied at the lower use rates.

**Remarks** Use flucarbazone with a nonionic surfactant (0.25%) in 5 to 10 gal/a spray volume. Including a liquid nitrogen or ammonium sulfate fertilizer is also recommended on the labels. See Pre-Pare, Everest 2.0, and Sierra labels for further directions related to using these products in conjunction with one another.

**Caution** Do not apply Everest 2.0 or Sierra after winter wheat jointing starts. Do not apply Everest 2.0 or Sierra more than once per season; follow tank mixing instructions carefully. Weed control may be reduced, and winter wheat injury increased, when applied during temperature extremes or when soil is saturated. Do not exceed a total of 0.027 lb ai/a of flucarbazone using the combined products per growing season. Consult all labels for crop rotation restrictions.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

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**flucarbazone + fluroxypyr (Raze)**

**Rate** 0.018 lb ai/a flucarbazone + 0.091 lb ae/a fluroxypyr (7.0 oz/a Raze)

**Time** Apply to winter wheat in the fall or spring from 2-leaf to jointing stage. Apply to wild oat and Italian ryegrass with one to four leaves prior to tillering.

**Remarks** Higher rates (up to 9 oz/a) may be used to control Italian ryegrass and certain broadleaf weeds. Lower rates will be required if a preemergence application of Pre-Pare (see entry above) has been made to the field. See Pre-Pare and Raze labels for further directions related to using these products in conjunction with one another. A basic blend adjuvant (0.5-1.0% v/v) is the preferred adjuvant for use

with Raze. See Raze label for further tank mixing instructions and crop rotation restrictions.

**Caution** Apply Raze only once per season. Do not tank mix with products containing additional fluroxypyr. Pre-harvest interval for grain is 60 days.

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

**Chemical family** (flucarbazone) sulfonylaminocarbonyltriazolinone; (fluroxypyr) pyridine

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**flufenacet + metribuzin (Axiom DF)**

**Rate** 0.13 to 0.31 lb ai/a flufenacet + 0.034 to 0.087 lb ai/a metribuzin (4 to 10 oz/a Axiom)

**Time** Apply early postemergence when winter wheat is between spike and 3-leaf growth stage.

**Remarks** For control and suppression of annual grasses and broadleaf weeds in winter wheat. Axiom may be tank mixed with metribuzin, but do not exceed a total of more than the labeled metribuzin rate specified on the specific metribuzin label for soil type and winter wheat stage at application. For sequential applications of Axiom and metribuzin do not exceed a total of 0.5 lb ai/a per year of metribuzin. See label for suggested timing of sequential applications of Axiom and metribuzin based on environmental conditions.

**Caution** Use lower Axiom rates on coarse soils, and soils with low organic matter and high pH. For best control of weeds emerging with winter wheat crop, plant winter wheat after initial flushes of weeds have been controlled with tillage or a burndown herbicide. Do not graze treated winter wheat for at least 30 days after applying. Do not exceed one application or 10 oz/a of Axiom per year. Do not apply in tank-mixtures with adjuvants. Certain winter wheat varieties are sensitive to Axiom, including "Yamhill". See label for listed varieties sensitive to Axiom. Not all of the available newer winter wheat releases and varieties have been tested for tolerance to Axiom.

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

**Chemical family** (flufenacet) oxyacetamide; (metribuzin) triazine

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**imazamethabenz (Assert)**

**Rate** 0.38 to 0.47 lb ai/a (1.2 to 1.5 pints/a Assert)

**Time** Apply from the one- to 4-leaf stage of wild oat. Apply to wheat from the 2-leaf stage up to jointing.

**Remarks** For control of wild oat, roughstalk bluegrass, and certain broadleaf weeds in winter wheat. Use 80% ai nonionic surfactant at 2 pints/100 gal. If wild oat exceeds 25 plants/sq ft, use a minimum spray volume of 15 gal/a by ground. Allow at least 2 days of above-freezing temperatures before and after applying, otherwise weed control may be reduced. Assert will not control Italian ryegrass.

**Caution** See label for tank mixing instructions and crop rotation restrictions. Do not tank mix with phosphorous fertilizers. Do not tank mix with dicamba, MCPA amine, or 2,4-D amine. Do not plant crops other than wheat, barley, corn, soybean, saf-flower, edible beans, or sunflowers for 15 months, or sugar beets for 20 months after application. Do not graze treated wheat or cut treated wheat for forage.

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

**Chemical family** Imidazolinone

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**linuron (Linex)**

**Rate** 1.0 to 1.75 lb ai/a. Make a single application of Linex 4L at 2 to 3.5 pints/a

**Time** Apply as soon as possible after planting winter wheat. If winter wheat and weeds have emerged, apply before weeds are 3 inches tall. Note that application to actively growing plants may result in temporary crop chlorosis. Do not apply to winter wheat in the boot stage of maturity or when daily temperatures exceed 60°F, or crop may be injured.

**Remarks** When using Linex, plant winter wheat seed at least 1 inch deep. When planting in very dry conditions, use Linex only after rain or irrigation settles the soil.

**Caution** Crop may be injured if severe winter stress, disease, or insect damage follows application or from failure to observe correct winter wheat planting depth. Do not use Linex with other pesticides (except those listed in label), surfactants, or nitrogen solutions after winter wheat emerges. See label for crop rotation restrictions; any crop registered for the rate of Linex that was applied may be replanted immediately. Do not plant any other crop until 12 months after the last Linex application.

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

**Chemical family** Substituted urea

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**mesosulfuron-methyl (Osprey)**

**Rate** 0.009 to 0.0134 lb ai/a (3.2 to 4.75 oz/a Osprey)

**Time** Fall or spring: Apply specified dosage per acre as a post-emergence broadcast spray to young, actively growing weeds (one-leaf to two-tiller growth stage). Apply from crop emergence to the winter wheat jointing stage.

**Remarks** For Italian ryegrass, use 4.75 oz/a Osprey. Use the 3.2 oz/a Osprey rate for wild oat control if wild oat is the only target weed. A nonionic surfactant (0.5% v/v) with ammonium nitrogen (1 to 2 quarts/a) or ammonium sulfate (1.5 to 3 lb/a) fertilizer must be tank mixed with Osprey. Do not exceed one application or 4.75 oz/a Osprey per winter wheat season.

**Caution** Crop may be injured if frost occurs shortly after application to actively growing wheat. Consult label for broadleaf tank-mix options with Osprey and additional cautions.

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

**Chemical family** Sulfonylurea

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**metribuzin (several trade names)**

**Rate** 0.094 to 0.5 lb ai/a

**Time** Apply 0.094 to 0.187 lb ai/a in fall after winter wheat has at least two leaves. Apply 0.314 to 0.5 lb ai/a in spring when winter wheat has more than four tillers and secondary roots are more than 1 inch long.

**Remarks** Most effective if applied before weedy grasses exceed the 2-leaf stage; therefore, lower rates in fall usually are more effective than higher rates in spring. If applying metribuzin sequentially, allow at least 45 days between applications. Adding a nonionic surfactant with the fall application usually improves control. To control severe grass infestations see entry for triallate + metribuzin + chlorsulfuron + metsulfuron below. Metribuzin applied at 0.28 lb ai/a controls speedwell species.

**Caution** Some winter wheat varieties are sensitive to metribuzin. Do not apply on "Yamhill" wheat. See label for

maximum application rate on different soil types. Do not exceed 0.5 lb ai/a per year.

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

**Chemical family** Thiazine

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**pendimethalin (Prowl H<sub>2</sub>O)**

**Rate** 0.71 to 1.42 lb ai/a (1.5 to 3 pints/a Prowl H<sub>2</sub>O)

**Time** Apply postemergence when winter wheat is at least 1-leaf through flag leaf emergence, but prior to weed emergence. Prowl H<sub>2</sub>O will not control emerged weeds, but may be useful to suppress additional weed flushes or late emerging weed species.

**Remarks** Controls and suppresses annual grasses and broadleaf weeds in winter wheat. May be tank mixed with other post-emergence herbicides labeled in wheat to control established weeds and to broaden the weed control spectrum. Refer to label for approved tank-mix options.

**Caution** Application rate is dependent on soil type. Use lower rates on coarse-textured soils and higher rates on medium- to fine-texture soils.

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

**Chemical family** Dinitroaniline

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**pinoxaden (Axial XL)**

**Rate** 0.054 lb ai/a (16.4 oz/a Axial XL)

**Time** Apply to winter wheat from the 2-leaf to preboot stage. Apply to wild oat with one to six leaves on the main stem, and to Italian ryegrass with one to five leaves on the main stem.

**Remarks** See label for crop rotation restrictions and labeled broadleaf weed control tank-mix partners.

**Caution** Apply only once per season. Do not apply to a crop stressed by conditions such as drought, frost, low fertility, or pest damage; crop may be injured.

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

**Chemical family** Phenylpyrazolin

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**pinoxaden + fluroxypyr (Axial Star)**

**Rate** 0.054 lb ai/a + 0.132 lb ae/a fluroxypyr (16.4 oz/a Axial Star)

**Time** Apply to winter wheat from the 2-leaf to preboot stage. Apply to wild oat with one to six leaves on the main stem, and to Italian ryegrass with one to five leaves on the main stem. Broadleaf weeds should have 2 to 4 leaves and be less than 4 inches in height at the time of application.

**Remarks** See label for crop rotation restrictions and labeled broadleaf weed control and fungicide tank-mix partners. Axial Star may be applied in a carrier that contains up to 50% liquid nitrogen fertilizer.

**Caution** Apply only once per season. Do not apply to a crop stressed by conditions such as drought, frost, low fertility, or pest damage; crop may be injured. Do not harvest grain for 60 days following application.

**Site of action** (pinoxaden) Group 1: acetyl CoA carboxylase (ACCase) inhibitor; (fluroxypyr) Group 4: synthetic auxin

**Chemical family** (pinoxaden) phenylpyrazolin; (fluroxypyr) pyridine

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**propoxycarbazone-sodium (Olympus)**

**Rate** 0.027 to 0.04 lb ai/a (0.6 to 0.9 oz/a Olympus)

**Time** Fall or spring; apply specified dosage per acre as a post-emergence broadcast spray to actively growing wild oat and annual brome grasses in 2-leaf to two-tiller stage. Fall and spring: apply 0.6 to 0.9 oz/a Olympus in fall and then 0.3 to 0.6 oz/a Olympus in spring as a postemergence broadcast spray. Apply from crop emergence to before jointing begins. Olympus may also be applied at 0.6 oz/a with glyphosate in the fall as a pre-plant/pre-emergence burndown treatment in winter wheat.

**Remarks** Use with nonionic surfactant (0.25% to 0.5% v/v). Do not exceed 1.2 oz/a Olympus per crop year. Fall applications may not control spring-germinating weeds. Olympus will not control Italian ryegrass.

**Caution** See label for broadleaf tank-mix options with Olympus and additional cautions.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

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**pyroxasulfone (Zidua)**

**Rate** 0.053 to 0.092 lb ai/a (1.0 to 1.75 oz/a Zidua) preplant surface or preemergence; 0.037 to 0.106 lb ai/a (0.7 to 2.0 oz/a Zidua) delayed preemergence; 0.074 to 0.133 lb ai/a (1.0 to 2.5 oz/a Zidua) early postemergence

**Time** Zidua may be applied preplant surface, preemergence, delayed preemergence or early postemergence. For the delayed preemergence application, apply when 80% of germinated wheat seeds have 0.5-inch-long shoots up to fourth tiller for the early postemergence applications. See main Zidua label and supplemental labels for specific information on application timing, soil type, and rate information.

**Remarks** Wheat must be planted at least 1 inch deep to avoid injury. Wheat should not be planted more than 1.5 inches deep before a preemergence or delayed preemergence application. Zidua will not control germinated or emerged weeds. Zidua may be applied as a single treatment or sequential treatments and may be applied with other labeled herbicides. For herbicide resistance management, particularly for Italian ryegrass, apply a fall or spring postemergence grass herbicide such as Axial XL or PowerFlex HL.

**Caution** Do not exceed a total of 2.5 oz/a of Zidua per season. Do not apply to Durum wheat. Do not apply preplant or pre-emergence to broadcast-seeded wheat. Wheat for age may be fed or grazed 7 days following application.

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

**Chemical family** isoxazoline

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**pyroxasulfone + carfentrazone (Anthem Flex)**

**Rate** 0.063 to 0.141 lb ai/a (2.0 to 4.5 oz/a Anthem Flex)

**Time** Apply 30 days preplant through fourth tiller. See label for application timing, soil type, and rate information.

**Remarks** For Italian ryegrass control, apply preplant through preemergence only to soils with a CEC greater than 15, pH less than 7.5, and organic matter greater than 2%. If soils do not meet these requirements, Anthem Flex must be applied as a delayed preemergence or postemergence treatment. Results are best when applied prior to weed emergence. Wheat must be planted a minimum of 1 inch deep. Anthem Flex may be applied as a single

treatment or as sequential treatments and may be applied with other labeled herbicides. For herbicide resistance management, particularly for Italian ryegrass, apply a fall or spring postemergence grass herbicide such as Axial XL or PowerFlex HL.

**Caution** Do not exceed a total of 4.5 oz of Anthem Flex per season. Do not apply to Durum wheat. See label for rotational restrictions. Do not make postemergence applications to foliage that is wet from dew, rain, or irrigation, as increased wheat leaf speckling may occur.

**Site of action** (pyroxasulfone) Group 15: inhibits very-long-chain fatty acid synthesis; (carfentrazone) Group 14: protoporphyrinogen oxidase inhibitor

**Chemical family** (pyroxasulfone) isoxazoline; (carfentrazone) triazolinone

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**pyroxsulam (PowerFlex HL)**

**Rate** 0.016 lb ai/a (2 oz/a PowerFlex HL)

**Time** Apply in either fall or spring, to actively growing winter wheat from 3-leaf to jointing stage, after most weeds have emerged. PowerFlex HL will control or suppress Italian ryegrass, downy brome, and cheat, and has good broadleaf activity.

**Remarks** A nonionic surfactant (0.25% to 0.5% v/v) with ammonium sulfate (1.5 lb/a) fertilizer must be tank mixed with PowerFlex HL for maximum efficacy. Do not exceed one application of PowerFlex HL per winter wheat season. Do not make split applications. When applying with fluid fertilizer as a carrier, spray solution should not be composed of more than 50% liquid nitrogen and should not exceed 30 lb of actual nitrogen per acre.

**Caution** For winter wheat only. Do not tank mix with products containing dicamba or amine formulations of 2,4-D or MCP or organophosphate insecticides. Crop rotation restriction is 10 months for field and sweet corn, grasses, alfalfa and canola.

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

**Chemical family** Triazolopyrimidine sulfonamide

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**pyroxsulam + fluroxypyr + florasulam (GoldSky)**

**Rate** 0.013 lb ai/a pyroxsulam + 0.088 lb ae/a fluroxypyr + 0.015 lb ai/a florasulam (1 pint/a GoldSky)

**Time** Apply in the spring to actively growing winter wheat from 3-leaf to jointing stage and after most weeds have emerged.

**Remarks** GoldSky will control or suppress Italian ryegrass, downy brome, and cheat, and has good broadleaf activity. A nonionic surfactant (0.25% to 0.5% v/v) with ammonium sulfate (1.5 lb/a) fertilizer should be tank mixed with GoldSky for maximum efficacy when it is applied alone. When GoldSky is applied with EC formulations, such as 2,4-D ester or MCPA ester products, do not include an adjuvant.

**Caution** Do not apply more than 1 pint/a of GoldSky per year. Do not harvest winter wheat within 60 days of application. Do not graze within 7 days of application or harvest wheat as hay within 28 days of application.

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

**Chemical family** (pyroxsulam) triazolopyrimidine sulfonamide; (fluroxypyr) pyridine; (florasulam) triazolopyrimidine

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**sulfosulfuron (Maverick)**

**Rate** 0.031 lb ai/a sulfosulfuron (0.67 oz/a Maverick)

**Time** Apply only once, at the maximum rate of 0.67 oz/a, per season. Apply after wheat emerges but before jointing. Apply to weeds postemergence, when soil moisture is adequate for active growth. For best control of brome species, apply at the two- to 3-leaf growth stage.

**Remarks** Maverick's strong point is downy brome control, found mostly east of the Cascades, but it is also good on quackgrass and cheatgrass, and fair on Italian ryegrass and wild oat. Bedstraw is among the broadleaf weeds controlled. Use with an 80% ai nonionic surfactant at 2 quarts/100 gal.

**Caution** Do not plant any crop except spring or winter wheat for 1 year after applying Maverick.

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

**Chemical family** Sulfonylurea

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**triallate (several trade names)**

**Rate** 1.25 lb ai/a

**Time** Apply just before or soon after seeding. Incorporate immediately 2 to 3 inches deep, but above the planted winter wheat seeds, with two harrowings at right angles.

**Remarks** In a roughly tilled field or one with heavy crop residue, weed control may be reduced due to poor incorporation of the herbicide. Additional herbicide treatments may be necessary for dense infestations of Italian ryegrass or wild oat.

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

**Chemical family** Thiocarbamate

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**triallate (several trade names) + diuron (several trade names)**

**Rate** 1.25 lb ai/a triallate + 1.2 to 1.6 lb ai/a diuron

**Time** Apply triallate just before or soon after seeding. Incorporate immediately 2 to 3 inches deep, but above the planted winter wheat seeds, with two harrowings at right angles. Apply diuron pre- or post-emergence after rain settles soil.

**Remarks** Triallate is safer on winter wheat if applied after planting. Triallate is not effective against broadleaf weeds but is effective on wild oat and Italian ryegrass.

**Site of action** (triallate) Group 8: lipid synthesis inhibitor but not an ACCase inhibitor; (diuron) Group 7: photosystem II inhibitor

**Chemical family** (triallate) thiocarbamate; (diuron) substituted urea

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**triallate (several trade names) + metribuzin (several trade names)**

**Rate** 1.25 lb ai/a triallate + 0.094 to 0.5 lb ai/a metribuzin

**Time** Triallate is safer on wheat if applied after planting. Apply triallate just before or soon after seeding, and incorporate immediately 2 to 3 inches deep, but above wheat seed, with two harrowings at right angles. See above for rates and timings of metribuzin.

**Remarks** Triallate is ineffective against broadleaf weeds. Treatment will provide fair to good control of Italian ryegrass, wild oat, and annual bromes. Metribuzin will also control many broadleaf weeds.

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**Site of action** (triallate) Group 8: lipid synthesis inhibitor but not an ACCase inhibitor; (metribuzin) Group 5: photosystem II inhibitor

**Chemical family** (triallate) thiocarbamate; (metribuzin) triazine

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**triallate (several trade names) + metribuzin (several trade names) + chlorsulfuron + metsulfuron (several trade names)**

**Rate** 1.25 lb ai/a triallate + 0.141 lb ai/a metribuzin + 0.018 lb ai/a chlorsulfuron + metsulfuron

**Time** Apply triallate just before or soon after seeding, and incorporate immediately 2 to 3 inches deep, but above planted winter wheat seed, with two harrowings at right angles. Apply metribuzin + chlorsulfuron + metsulfuron when winter wheat is in the 2-leaf stage. This application is most effective before grass weeds exceed the 2-leaf stage.

**Remarks** Recommended for fields heavily infested with annual bromes and/or Italian ryegrass with suspected diclofop or diuron resistance. Adding an 80% ai nonionic surfactant improves control. Also gives fair to good control of wild oat.

**Caution** Observe the same use precautions given above for metribuzin and chlorsulfuron + metsulfuron alone.

**Site of action** (triallate) Group 8: lipid synthesis inhibitor but not an ACCase inhibitor; (metribuzin) Group 5: photosystem II inhibitor; (chlorsulfuron and metsulfuron) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (triallate) thiocarbamate; (metribuzin) triazine; (chlorsulfuron and metsulfuron) sulfonylurea

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**trifluralin (several trade names)**

**Rate** 0.5 to 1.0 lb ai/a

**Time** Trifluralin can be applied as a preplant incorporated treatment up to 3 weeks before planting winter wheat, or as a postplant incorporated treatment immediately following winter wheat planting.

**Remarks** For grass and broadleaf control. Trifluralin will not control established weed seedlings. Incorporate trifluralin with two harrowings at right angles following applications. Rate depends on soil type and the application timing used.

**Caution** Selectivity of trifluralin depends on the placement relative to planted winter wheat seed. Crop may be severely injured if winter wheat seed is planted into herbicide-treated soil. Do not replant treated areas to annual or perennial grass seed crops within 1 year of application; see individual labels for more specific instructions on limiting injury to rotational crops.

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

**Chemical family** Dinitroaniline

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**trifluralin (several trade names) + diuron (several trade names)**

**Rate** 0.75 lb ai/a trifluralin + 1.2 to 1.6 lb ai/a diuron

**Time** Apply trifluralin after planting but before wheat germinates. Immediately incorporate trifluralin above the planted winter wheat seeds with two harrowings at right angles. Apply diuron pre- or post-emergence after rain settles soil.

**Remarks** Use lower diuron rate if Italian ryegrass escapes are fewer than five plants/sq ft. Higher rates may injure crop, but this may be offset by better weed control when the weed population is high. This treatment gives fair control of annual bromes but poor control of wild oat.

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**Caution** Selectivity of trifluralin and diuron depends on their placement relative to winter wheat seed. Crop may be severely injured if winter wheat seed is in herbicide treated soil. Do not replant treated areas to any other crop within 1 year of application.

**Site of action** (trifluralin) Group 3: microtubule assembly inhibitor; (diuron) Group 7: photosystem II inhibitor

**Chemical family** (trifluralin) dinitroaniline; (diuron) substituted urea

## Broadleaf Weeds

### 2,4-D amine (several trade names) or MCPA (several trade names)

**Rate** 0.75 lb ae/a

**Time** Apply in spring when winter wheat has at least four tillers and 12 leaves, but before jointing.

**Remarks** Do not apply in the fall. Do not apply between jointing and dough stage of growth.

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

**Chemical family** (both) phenoxy acetic acid

### bromoxynil (several trade names)

**Rate** 0.375 to 0.5 lb ai/a

**Time** Apply from winter wheat emergence to the boot stage. Apply to weeds up to the 4-leaf stage or 2 inches high or 1 inch wide, whichever is first. Certain weeds may be controlled when larger; see label for size recommendations and application timings.

**Remarks** Do not apply to crops under moisture stress. Do not exceed 0.5 lb ai/a total per season.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

### bromoxynil + MCPA (Bronate Advanced)

**Rate** 0.25 to 0.5 lb ai/a bromoxynil + 0.25 to 0.5 lb ae/a MCPA (12.8 to 25.6 oz/a Bronate Advanced)

**Time** Apply to winter wheat after 3-leaf stage but before boot stage. Apply to weeds up to the 4-leaf stage or 2 inches high. Certain larger weeds may be controlled; see label for size recommendations and application timings.

**Remarks** Do not apply when crops are under moisture stress.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) nitrile; (MCPA) phenoxy acetic acid

### bromoxynil + bicyclopyrone (Talinor)

**Rate** 0.156 to 0.207 lb ae/a bromoxynil + 0.033 to 0.044 lb ai/a bicyclopyrone (13.7 to 18.2 oz/a Talinor)

**Time** Apply to winter wheat after 2-leaf stage up to pre-boot stage. Apply to weeds up to the 4-leaf stage or 2 inches high. Certain larger weeds may be controlled; see label for size recommendations and application timings.

**Remarks** Do not apply when crops or weeds are under moisture stress. Co-packed with CoAct+ additive which must be used with Talinor. COC at 1% v/v is the preferred adjuvant for use with Talinor.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (bicyclopyrone) Group 27: 4-hydroxyphenylpyruvate dioxygenase (HPPD) Inhibitor

**Chemical family** (bromoxynil) nitrile; (bicyclopyrone) triketone

### bromoxynil + MCPA + fluroxypyr (Carnivore)

**Rate** 0.20 to 0.31 lb ai/a bromoxynil + 0.20 to 0.31 lb ae/a MCPA + 0.08 to 0.125 lb ae/a fluroxypyr (1 to 1.5 pints/a Carnivore)

**Time** Apply to winter wheat after 2-leaf stage through flag leaf emergence. Apply to weeds up to the 4-leaf stage, or 8 inches high. Certain larger weeds may be controlled; see label for size recommendations and application timings.

**Remarks** Do not apply when crops are under moisture stress. Do not apply more than 2.4 pints/a of Carnivore per growing season. Do not harvest treated wheat as forage or allow livestock to graze treated wheat within 45 days of application. Do not apply within 40 days of harvesting grain or straw.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA and fluroxypyr) Group 4: synthetic auxin

**Chemical family** (bromoxynil) nitrile; (MCPA) phenoxy acetic acid; (fluroxypyr) pyridine

### bromoxynil + pyrasulfotole (Huskie)

**Rate** 0.186 to 0.254 lb ai/a (11 to 15 oz/a Huskie)

**Time** Apply to winter wheat from one leaf up to flag-leaf emergence. See label for weed size recommendations and application timings, but control of most species is best at the 11 fl oz/a rate when weeds have from one to six leaves.

**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. Huskie may be tank mixed with a variety of other broadleaf and grass herbicides; see label for instructions.

**Caution** See label for crop rotation restrictions. Wheat, triticale, and oats may be planted 7 days after application; alfalfa, canola, field pea, sugar beet and potatoes 9 months after application. Do not graze or harvest treated winter wheat for forage within 25 days of application, or harvest grain and straw within 60 days of application. Do not exceed one application of Huskie to winter wheat per year. Do not tank mix Huskie with tebuconazole fungicides.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (pyrasulfotole) Group 27: inhibits 4hydroxyphenylpyruvate-dioxygenase (4-HPPD)

**Chemical family** (bromoxynil) nitrile; (pyrasulfotole) isoxazole

### carfentrazone (Aim EC)

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

**Time** For emerged winter wheat, use 0.5 to 1 oz/a Aim EC. Use higher rates when treating more mature weeds or dense vegetative growth. Do not exceed 0.031 lb ai/a of Aim per season. Apply to emerged and actively growing weeds. Apply to wheat up to jointing stage. For best performance, apply to weeds up to 4 inches high and rosettes less than 3 inches across.

**Remarks** Aim is excellent for controlling bedstraw and speedwells. Use with an 80% ai nonionic surfactant at 2 pints/100 gal.

**Caution** Plant registered crops any time after applying Aim, subject to specific crop rotation restrictions on the Aim label. Root and leafy vegetables may be planted 30 days after

application. All other crops may be planted 12 months after application. Crop injury may increase with tank-mixtures; see label for tank mixing guidelines.

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

**Chemical family** Triazinone

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**chlorsulfuron (several trade names) + another broadleaf herbicide with a different mode of action**

**Rate** 0.008 to 0.016 lb ai/a

**Time** Apply in fall or spring any time after the crop is in the 2-leaf stage, but before boot.

**Remarks** Do not exceed 0.016 lb ai/a of chlorsulfuron in an 18-month period.

**Caution** Consult individual labels regarding crop rotation restrictions. Many crops may not be planted for 2 years or longer after application.

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

**Chemical family** Sulfonylurea

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**chlorsulfuron + metsulfuron (several trade names) + another broadleaf herbicide with a different mode of action**

**Rate** 0.014 to 0.019 lb ai/a preemergence or fall postemergence; 0.009 to 0.014 lb ai/a spring postemergence. Do not exceed 0.019 lb ai/a of a chlorsulfuron + metsulfuron premix in an 18-month period.

**Time** Preemergence in fall or spring, or any time after wheat is in the 2-leaf stage but before boot stage.

**Remarks** When applying postemergence, use 80% ai surfactant at 1 to 2 quarts/100 gal for best results. This combination effectively controls speedwells. Use when weeds are small and actively growing.

**Caution** See label for crop rotation restrictions. Many crops cannot be planted for 2 year or longer after application. Perennial and annual ryegrass, and crimson clover may not be planted for 9 months, barley and oats for 10 months, or red clover for 15 months after an application. No restrictions on rotations to wheat, rye, or triticale.

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

**Chemical family** (both) sulfonylurea

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**dicamba (several trade names)**

**Rate** 0.063 to 0.125 lb ae/a for early-season applications; up to 0.188 lb ae/a on fall-seeded wheat in western Oregon as a spring application only.

**Time** For best performance, apply when weeds are in the two- to 3-leaf stage and rosettes are less than 2 inches across. Applications must be before winter wheat jointing stage.

**Remarks** Tank mixing with other herbicides offers the best spectrum of weed control and herbicide resistant weed management. Consult product labels for rates and timing.

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

**Chemical family** Benzoic acid

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**florasulam + halauxifen (Quelex)**

**Rate** 0.075 oz ai/a florasulam + 0.075 oz ae/a halauxifen (0.75 oz/a Quelex)

**Time** Apply to winter wheat postemergence from the 2-leaf stage up to flag leaf emergence.

**Remarks** Results are best when weeds are young and actively growing. Use with a nonionic surfactant 0.25% v/v or crop oil concentrate or methylated seed oil (1% v/v) unless applied with an EC tank mix partner.

**Caution** See label for specific crop rotation restrictions.

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

**Chemical family** (florasulam) triazolopyrimidine sulfonamide; (halauxifen) arylpicolinate

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**florasulam + MCPA (Orion)**

**Rate** 0.004 lb ai/a florasulam + 0.31 lb ai/a MCPA (17 oz/a Orion)

**Time** Apply to winter wheat postemergence, from the 3-leaf stage up to jointing.

**Remarks** Results are best when weeds are young and actively growing. Orion will control chickweeds, wild buckwheat, mustard spp., and bedstraw and can be tank mixed with other grass and broadleaf herbicides to broaden the weed control spectrum.

**Caution** See label for specific crop rotation restrictions. For most crops the plant-back interval is 3 to 9 months. Do not graze wheat within 7 days of an Orion application, and do not harvest wheat within 60 days of an application.

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

**Chemical family** (florasulam) triazolopyrimidine; (MCPA) phenoxy acetic acid

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**florasulam + fluroxypyr (Starane Flex)**

**Rate** 0.092 lb ai/a (13.5 fl oz/a Starane Flex)

**Time** Apply to actively growing wheat from 3-leaf to flag leaf emergence. Apply when susceptible broadleaf weeds are actively growing and less than 4 inches tall.

**Remarks** Only weeds emerged at the time of treatment will be controlled. Best results are obtained from application made to seedling weeds.

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

**Chemical family** (florasulam) triazolopyrimidine sulfonamide; (fluroxypyr) pyridine

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**fluroxypyr (Starane Ultra)**

**Rate** 0.10 to 0.245 lb ai/a fluroxypyr (0.3 to 0.7 pint/a Starane Ultra)

**Time** For best performance, apply to emerged and actively growing broadleaf weeds less than 4 inches high or 1 inch wide. Use higher rate for susceptible broadleaf weeds up to 8 inches tall. Only weeds that have emerged at time of application will be controlled. Apply to 2-leaf winter wheat up to flag leaf emergence.

**Remarks** Do not exceed 0.7 pints/a per growing season.

**Caution** Do not harvest winter wheat for hay or silage from treated area within 7 days of application. Preharvest interval is 40 days.

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

**Chemical family** Pyridine

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**fluroxypyr + bromoxynil (Starane NXT)**

**Rate** 0.0625 to 0.125 lb ai/a fluroxypyr + 0.25 to 0.5 lb ai/a bromoxynil (14 to 27.4 oz/a Starane NXT)

**Time** For best performance, apply to emerged and actively growing weeds up to 4 to 8 inches tall depending on rate. Apply to wheat from 3-leaf stage through flag leaf emergence.

**Remarks** Provides control of broadleaf weeds including kochia, wild buckwheat, Russian thistle, and sunflower. Tank-mix compatible with MCPA, thifensulfuron or 2,4-D and most grass herbicides.

**Caution** Any rotational crop may be planted 120 days after application. Do not apply within 45 days of wheat harvest or allow livestock to graze within 45 days of application. Do not apply with fungicides containing strobilurin chemistry.

**Site of action** (fluroxypyr) Group 4: synthetic auxin; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (fluroxypyr) pyridine; (bromoxynil) nitrile

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**fluroxypyr + dicamba (Pulsar)**

**Rate** 0.061 to 0.092 lb ae/a fluroxypyr + 0.047 to 0.071 lb ae/a dicamba (8.3-12.5 oz/a Pulsar)

**Time** For best performance, apply to emerged and actively growing broadleaf weeds in the 1- to 4-leaf stage and up to pre-bolt stage for some species. Apply to wheat up to the jointing stage.

**Remarks** Provides control of broadleaf weeds including kochia and Russian thistle along with many others. Tank-mix compatible with many broadleaf herbicides and some grass herbicides. See the Pulsar label for specific tank-mix recommendations and adjuvant recommendations

**Caution** Do not make more than one application of Pulsar per year. Do not apply more than 12.5 oz/a per year. Do not graze treated areas or harvest wheat as forage within 7 days of application. Do not apply within 40 days of harvesting grain or straw.

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

**Chemical family** (fluroxypyr) pyridine; (dicamba) benzoic acid

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**fluroxypyr + clopyralid + pyroxsulam (PerfectMatch)**

**Rate** 0.097 lb ae/a fluroxypyr + 0.097 lb ae/a clopyralid + 0.013 lb ai/a pyroxsulam (1 pint/a PerfectMatch)

**Time** Apply to actively growing wheat from the 3-leaf to jointing stage. Treat after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant at 0.25% to 0.50% v/v (1 to 2 quarts/100 gal spray solution) and ammonium sulfate at 1.5 lb/a. Warm, moist growing conditions promote active weed growth and enhance activity of PerfectMatch. Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed, and may re-grow. PerfectMatch is rainfast within 4 hours after application.

**Caution** Do not apply more than 1 pint/a per growing season. Limit NIS rate to 0.25% when tank mixing with up to 6 fluid oz of EC formulated products per acre. Do not use any surfactant when total EC products exceed 6 fluid oz/acre. Do not apply within 60 days of wheat harvest.

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

**Chemical family** (fluroxypyr) pyridine; (clopyralid) pyridine; (pyroxsulam) triazolopyrimidine sulfonamide

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**metsulfuron (several trade names) + another broadleaf herbicide with a different mode of action**

**Rate** 0.004 lb ai/a

**Time** Apply postemergence after 2-leaf but before boot stage.

**Remarks** Metsulfuron controls a wide range of broadleaf weeds, and inhibits Canada thistle growth. For best results, add a nonionic surfactant of at least 80% ai at 1 to 2 quarts/100 gal. For weeds that are difficult to control, apply while they are actively growing and not more than 2 inches tall or in diameter. To broaden the spectrum of control, tank mix with a suitable registered herbicide. Time application to coincide with recommendation for specific tank-mix partner.

**Caution** Metsulfuron can persist in soil. Carefully follow label instructions about crop rotation restrictions.

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

**Chemical family** Sulfonylurea

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**proflufen (Peak) + another broadleaf herbicide with a different mode of action**

**Rate** 0.009 to 0.018 lb ai/a (0.25 to 0.5 oz/a Peak)

**Time** Apply postemergence from the 3-leaf to second-joint stage.

**Remarks** Results are best when weeds are young and actively growing. Apply with nonionic surfactant of at least 80% ai at 1 to 2 quarts/100 gal or a crop oil concentrate of at least 12% emulsifier at 1 to 4 pints/a.

**Caution** Carefully follow label instructions on crop rotation restrictions. Do not let spray drift to non-target crops. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold weather.

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

**Chemical family** Sulfonylurea

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**pyraflufen (Vida or ETX)**

**Rate** 0.0008 to 0.002 lb ai/a (0.5 to 1.0 oz/a Vida or 0.3 to 0.6 oz/a ETX)

**Time** Apply to winter wheat that is 6 to 8 inches tall up to jointing. Apply to seedling weeds that are less than 4 inches tall or less than 3 inches in diameter if in the rosette stage.

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

**Caution** Do not tank mix with products containing bromoxynil because severe wheat injury may result. Do not exceed two applications per season. Allow a minimum of 30 days between applications. Do not graze wheat within 7 days of application or harvest wheat for hay within 21 days of application. The preharvest interval for grain is 60 days.

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

**Chemical family** Phenylpyrazole

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**thifensulfuron + tribenuron (several trade names) + another broadleaf herbicide with a different mode of action**

**Rate** 0.014 to 0.028 lb ai/a

**Time** Apply after crop is in the 2-leaf stage through the boot stage.

**Remarks** Results are best when weeds are young and actively growing. For best performance, apply when conditions include temperatures of 60°F or higher and adequate soil moisture before, during, and immediately after treatment. Use with an 80% ai nonionic surfactant at 2 pints/100 gal.

**Caution** Wheat, barley, and oats may be replanted any time after application. Sugar beets and winter canola can be planted 60 days after application. All other crops can be planted 45 days after application.

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

**Chemical family** (both) sulfonylurea

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**thifensulfuron + tribenuron + fluroxypyr (Supremacy)**

**Rate** 6 oz/a Supremacy

**Time** Apply after winter wheat is in the 2-leaf stage but before flag leaf emergence.

**Remarks** Results are best when applied to broadleaf weeds that are actively growing. For best performance, apply when conditions include temperatures of 60°F or higher and adequate soil moisture before, during, and immediately after treatment. Supremacy may be applied with basic blend, NIS + UAN or AMS or MSO + UAN or AMS adjuvants. See Supremacy label for instructions on tank mixing with additional grass and broadleaf herbicides and fungicides.

**Caution** Do not apply more than 7.5 oz/a in a single application or more than 12.5 oz/a in one growing season.

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

**Chemical family** (thifensulfuron and tribenuron) sulfonylurea; (fluroxypyr) pyridine

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**thifensulfuron (several trade names) + another broadleaf herbicide with a different mode of action**

**Rate** 0.014 to 0.028 lb ai/a plus nonionic surfactant

**Time** After crop is in the 2-leaf stage but before flag leaf is visible.

**Remarks** Results are best when weeds are young and actively growing. For best performance apply when temperatures are 60°F or higher and soil moisture is adequate before, during, and immediately after treatment. Can be tank mixed with grass herbicides. Include a nonionic surfactant of at least 80% ai at 1 quart/100 gal.

**Caution** Do not let spray drift to adjacent crop or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean chemical from mixing and spray equipment with an approved tank cleaner. Do not plant any crop other than wheat, barley, soybeans, field corn, or oats for 45 days after applying.

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

**Chemical family** Sulfonylurea

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**triasulfuron + dicamba (Rave)**

**Rate** 0.005 to 0.022 lb ai/a triasulfuron + 0.034 to 0.138 lb ai/a dicamba (1 to 4 oz/a Rave)

**Time** Apply to winter wheat postemergence from emergence up to jointing.

**Remarks** Results are best when weeds are young and actively growing. Apply with nonionic surfactant of at least 80% ai at 1 to 2 quarts/100 gal or a crop oil concentrate of at least 12% emulsifier at 1 to 4 pints/a.

**Caution** Carefully follow label instructions on crop rotation restrictions. Do not let spray drift to non-target crops. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold weather. Follow label instructions on grain, grazing and forage harvest restrictions.

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

**Chemical family** (triasulfuron) sulfonylurea; (dicamba) benzoic acid

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**Broadleaf Weeds and Canada Thistle**

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**clopyralid (Stinger)**

**Rate** 0.094 to 0.125 lb ae/a (0.25 to 0.33 pint/a Stinger)

**Time** Apply from 3-leaf up to early boot stage of winter wheat growth. Apply to actively growing weeds. Only weeds emerged at the time of application will be affected.

**Remarks** To control perennial weeds such as Canada thistle, use the 0.33 pint/a rate.

**Caution** Do not exceed 0.67 pint/a per crop year. Plant wheat, barley, oats, grasses, field corn, or sugar beets any time after treatment. See label for crop rotation restrictions on other crops. Do not apply by air.

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

**Chemical family** Pyridine

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

**Rate** 0.095 to 0.126 lb ae clopyralid + 0.5 to 0.67 lb ae/a 2,4-D amine (2 to 2.66 pints/a Curtail)

**Time** Apply in spring to actively growing weeds, after winter wheat begins tillering up to jointing stage.

**Remarks** This combination is particularly effective on members of the sunflower family such as Canada thistle and mayweed. Controlling tough winter annual weeds such as corn gromwell and fiddleneck requires tank mixing with other herbicides. Check Curtail label for details on mixtures. For Canada thistle, apply after most basal leaves emerge but before bud stage.

**Caution** Do not plant wheat, barley, oats, grasses, or field corn within 30 days after applying Curtail. Do not plant sugar beets, including beets grown for seed, in the same growing season after applying Curtail. See label for crop rotation restrictions on other crops.

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

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

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**clopyralid + MCPA (Curtail M)**

**Rate** 0.092 to 0.122 lb ae/a clopyralid + 0.5 to 0.69 lb ae/a MCPA (1.75 to 2.33 pints/a Curtail M)

**Time** Apply in spring to actively growing weeds from the 3-leaf up to jointing stage of wheat growth. Only weeds emerged at the time of application will be affected.

**Remarks** For Canada thistle, apply after most basal leaves emerge but before bud stage.

**Caution** Do not plant wheat, barley, oats, grasses, or corn within 30 days after applying Curtail M. Do not plant sugar beets in the same growing season after Curtail M. See label for crop rotation restrictions on other crops.

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

**Chemical family** (clopyralid) pyridine; (MCPA) phenoxy acetic acid

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**clopyralid + MCPA + fluroxypyr (Weld)**

**Rate** 0.063 to 0.094 lb ae/a clopyralid + 0.22 to 0.33 lb ae/a MCPA + 0.08 to 0.12 lb ae/a fluroxypyr (1.0 to 1.5 pints/a Weld)

**Time** Apply to winter wheat after 3-leaf stage through flag leaf emergence. Apply to weeds up to the 4-leaf stage or 4 inches high. Certain larger weeds may be controlled; see label for size recommendations and application timings.

**Remarks** Do not apply when crops are under moisture stress. Do not harvest treated wheat as forage or allow livestock to graze treated wheat within 7 days of application. Do not apply within 40 days of harvesting grain or straw. See Weld label for crop rotation restrictions in Oregon.

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

**Chemical family** (MCPA) phenoxy acetic acid; (fluroxypyr and clopyralid) pyridine

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**dicamba (several trade names) + MCPA (several trade names)**

*Oregon only*

**Rate** 0.125 to 0.188 lb ae/a dicamba + 0.75 lb ae/a MCPA

**Time** Apply in spring when winter wheat has at least four tillers but before it begins to joint.

**Remarks** Controls many broadleaf weeds and kills or suppresses Canada thistle.

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

**Chemical family** (dicamba) benzoic acid; (MCPA) phenoxy acetic acid

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**fluroxypyr + clopyralid (several trade names)**

**Rate** 0.094 to 0.125 lb ai/a fluroxypyr + 0.094 to 0.125 lb ai/a clopyralid

**Time** For best performance, apply to emerged and actively growing weeds 4 to 8 inches tall depending on rate. Apply to winter wheat from 3-leaf stage through flag leaf emergence.

**Remarks** Controls broadleaf weeds including kochia, wild buckwheat, Canada thistle, and prickly lettuce. Tank-mix compatible with MCPA, thifensulfuron or 2,4-D, and most grass herbicides.

**Caution** See label for rotation restrictions on other crops. Do not allow livestock to graze treated areas or harvest forage within 7 days of application. Preharvest interval for grain or straw is 40 days.

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

**Chemical family** (both) pyridine

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**tribenuron (several trade names)**

**Rate** 0.008 to 0.016 lb ai/a

**Time** Apply after crop is in the 2-leaf stage but before the flag leaf is visible.

**Remarks** Results are best on young, actively growing weeds. For best performance, apply when temperatures are 60°F or higher and moisture is adequate before, during, and immediately after treatment. The 0.016 lb ai/a rate is effective on Canada thistle; apply at 4 to 12 inches of growth. Use with an 80% ai nonionic surfactant at 2 pints/100 gal.

**Caution** Replant wheat, barley, and oats any time after application. Plant sugar beets, winter rape, and canola 60 days after application, and all other crops 45 days after application.

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

**Chemical family** Sulfonylurea

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**Preharvest Weed Control****2,4-D (several trade names)**

**Rate** 0.5 to 1.4 lb ae/a

**Time** Apply when grain is in the hard dough stage, and the green color is gone from stem nodes.

**Remarks** Controls weeds that will interfere with harvest, and suppresses perennial weeds. Preharvest interval is 7 days.

**Caution** Do not apply to winter wheat grown for seed.

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

**Chemical family** Phenoxy acetic acid

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**carfentrazone (Aim EC)**

**Rate** 0.016 to 0.031 lb ai/a (1 to 2 oz/a Aim EC)

**Time** Apply when winter wheat is mature and the grain has begun to dry down.

**Remarks** A nonionic surfactant, methylated seed oil, or crop oil concentrate is required. Good spray coverage is essential for satisfactory weed control. Repeat application if necessary.

**Caution** See label for tank mixing guidelines, precautions, and crop rotation restrictions.

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

**Chemical family** Triazinone

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**dicamba (several trade names)**

**Rate** 0.25 lb ae/a

**Time** Apply when grain is in the hard dough stage, and the green color is gone from stem nodes.

**Remarks** To control weeds that will interfere with harvest or to suppress perennial weeds. Not all dicamba labels include this use. Preharvest interval is 7 days.

**Caution** Do not apply to winter wheat grown for seed.

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

**Chemical family** Benzoic acid

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**dicamba (several trade names) + 2,4-D (several trade names)**

**Rate** 0.25 lb ae dicamba/a + 0.5 to 1 lb ae/a 2,4-D

**Time** Apply when grain is in the hard dough stage and the green color is gone from stem nodes.

**Remarks** To control weeds that will interfere with harvest or to suppress perennial weeds. Preharvest interval is 7 days. Not all dicamba labels include this use.

**Caution** Do not apply to winter wheat grown for seed.

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

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

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**flumioxazin (Valor)**

**Rate** 0.0478 to 0.0637 lb ai/a (1.5 to 2.0 oz/a Valor)

**Time** Valor may be applied as a harvest aid to winter wheat when the grain has reached physiological maturity (hard dough stage), and has no more than 30% moisture. Tank mixing Valor with glyphosate is recommended for harvest aid applications.

**Remarks** Valor should be applied with an MSO + AMS or UAN adjuvant system in a minimum volume of 10 gal/a to optimize desiccation of the winter wheat and any weeds present.

**Caution** Winter wheat may be harvested 10 days after a harvest aid application of Valor.

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

**Chemical family** N-phenylphthalimide

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**glyphosate (several trade names)**

**Rate** 0.38 to 0.75 lb ae/a

**Time** Apply when grain is in the hard dough stage, and the green color is gone from stem nodes.

**Remarks** To control weeds that will interfere with harvest or to suppress perennial weeds. Add an 80% ai nonionic surfactant. Preharvest interval is 7 days. Not all glyphosate labels include this use.

**Caution** Do not apply to winter wheat grown for seed.

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

**Chemical family** None generally accepted

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**saflufenacil (Sharpen powered by Kixor herbicide)**

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

**Time** Apply only to wheat that has reached physiological maturity (hard-dough stage; grain contains less than 30% moisture). Allow 7 days for optimum desiccation effect depending on environmental conditions.

**Remarks** A methylated seed oil plus ammonium-based adjuvant system is required for optimum desiccation activity and weed control. See label for more information on adjuvants and tank-mixes.

**Caution** Do not apply more than a maximum cumulative amount of 2.0 oz/a of Sharpen per cropping season for desiccation purposes. Do not apply Sharpen on wheat (all types) grown for seed production.

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

**Chemical family** Pyrimidinedione

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**Clearfield Wheat System**

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**imazamox (Beyond)**

*Clearfield wheat only*

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

**Time** Apply postemergence to Clearfield wheat, after tiller initiation but before jointing. In Clearfield Plus (2-gene) varieties, applications can be made from the 2-leaf stage (if nonionic surfactant is used) until the second joint is detected at the soil surface. May be applied in fall-winter or spring, for winter or spring annual weed control. Apply when most actively growing annual grass weeds are in the four- to five- leaf stage. Broadleaf weeds should be actively growing and less than 3 inches tall.

**Remarks** Adding a nonionic surfactant and a liquid nitrogen fertilizer or ammonium sulfate solution is required. For Clearfield Plus wheat varieties, crop oil concentrate or methylated seed oil may be substituted for nonionic surfactant after tiller initiation to increase weed control, but they may also increase crop response. Do not apply more than 8 oz/a per growing season. An adjuvant (nonionic surfactant) and a liquid nitrogen fertilizer or ammonium sulfate solution is required.

**Caution** Apply to Clearfield wheat varieties only. Temporary height reduction or slight leaf yellowing may occur after application; effects can be more pronounced if the crop is under environmental stress. Do not tank mix with sulfonylurea herbicides (such as Finesse, Ally, or Harmony) due to potential crop response or weed-control antagonism. Apply Beyond a maximum of 2 out of 4 years. Do not plant Clearfield wheat continuously. There are no restrictions on feeding or grazing wheat forage and hay after applying Beyond. Some rotation crops cannot be planted within 26 months of application; see updated label for crop rotation restrictions.

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

**Chemical family** Imidazolinone

# Herbicide Effectiveness on Weeds in Wheat (West of the Cascades)

Weed Family	thifensulfuron+ tribenuron	chlorsulfuron+ metsulfuron	2,4-D	MCPA	dicamba	bromoxynil	metribuzin	diuron	2,4-D+ clopyralid	prosulfuron	metsulfuron	clopyralid
Amaranth												
Amaranth, Powell <i>Amaranthus powellii</i>	G	G	G	G	G	F	—	G	—	—	—	—
Pigweed, redroot <i>Amaranthus retroflexus</i>	G	G	G	G	G	F	—	G	—	G	G	G
Borage												
Fiddleneck, coast <i>Amsinckia intermedia</i>	G	G	F	F	—	G	—	G	—	—	—	—
Buckwheat												
Buckwheat, wild <i>Polygonum convolvulus</i>	G	G	F	F	G	G	F	F	G	—	G	G
Dock, broadleaf <i>Rumex obtusifolius</i>	G	G	G	F	G	P	—	F	—	—	—	—
Dock, curly <i>Rumex crispus</i>	G	G	G	F	G	P	—	F	G	—	—	G
Knotweed, prostrate <i>Polygonum aviculare</i>	G	G	F	P	G	F	F	F	—	—	G	—
Ladysthumb <i>Polygonum persicaria</i>	—	G	G	F	G	G	P	F	F	—	G	G
Sorrel, red <i>Rumex acetosella</i>	—	F	P	P	G	P	—	F	G	—	—	G
Buttercup												
Buttercup, corn <i>Ranunculus arvensis</i>	—	—	G	G	G	—	—	—	—	—	—	—
Buttercup, creeping <i>Ranunculus repens</i>	G	G	F	G	G	—	—	—	—	—	—	—
Buttercup, western field <i>Ranunculus occidentalis</i>	—	—	G	G	G	—	—	—	—	—	—	—
Carrot												
Bur chervil <i>Anthriscus scandicina</i>	G	G	P	G	—	P	—	P	—	—	—	—
Carrot, wild <i>Daucus carota</i>	G	G	F	F	P	F	—	P	—	P-F	P-F	—
Cucumber												
Cucumber, western wild <i>Marah oreganus</i>	—	—	P	P	P	P	P	P	—	—	—	—
Evening Primrose												
Willowweed, panicle <i>Epilobium paniculatum</i>	—	—	P	P	—	—	G	G	—	—	—	—
Figwort												
Mullein, common <i>Verbascum thapsus</i>	G	—	P	P	—	—	—	—	—	—	—	—
Mullein, moth <i>Verbascum blattaria</i>	—	—	F	P	—	—	—	—	—	—	—	—
Speedwell, birdseye <i>Veronica persica</i>	—	F	P	P	P	F	G	P	—	—	—	—
Speedwell, ivyleaf <i>Veronica hederifolia</i>	G	F	P	P	P	F	G	P	—	—	—	—

G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information

Weed Family	thifensulfuron+ tribenuron	chlorsulfuron+ metsulfuron	2,4-D	MCPA	dicamba	bromoxynil	metribuzin	diuron	2,4-D+ clopyralid	prosulfuron	metsulfuron	clopyralid
Speedwell, purslane <i>Veronica peregrina</i>	G	G	F	P	P	—	G	P	—	—	—	—
Toadflax, yellow <i>Linaria vulgaris</i>	—	—	P	P	—	—	—	—	—	—	—	—
Geranium												
Filaree, redstem <i>Erodium cicutarium</i>	G	G	F	F	—	P	G	F	—	—	G	—
Geranium, cutleaf <i>Geranium dissectum</i>	G	G	P	G	—	—	G	G	—	—	—	—
Geranium, dovefoot <i>Geranium molle</i>	—	G	P	P	—	—	G	G	—	—	—	—
Goosefoot												
Lambsquarters, common <i>Chenopodium album</i>	F	G	G	G	G	G	F	G	—	G	G	G
Garlic, wild <i>Allium vineale</i>	G	F	F	P	F	P	P	P	—	—	—	—
Onion, wild <i>Allium amplexans</i>	G	F	F	P	F	P	P	P	—	—	—	—
Madder												
Bedstraw, catchweed <i>Galium aparine</i>	F	F	P	P	F	F	P	P	—	—	—	—
Bedstraw, corn <i>Galium tricornis</i>	—	—	P	P	—	F	P	P	—	—	—	—
Madder, field <i>Sherardia arvensis</i>	—	—	P	P	—	—	—	—	—	—	—	—
Mallow												
Mallow, common <i>Malva neglecta</i>	G	G	F	P	—	P	P	P	—	—	—	—
Mallow, dwarf <i>Malva rotundifolia</i>	—	—	F	P	—	—	—	—	—	—	—	—
Mallow, little <i>Malva parviflora</i>	—	—	F	P	—	—	—	—	—	—	—	—
Mint												
Deadnettle, red <i>Lamium purpureum</i>	G	G	P	F	—	P	G	G	—	—	—	—
Healall <i>Prunella vulgaris</i>	—	—	G	P	—	—	—	—	—	—	—	—
Henbit <i>Lamium amplexicaule</i>	G	G	P	F	—	P	G	G	—	G	G	—
Morningglory												
Bindweed, field <i>Convolvulus arvensis</i>	P	P	F	F	F	P	P	P	—	F-G	—	—
Bindweed, hedge <i>Convolvulus sepium</i>	P	—	G	G	G	P	P	P	—	—	—	—
Mustard												
Bittercress, little <i>Cardamine oligosperma</i>	G	G	G	G	—	F	G	G	—	—	—	—
Mustard, black <i>Brassica nigra</i>	G	G	G	G	P	G	G	G	—	G	G	—
G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information												

Weed Family	thifensulfuron+ tribenuron	chlorsulfuron+ metsulfuron	2,4-D	MCPA	dicamba	bromoxynil	metribuzin	diuron	2,4-D+ clopyralid	prosulfuron	metsulfuron	clopyralid
Mustard, Indian <i>Brassica juncea</i>	G	G	G	G	P	P	—	G	—	G	G	—
Mustard, wild <i>Brassica kaber</i>	G	G	G	G	P	F	G	G	—	G	G	G
Radish, common <i>Raphanus sativus</i>	G	G	G	G	P	F	G	G	—	—	—	—
Radish, wild <i>Raphanus raphanistrum</i>	G	G	G	G	P	F	G	G	—	—	—	G
Rocket, yellow <i>Barbarea vulgaris</i>	G	G	G	G	—	P	G	G	—	—	—	—
Shepherdspurse <i>Capsella bursa-pastoris</i>	G	G	G	G	—	F	G	G	—	G	—	G
Turnip, wild <i>Brassica campestris</i>	G	G	G	G	P	G	G	G	—	—	—	—
Wort, whitlow <i>Draba verna</i>	—	G	—	—	—	—	G	G	—	—	—	—
Nightshade												
Nightshade, black <i>Solanum nigrum</i>	P	P	F	F	—	—	P	G	G	—	—	G
Nightshade, hairy <i>Solanum sarrachoides</i>	P	P	F	F	—	—	P	G	G	—	—	G
Pea												
Vetch, common <i>Vicia sativa</i>	G	G	G	G	G	F	P	P	G	—	—	G
Vetch, hairy <i>Vicia villosa</i>	G	F	G	G	G	F	P	P	—	—	—	G
Vetch, narrowleaf <i>Vicia angustifolia</i>	—	—	G	F	G	F	P	P	—	—	—	G
Phlox												
Gilia, field <i>Gilia capitata</i>	—	F	—	—	—	—	G	G	—	—	—	—
Gilia, skunkweed <i>Navarretia squarrosa</i>	—	G	—	—	—	—	G	G	—	—	—	—
Gilia, woolly <i>Navarretia intertexta</i>	—	—	—	—	—	—	G	G	—	—	—	—
Pink												
Bouncing bet <i>Saponaria officinalis</i>	—	—	P	P	—	P	P	P	—	—	—	—
Chickweed <i>Stellaria media</i>	G	G	F	P	G	P	G	G	—	G	G	—
Chickweed, mouseear <i>Cerastium vulgatum</i>	G	G	F	P	F	P	G	G	—	—	—	—
Chickweed, sticky <i>Cerastium viscosum</i>	—	G	P	P	F	P	G	G	—	G	G	—
Knawel <i>Scleranthus annuus</i>	—	—	P	P	G	P	G	G	—	—	—	—
Spurry, corn <i>Spergula arvensis</i>	—	G	P	F	—	P	G	G	—	—	—	—
Plantain												
Plantain, buckhorn <i>Plantago lanceolata</i>	—	—	G	G	P	—	—	P	—	—	F	G
G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information												

Weed Family	thifensulfuron+ tribenuron	chlorsulfuron+ metsulfuron	2,4-D	MCPA	dicamba	bromoxynil	metribuzin	diuron	2,4-D+ clopyralid	prosulfuron	metsulfuron	clopyralid
Poppy												
Poppy, California <i>Eschscholtzia californica</i>	—	—	G	G	—	—	—	—	—	—	—	—
Primrose												
Pimpernel, scarlet <i>Anagallis arvensis</i>	—	G	G	G	—	P	G	G	—	—	—	—
Purslane												
Minerslettuce <i>Montia perfoliata</i>	G	G	P	P	—	F	G	G	—	—	—	—
Purslane, redmaids rock <i>Calandrinia ciliata</i>	—	—	G	G	—	—	G	G	—	—	—	—
Rose												
Burnet, small <i>Sanguisorba minor</i>	—	—	—	—	—	—	—	G	—	—	—	—
Cinquefoil, silverweed <i>Potentilla anserina</i>	—	—	P	P	—	—	—	P	—	—	—	—
Rush												
Toadrush <i>Juncus bufonius</i>	—	—	G	G	—	—	—	G	—	—	—	—
Sunflower												
Artichoke, Jerusalem <i>Helianthus tuberosus</i>	—	—	G	G	G	P	P	—	G	—	—	G
Catsear, spotted <i>Hypochoeris radicata</i>	G	G	G	G	—	—	—	—	—	—	—	—
Chicory <i>Cichorium intybus</i>	—	—	G	G	—	—	—	—	—	—	—	—
Cocklebur, heartleaf <i>Xanthium strumarium</i>	—	—	G	F	G	—	—	G	G	—	—	—
Cornflower <i>Centaurea cyanus</i>	—	F	G	F	—	F	—	G	G	—	—	G
Cudweed, low <i>Gnaphalium uliginosum</i>	—	—	P	P	—	—	—	—	—	—	—	—
Cudweed, purple <i>Gnaphalium purpureum</i>	—	G	P	P	—	—	—	—	—	—	—	—
Daisy, oxeye <i>Chrysanthemum leucanthemum</i>	—	—	F	F	—	—	—	F	G	—	—	G
Dandelion, common <i>Taraxacum officinale</i>	G	G	G	G	—	P	—	—	G	—	F-G	G
Groundsel, common <i>Senecio vulgaris</i>	G	G	P	P	—	G	F	F	G	—	G	G
Hawkbit, rough <i>Leontodon nudicaulis</i>	—	—	G	G	—	—	—	—	—	—	—	—
Hawksbeard, bristly <i>Crepis setosa</i>	—	G	P	P	P	—	G	G	G	—	—	G
Lettuce, prickly <i>Lactuca serriola</i>	G	G	G	G	G	F	G	G	G	G	F-G	G
Lettuce, willowleaf <i>Lactuca saligna</i>	—	—	G	G	—	—	—	—	—	—	—	—
G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information												

Weed Family	thifensulfuron+ tribenuron	chlorsulfuron+ metsulfuron	2,4-D	MCPA	dicamba	bromoxynil	metribuzin	diuron	2,4-D+ clopyralid	prosulfuron	metsulfuron	clopyralid
Mayweed (Dog fennel) <i>Anthemis cotula</i>	G	G	F	P	G	G	F	G	G	G	G	G
Nipplewort <i>Lapsana communis</i>	G	G	P	P	—	G	—	G	—	—	—	—
Pineappleweed <i>Matricaria matricarioides</i>	G	G	F	P	F	G	—	F	G	—	—	G
Salsify, common <i>Tragopogon porrifolius</i>	—	—	G	—	F	—	—	—	—	—	—	—
Salsify, meadow <i>Tragopogon pratensis</i>	—	G	G	—	F	—	—	—	G	—	—	G
Salsify, western <i>Tragopogon major</i>	—	—	G	—	F	—	—	—	—	—	—	—
Sowthistle, annual <i>Sonchus oleraceus</i>	G	G	G	G	G	F	G	G	G	—	—	G
Sowthistle, spiny <i>Sonchus asper</i>	G	—	G	G	G	F	G	G	—	—	—	—
Tarweed, cluster <i>Madia glomerata</i>	—	—	—	—	—	G	—	—	—	—	—	—
Tarweed, Chilean <i>Madia sativa</i>	—	—	P	P	—	G	—	—	—	—	—	—
Thistle, bull <i>Cirsium vulgare</i>	F	F	G	G	—	—	—	G	—	—	—	—
Thistle, Canada <i>Cirsium arvense</i>	G	G	F	F	F	P	P	P	G	F	—	G
Yarrow, common <i>Achillea millefolium</i>	—	—	P	P	F	P	—	P	—	—	—	—

G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information

Grasses	chlorsulfuron + metsulfuron	imazamethabenz	diclofop	fenoxaprop	triale	diuron	flucarbazone	metribuzin
Barnyardgrass ( <i>Echinochloa crus-galli</i> )	P	P	G	G	P	G	G	F
Blackgrass ( <i>Alopecurus myosuroides</i> )	G	P	G	G	P	P	—	G
Bluegrass, annual ( <i>Poa annua</i> )	F	P	P	P	P	G	—	F
Brome, California ( <i>Bromus carinatus</i> )	P	P	P*	P	P	P	P	P
Brome, ripgut ( <i>Bromus rigidus</i> )	P	P	G*	P	F	P	P	F
Cheat ( <i>Bromus secalinus</i> )	P	P	F*	P	F	P	P	F
Chess, soft ( <i>Bromus mollis</i> )	P	P	F*	P	F	P	—	F
Fescue, rattle ( <i>Vulpia myuros</i> )	P	P	P	P	P	G	—	G
Foxtail, green ( <i>Setaria viridis</i> )	P	P	G	G	P	G	G	P
Oat, wild ( <i>Avena fatua</i> )	P	G	G	G	F	P	G	P
Ryegrass, Italian ( <i>Lolium multiflorum</i> )	F	P	G	P	F	F	G	F
Witchgrass ( <i>Panicum capillare</i> )	P	P	F	P	P	F	G	F

G = good (85%-100%)    F = fair (70%-84%)    P = poor (0-69%)    (—) = limited information

# Spring Wheat

Judit Barroso and Don Morishita

Revised March 2019

## Preplant and Preemergence Weed Control

### carfentrazone (Aim EC)

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

**Time** Apply before, during, or after grain has been planted.

**Remarks** May be applied as a preplant burndown (up to 1 day before seeding), foliar broadcast or as a harvest-aid. Use a non-ionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution) having at least 80% active ingredient. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v (2 to 4 gal/100 gal spray solution) or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to NIS. Tank-mixtures with other herbicides increase spectrum of control. Apply to actively growing weeds not more than 4 inches tall or rosettes 3 inches in diameter. Thorough coverage is essential for good control. To avoid significant crop response, do not apply within 6 to 8 hours of rain or irrigation or if heavy dew is present. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use Aim EC with crop oil concentrates (COC), methylated seed oil (MSO), or silicone-based adjuvants. Do not exceed 0.031 lb ai/a (2 fl oz Aim EC) per crop season. Do not harvest for forage within 7 days after application.

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

**Chemical family** Triazolinone

### sulfentrazone + carfentrazone (Spartan Charge)

**Rate** 0.094 to 0.194 lb ai/a sulfentrazone + 0.010 to 0.021 lb ai/a carfentrazone (3.8 to 7.6 oz Spartan Charge 3.5SE)

**Time** Apply fall or spring as preplant or preemergence within 3 days after planting.

**Remarks** This is a 24c SLN registration for Idaho only; to be used for the control of Russian thistle and kochia. Consult label to determine rate for soil pH, percentage of organic matter, and texture. Consult label for specific crop rotation restrictions. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 0.28 lb ai (10.2 oz) Spartan Charge per 12-month period. Do not apply after crop emerges or if seedlings are near soil surface. Do not apply on coarse soils with less than 1.5% organic matter and soil pH greater than 7.6. Do not apply to frozen soil. Do not incorporate as this can destroy the herbicide barrier. Do not apply this product to spring wheat fields if this herbicide or additional sulfentrazone-containing products have been previously applied within the same 12-month period.

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

**Chemical family** Triazolinone

### pyroxasulfone + carfentrazone (Anthem Flex)

**Rate** 0.063 to 0.141 lb ai/a (2.0 to 4.5 oz/a Anthem Flex)

**Time** Apply 30 days preplant through fourth tiller. See label for application timing, soil type, and rate information.

**Remarks** Apply preplant through preemergence only to soils with a CEC greater than 15, pH less than 7.5, and organic matter greater than 2%. If soils do not meet these requirements, Anthem

Flex must be applied as a delayed preemergence or postemergence treatment. Results are best when applied prior to weed emergence. May be applied as a single treatment or sequential treatments. May be applied with other labeled herbicides. For herbicide resistance management, particularly for Italian ryegrass, apply a spring postemergence grass herbicide such as Axial or PowerFlex. Restricted entry interval (REI) is 12 hours.

**Caution** Wheat must be planted a minimum of 1 inch deep. Do not apply more than a total of 0.031 ai/a of carfentrazone to wheat per year. Must have a minimum of 0.5 inch of rain to activate. Rainfall and/or irrigation needs to be between 48 hours and 7 days after application or weed control may be erratic. Do not apply through any type of irrigation system. Do not apply to frozen or snow-covered ground.

**Site of action** (pyroxasulfone) Group 15: inhibits very-long-chain fatty acid synthesis; (carfentrazone) Group 14: protoporphyrinogen oxidase inhibitor.

**Chemical family** (pyroxasulfone) chloroacetamide; (carfentrazone) triazolinone

### pyroxasulfone (Zidua)

**Rate** 0.041 to 0.081 lb ai/a (1.25 to 2.50 fl oz/a Zidua SC) delayed preemergence; 0.057 to 0.130 lb ai/a (1.75 to 4 fl oz/a Zidua SC) early postemergence.

**Time** Apply delayed preemergence or early postemergence in fall-seeded or spring-seeded wheat. Plant wheat seed 1 to 1.5 inches deep and apply only to a uniform seedbed with good seed row closure and soil coverage.

- Delayed Preemergence: Apply as a broadcast spray to the soil surface when 80% of germinated wheat seeds have a shoot at least 0.5 inch long until wheat spiking.
- Early Postemergence: Apply to wheat at spiking up to the fourth-tiller growth stage.

**Remarks** Applied as pre-plant surface or pre-emergence can cause wheat injury. Activity may be reduced if trash from previous crop covers more than 25% of the soil surface. Must be incorporated with rainfall or irrigation after application for optimal weed control. Crop rotation interval ranges from 1 to 6 months depending on amount of Zidua used (see label for details). Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than a maximum cumulative amount of 4.0 fl oz/a of Zidua (0.130 lb ai/a pyroxasulfone) per cropping season. Do not apply Zidua to durum wheat. Do not apply preplant surface, preplant incorporated, or preemergence in wheat. Do not apply delayed preemergence to broadcast seeded wheat.

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

**Chemical family** Pyrazole

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**glyphosate (several trade names)**

**Rate** 0.375 to 0.75 lb ae/a (1 to 2 pt/a of a 3 lb ae/gal formulated herbicide)

**Time** Apply before, during, or after planting wheat, but before wheat emerges.

**Remarks** Results are best if a delay between tillage and planting allows weeds to emerge before the wheat. Glyphosate may be used only as a spot-treatment in wheat fields. Do not treat more than 10% of the field to be harvested. Be aware that glyphosate is formulated as 3 lb, 4 lb, 4.2 lb, 4.5 lb, and 5 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Some glyphosate products require adding a nonionic surfactant (NIS); check the label. The addition of 1 to 2% ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal spray solution may increase the performance of glyphosate particularly with hard water or spraying during drought conditions. Restricted entry interval (REI) is 4 hours.

**Caution** Carefully check the entire field to ensure that wheat has not begun to emerge. Do not allow glyphosate to drift off target. Do not apply glyphosate through any irrigation system.

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

**Chemical family** Organophosphorus

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**paraquat (Gramoxone Inteon)**

**Rate** 0.25 to 1 lb ai/a (2 to 4 pints/a Gramoxone Inteon 2SL)

**Time** Apply before, during, or after planting wheat but before wheat emerges and when weeds are actively growing and 1 to 6 inches tall.

**Remarks** It is essential to obtain complete coverage of target weeds to get good control. Results are best if a delay between tillage and planting allows weeds to emerge. Controls only annual weeds. Weeds 1 to 6 inches in height are the easiest to control. Always use a nonionic surfactant (NIS) at a minimum of 0.125% v/v (1 pint/100 gal spray solution); crop oil concentrate (COC) or methylated seed oil (MSO) containing 15 to 20% approved emulsifier at 1% v/v (1 gal/100 gal spray solution) with the application. Restricted entry interval (REI) is 24 hours.

**Caution** A restricted-use herbicide. Do not mix or store in containers, spray tanks, nurse tanks or such systems made of aluminum or having aluminum fittings. May be fatal if swallowed or inhaled. See label for correct protective equipment. Applicators, mixers and loaders must wear long-sleeve shirt and long pants, shoes plus socks, protective eyewear (applicator), face shield (mixers and loaders), Category A chemical resistant gloves, chemical resistant apron (mixers and loaders), and a dust mist NIOSH-approved respirator with an N, R, P, or HE filter. Dry, dusty conditions will decrease herbicide's activity. Do not apply if wheat has already emerged.

**Site of action** Group 22: photosystem I electron diversion

**Chemical family** Bipyridilium

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**Wild oats, Italian ryegrass and other grass weeds**

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**clodinafop (Discover NG)**

**Rate** 0.05 to 0.0625 lb ai/a (12.8 to 16 oz/a Discover NG 0.5EC)

**Time** Apply to wheat from two-leaf stage to pre-boot stage. Apply to wild oat in the one- to six-leaf stage. Apply to Italian ryegrass at the one- to five-leaf stage.

**Remarks** Wild oat will be controlled up to the emergence of the fourth tiller. A nonphytotoxic methylated seed oil (MSO) may be added at 0.25% v/v to enhance weed control under low-moisture or high-temperature stress or when spray volumes exceed 10 gal/a. Rainfast 30 minutes after application. Restricted entry interval (REI) is 12 hours.

**Caution** Avoid drift to crop oats and corn. Do not graze livestock or feed forage from treated area for a minimum of 30 days after application. Do not harvest grain for 60 days after application. Do not apply this product through any type of irrigation system. Do not apply during periods of stress to either the weeds or crop (e.g., frost, low fertility, drought, flooding, etc.). Make only one application per crop season. Do not apply to winter wheat in fall.

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

**Chemical family** Aryloxyphenoxy propionate

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**fenoxaprop-p-ethyl (Double Check, Parity, Tacoma)**

**Rate** 0.05 to 0.0825 lb ai/a (6.4 to 10.5 fl oz/a Puma 1EC)

**Time** Apply to wheat from 1 to 6 leaves on main stem plus 3. Apply to young, vigorously growing grass weeds when they are in the one-leaf (fully expanded) to advanced tillering stage. Windgrass will be controlled from emergence to 3 in tall.

**Remarks** Use 5.3 fl oz/a for green foxtail, 6.4 fl oz/a for yellow foxtail and wild proso millet, and 10.6 fl oz/a for barnyardgrass, blackgrass, windgrass, green foxtail and wild oat control. Low soil moisture, low humidity, and temperatures above 85°F several days prior, during or following application may reduce foxtail and wild oat control. Low soil moisture, low humidity, and high temperatures before herbicide application might slightly reduce wild oat control. Under cool, wet conditions, further crop safety can be obtained by tank mixing MCPA ester at recommended rates. In dense weed populations, a 15 to 20 gal/a spray volume is required for best control. Restricted entry interval (REI) is 12 hours.

**Caution** Always check the tank-mix partner label to determine if the addition of a surfactant is required. Do not tank mix with dicamba or 2,4-D; see label for herbicides approved for tank mixing. Do not apply if conditions might move spray from target area. Do not apply within 70 days of harvesting wheat. Do not apply through any irrigation system. Rain or sprinkler irrigation within 1 hour after application may reduce wild oat control. Do not mix with malathion insecticides as wild oat control will be reduced. Application beyond the 6 leaf stage may result in injury.

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

**Chemical family** Aryloxyphenoxy propionate

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**flucarbazone (Pre-Pare, Everest 3.0, or Sierra)**

**Rate** 0.009 lb ai/a (0.3 oz/a Pre-Pare) and/or 0.027 lb ai/a (2.0 fl oz/a Everest 1.75 OD) and/or 0.014 to 0.027 lb ai/a (0.5 to 1.0 oz/a Sierra)

**Time** Pre-Pare may be tank mixed with glyphosate to improve burndown control of many grass and broadleaf weed species,

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and to provide soil residual weed control prior to planting spring wheat. Apply Everest 3.0 or Sierra postemergence to actively growing wild oats and Italian ryegrass that have one leaf to two tillers, and when spring wheat is between one-leaf and the beginning of jointing for Sierra and between one-leaf and 60 days prior to harvest for Everest 3.0. An application of Pre-Pare may be followed by an in-crop application of Everest 3.0 or Sierra applied at the lower use rates.

**Remarks** Use flucarbazone with a nonionic surfactant (NIS) (0.25%) (1 qt/100 gal spray solution) in a spray volume of 5 to 10 gal/a. Including a liquid nitrogen or ammonium sulfate fertilizer is also recommended on the labels. See Pre-Pare, Everest 3.0, and Sierra labels for further directions related to using these products in conjunction with one another. Do not apply if rain is expected within 1 hour after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply Everest 3.0 or Sierra more than once per season; follow tank mixing instructions carefully. Do not allow chemical to drift to other crops. Weed control may be reduced, and spring wheat injury increased, when applied during temperature extremes or when soil is saturated. Do not exceed a total of 0.027 lb ai/a of flucarbazone using the combined products per growing season. Do not harvest grain for 60 days after application. Do not apply Pre-Pare to "Choteau" spring wheat. For Idaho, Everest 3.0 use is only permitted in Benewah, Bonner, Boundary, Clearwater, Idaho, Kootenai, Latah, Lewis, Nez Perce, and Shoshone counties. Consult all labels for crop rotation restrictions. Do not apply this product through any type of irrigation system. Check label for certain counties in Idaho, Oregon, Washington, and Wyoming that have specific protocol for endangered species protection.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

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### pinoxaden (Axial XL)

**Rate** 0.053 lb ai/a (16.4 fl oz/a Axial XL 0.42EC)

**Time** Apply to spring wheat from the 2-leaf to pre-boot stage. Apply to wild oat from one- to six-leaf stage on the main stem but before the fourth tiller emerges. Apply to green foxtail Italian ryegrass, barnyardgrass, wild-proso millet and windgrass from one- to five-leaf stage on the main stem but before third tiller emerges.

**Remarks** Use 5 to 10 gal/a water in ground applications. Application volumes greater than 10 gal/a may reduce grass control. Use at least 5 gal/a water in aerial applications. Surfactant is not required with Axial XL formulation. Axial XL is rainfast 30 minutes after application. Restricted entry interval (REI) is 48 hours.

**Caution** Do not apply through any type of irrigation system. Do not apply to a crop stressed by conditions such as frost, low fertility, drought, flooding, or disease or insect damage, because crop may be injured. Do not harvest grain or feed treated spring wheat straw for 60 days after application. Do not make more than one application per growing season. Do not treat wheat underseeded with legumes.

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

**Chemical family** Phenylpyrazolin

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### pinoxaden + fluroxypyr (Axial Star)

**Rate** 0.147 lb ae/a (16.4 fl oz/a Axial Star 1.15EC)

**Time** Apply from the 2-leaf to pre-boot stage.

**Remarks** Apply to actively growing weeds from 1 to 6 leaf on main stem depending on the weed. Axial Star may be tank mixed with several different broadleaf herbicides. Refer to the Axial Star label for the recommended list of broadleaf herbicides. Axial Star is rainfast 1 hour after application. Restricted entry interval (REI) is 48 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not apply to a crop that is stressed by conditions such as frost, low fertility, drought, flooding, disease damage, or insect damage or crop injury may result. Do not harvest grain or feed treated spring wheat straw for 60 days following application. Do not make more than one application per growing season. Do not graze livestock or harvest forage for hay from treated barley for 30 days after application.

**Site of action** (pinoxaden) Group 1: acetyl CoA carboxylase (ACCCase) inhibitor; (fluroxypyr) Group 4: Synthetic auxin

**Chemical family** (pinoxaden) Phenylpyrazolin; (fluroxypyr) Pyridine

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### propoxycarbazone-sodium (Olympus)

**Rate** 0.026 to 0.039 lb ai/a (0.6 to 0.9 oz/a Olympus 70 WDG) in a single application.

**Time** Apply to wheat from 2-leaf to before jointing begins. Apply to actively growing broadleaf weeds and grass weeds in the 2-leaf to 2-tiller growth stage.

**Remarks** Injury may occur when applied to wheat planted in soils with a pH greater than 8.0 or less than 5.0. Include a nonionic surfactant (NIS) at 0.25% to 0.5% v/v (1 to 2 qt/100 gal spray solution). The most consistent control is obtained with ground application. For wild oat control apply after emergence, but before wild oat reaches the 2-tiller growth stage. Rainfast within 4 hours. Restricted entry interval (REI) is 12 hours.

**Caution** Do not use with organosilicone-based surfactants. Do not harvest wheat within 71 days of application. Do not allow Olympus to drift off target. Do not exceed 0.9 oz/a Olympus per crop year.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

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### pyroxulam (TeamMate)

**Rate** 0.0133 lbs ai/a pyroxulam (1.0 oz/a TeamMate)

**Time** Apply to actively growing wheat from the three-leaf to jointing stage. Treat after most weeds are at the 2 leaf/2-tiller growth stage.

**Remarks** Apply with a nonionic surfactant (NIS) at 0.25% to 0.50% v/v (1 to 2 quarts/100 gal spray solution) and ammonium sulfate (AMS) at 1.5 lb/a. Symptoms of control may not be noticeable for 1 to 2 weeks after application. Warm, moist growing conditions promote active weed growth and enhance activity of TeamMate. Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed, and may re-grow. Liquid fertilizer application 7 days before or after application may result in transient leaf burn or stunting. Rainfast 4 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than 1.0 oz/a per growing season. Do not apply this product through any type of irrigation system. Do not apply within 60 days of harvest.

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

**Chemical family** Triazolopyrimidine sulfonamide

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### sulfosulfuron (Maverick or Outrider)

**Rate** 0.031 lb ai/a (0.67 oz/a Maverick 75WDG) + 0.5% non-ionic surfactant (NIS)

**Time** Apply to spring wheat in a single postemergence application when wild oat is in the one- to four-leaf stage and actively growing. May be applied after wheat emerges but before jointing.

**Remarks** Use a NIS at a concentration of 0.5 % v/v (2 qt/100 gal spray solution). See label for tank-mix partners. Rainfast within 2 hours. Restricted entry interval (REI) is 12 hours.

**Caution** No crop other than wheat may be planted sooner than 3 months after application. Do not use NIS or any other additives that alter the pH of the spray solution below pH 5. Do not apply this product through any irrigation system. Do not harvest wheat for hay within 30 days of application. Do not harvest wheat for grain within 55 days of application.

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

**Chemical family** Sulfonylurea

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### triallate (Far-Go or Avadex MA)

**Rate** 1.0 b ai/a (1.0 quart/a Far-Go 4EC or 10 lb/a Avadex MA 10G)

**Time** Apply before or after seeding, but before weeds germinate.

**Remarks** For proper incorporation, set incorporation implement to work the soil no deeper than 3 to 4 inches. Incorporation should be performed immediately after application. See Avadex Microactiv label for more specific incorporation instructions. Do not use disk implements for incorporation. If applied post-planting, cultivate with a flex multiweeder or harrow, and follow with a second incorporation at right angles, adjusting incorporation depth so seeds are not disturbed. Do not graze treated areas. Do not apply on wheat underseeded to legumes. Some stand thinning may occur on clay knobs or where wheat is dusted in, due to dry weather. Application to a field that is wet, lumpy, rough, or ridged will result in reduced wild oat control and crop thinning. Restricted entry interval (REI) is 12 hours.

**Caution** Application to a field that is wet, lumpy, rough, or ridged will result in reduced wild oat control and promote crop thinning. Only one application per growing season and must not exceed 1.5 quarts/a of Far-Go or 15 lbs/a of Avadex.

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

**Chemical family** Thiocarbamate

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## Annual Broadleaf and Grass Weeds

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### florasulam + fluroxypyr + pyroxsulam (GoldSky)

**Rate** 0.0022 lb ai/a florasulam + 0.0891 lb ai/a fluroxypyr + 0.0133 lb ai/a pyroxsulam (1 pint/a GoldSky 1.53EC)

**Time** Apply to actively growing wheat from the 3-leaf to jointing stage. Treat after most weeds have emerged. The best control is before the 2 leaf/2-tiller stage or before the broadleaf leaves are larger than 2 inches tall or 2 inches in diameter.

**Remarks** Apply with a nonionic surfactant (NIS) at 0.25% to 0.50% v/v (1 to 2 qt/100 gal spray solution) and ammonium sulfate (AMS) at 1.5 lb/a. Warm, moist growing conditions promote active weed growth and enhance activity of GoldSky. Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed, and may re-grow. GoldSky is rainfast within 4 hours after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than 1 pint/a per growing season. Do not use an adjuvant when applying GoldSky in combination with emulsifiable concentrate (EC) formulations, such as 2,4-D ester or MCPA ester products. Do not apply this product through any irrigation system. Do not use on wheat varieties that are sensitive to ALS herbicides. Do not apply within 60 days of harvest.

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

**Chemical family** (florasulam) Sulfonamide; (fluroxypyr) Pyridine; (pyroxsulam) Triazolopyrimidine

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### imazamox (Beyond)

*Clearfield wheat only*

**Rate** 0.031 to 0.039 lb ai/a (4 to 5 fl oz/a Beyond 1SL)

**Time** Apply postemergence to Clearfield wheat after tiller initiation but before jointing. May be applied in fall-winter or in spring, for winter or spring annual weed control. Apply when weeds are actively growing and before broadleaf weeds exceed 3 inches tall and grasses exceed four to five leaves.

**Remarks** Add crop oil concentrate (COC), methylated seed oil (MSO), or high surfactant oil concentrate (HSOC) at 1 to 2% v/v (1 to 2 gal/100 gal spray solution) or a nonionic surfactant (NIS) at 0.25% v/v (1 quart/100 gal spray solution) and a liquid nitrogen fertilizer or ammonium sulfate (AMS) solution at 2.5% v/v (2.5 gal/100 gal spray solution). Apply Beyond herbicide a minimum of 1 hour before rainfall or overhead irrigation. Restricted entry interval (REI) is 4 hours.

**Caution** Use only on Clearfield and Clearfield Plus wheat varieties. Occasionally, reduction in plant height or temporary yellowing of crop plants may occur following Beyond herbicide applications. These effects can be more pronounced in spray overlap areas and/or if crops are growing under stressful environmental conditions (such as, but not limited to drought, excessive moisture, improper fertility, improper varietal adaptation, poor planting conditions, etc.). To avoid possible crop injury do not apply Beyond when extreme cold temperature (<40°F maximum daytime temperature) are expected within 1 week of application. Do not tank mix with ALS-inhibiting herbicides due to potential unwanted crop response or weed control antagonism. Apply Beyond no more than 2 out of 4 years. Do not plant Clearfield wheat continually. There are no restrictions for feeding or grazing wheat forage and hay after applying Beyond. Some crops cannot be planted within 26 months of applying; see label for crop rotation restrictions. Do not apply this product through any irrigation system.

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

**Chemical family** Imidazolinone

## Annual Broadleaf Weeds

### 2,4-D (several trade names)

**Rate** 0.25 to 0.95 lb ae/a

**Time** Apply when the wheat is fully tillered but before jointing.

**Remarks** Individual 2,4-D labels vary slightly on use rates and application timing. Using the highest rate increases potential for crop injury. Do not graze or feed forage within 14 days after treatment with 2,4-D. Be aware that 2,4-D may be formulated with 3.74, 3.8, 5, 5.5, 5.6, and 6 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Amine formulations require 6 hours before they are rainfast and LVE formulations require 1 hour. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not forage or graze treated grain fields within 2 weeks after treatment. Do not feed treated straw to livestock. Do not permit 2,4-D to drift off target. Check label for maximum amount allowed per crop cycle. Do not exceed 1.425 lb ae/a per crop cycle. Do not apply through any type of irrigation system.

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

**Chemical family** Phenoxy acetic acid

### 2,4-D amine or MCPA amine + dicamba (Banvel, Clarity, or others)

**Rate** 0.38 lb ae/a 2,4-D or 0.25 lb ae/a MCPA + 0.06 to 0.12 lb ae/a dicamba

**Time** Apply as soon as wheat is 4 to 8 inches tall (3 to 5 inches tall for MCPA) but before wheat exceeds the six-leaf stage. Weeds should be in the 2- to 3-leaf stage and rosettes less than 2 inches across.

**Remarks** Do not graze, feed forage, or harvest grain within 14 days after treatment with 2,4-D. Restricted entry interval (REI) is 12 hours for the 2,4-D low volatile ester (LVE) formulation, 24 hours for dicamba, and 48 hours for the 2,4-D amine formulation.

**Caution** Do not let this combination drift off target. Do not make more than one application per crop cycle. Do not apply through any type of irrigation system.

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

**Chemical family** (2,4-D and MCPA) Phenoxy acetic acid; (dicamba) Benzoic acid

### bicyclopyrone + bromoxynil (Talinor)

**Rate** 0.033 to 0.044 lb ai/a bicyclopyrone + 0.156 to 0.207 lb ae/a bromoxynil acid equivalent (13.7 to 18.2 fl oz/a Talinor)

**Time** Apply to spring wheat (including durum) from 2-leaf to pre-boot stage

**Remarks** Co-packed with CoAct+ additive which must be added at the rate specified on the label. Compatible with many commonly used tank-mix partners. Add a crop oil concentrate (COC) at 1% v/v of the finished spray volume. Although COC is the preferred adjuvant, nonionic surfactant (NIS) may be substituted at 0.25% v/v (1 quart/100 gal spray solution). When tank mixed with herbicides that have a built-in adjuvant, no additional adjuvant is needed. Rain occurring within 1 hour after application may reduce the efficacy of Talinor. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze livestock or harvest forage for hay from treated wheat or barley for a minimum of 30 days following

application. Do not harvest grain for a minimum of 60 days following application. Do not feed treated wheat or barley straw to livestock for a minimum of 60 days following application. Do not exceed more than 18.2oz/a per year. Follow label instructions on crop rotations. Do not apply this product through any type of irrigation system. Do not treat wheat underseeded with legumes.

**Site of action** (bicyclopyrone) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (bicyclopyrone) Triketone; (bromoxynil) Nitrile

### bromoxynil (several trade names)

**Rate** 0.25 to 0.5 lb ai/a (0.5 lb ai/a may be used with chemigation)

**Time** Apply after wheat emergence and prior to the boot stage. Apply to the weeds up to the four-leaf stage, or 2 inches tall, or 1 inch diameter, whichever is first.

**Remarks** Be aware that bromoxynil is formulated as 2 lb and 4 lb ai/gal; be sure to use the correct amount of herbicide. This herbicide is very compatible with many other broadleaf herbicides. Control has been more consistent with tank-mixtures. Do not apply when crops are under moisture stress or when crop canopy covers the weeds as poor weed control will result. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze for 45 days after application.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

### bromoxynil + fluroxypyr + MCPA (Carnivore)

**Rate** 0.21 to 0.312 lb ai/a bromoxynil, 0.084 to 0.125 lb ae/a fluroxypyr, 0.21 to 0.312 lb ae/a MCPA (1 to 1.5 pt/a Carnivore 4EC)

**Time** Apply when wheat is in the 2-leaf stage up to and including flag leaf emergence. To suppress volunteer potatoes, apply before potato plants are 4 inches tall.

**Remarks** Apply 1 pt/a if seedlings of susceptible species are less than 4 inches tall. For seedlings 4 to 8 inches tall and volunteer potatoes, apply 1.5 pt/a. Do not apply when crop canopy covers the weeds as poor control will result. Do not apply when crop canopy covers the weeds, or control will be poor. Rainfast within 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not allow mixture to drift off target. Do not apply within 40 days prior to harvesting grain, or within 14 days prior to cutting hay. Do not apply this product through any type of irrigation system. Do not apply more than 2.4 pints/a per crop season.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (fluroxypyr and MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (fluroxypyr and MCPA) Phenoxy acetic acid

### bromoxynil + MCPA (several trade names)

**Rate** 0.5 to 1 lb ai/a

**Time** Apply to fall and spring oats from the 3-leaf to boot stage. Application timing to weeds depends on weed species, but generally up to the 4-leaf stage or 3 inches tall, whichever comes first. If weed forms rosette, apply before weeds exceed 1.5 inches

in diameter. Most effective when applied to weeds up to 2 inches tall or across.

**Remarks** Use higher rate for larger or more resistant weeds. Be aware that bromoxynil + MCPA is formulated as 4 lb and 5 lb ae/gal; be sure to use the correct amount of herbicide depending on the formulation. Do not apply when crop is under moisture stress or when crop canopy covers the weeds, as poor weed control will result. Runoff of this product will be reduced by avoiding applications when rainfall is forecasted to occur within 48 hours. Restricted entry interval (REI) is 24 hours.

**Caution** Do not graze for 45 days.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (MCPA) Phenoxy acetic acid

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### **bromoxynil + pyrasulfotole (Huskie)**

**Rate** 0.15 to 0.21 lb bromoxynil lb ai/a + 0.027 to 0.037 lb pyrasulfotole (11 to 15 oz/a Huskie 2.06EC)

**Time** Apply to active growing wheat after the one-leaf growth stage up to flag leaf emergence. For best results, apply to young actively growing weeds.

**Remarks** Compatible with many commonly used tank-mix partners. Spray additives such as ammonium sulfate (AMS), urea ammonium nitrate (UAN), or nonionic surfactant (NIS) may be used especially under challenging conditions to optimize herbicidal activity. Fertilizer additives should be applied at 0.5 to 1 lb/a. Do not use additives that alter the spray solution below 6.0 pH. Apply alone or in a tank-mix with other herbicides to actively growing weeds. Rain within 1 hour after application may reduce control. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than once per season. Check label for crop rotation guidelines. Preharvest interval is 25 days for forage and 60 days for straw or grain. Do not tank mix with tebuconazole fungicide. Do not apply this product with backpack or handheld application equipment. Do not apply this product through any type of irrigation system. Do not apply more than 15 fl oz/a per season. Do not graze or harvest forage within 25 days, grain, and straw within 60 days after application.

**Site of action** (pyrasulfotole) Group 27: 4-hydroxyphenylpyruvatedioxygenase (HPPD) inhibitor; (bromoxynil) Group 6: photosystem II inhibitor

**Chemical family** (pyrasulfotole) Pyrazole; (bromoxynil) Nitrile

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

**Rate** 0.008 to 0.031 lb ai/a (0.5 to 2.0 fl oz/a Aim 2EC)

**Time** Apply prior to planting up to the jointing stage of wheat growth. For best performance, apply to actively growing weeds up to 4 inches high and rosettes less than 3 inches across. May also be used as a preharvest aid to desiccate/defoliate labeled crops.

**Remarks** Apply alone or as a tank-mix with other herbicides to emerged and actively growing weeds. Use higher rates on more mature weeds or dense vegetative growth. Use a nonionic surfactant (NIS) at 0.25% v/v (2 pints/100 gal spray solution) with at least 80% active ingredient. When wheat grows in very dry soil, a high-quality sprayable liquid nitrogen fertilizer (2 to 4% v/v or 2 to 4 gal/100 gal spray solution) may be used in addition to the NIS. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 2 fl oz/a per year. Crop injury may increase with tank-mixtures of carfentrazone with emulsifiable (EC) formulations of other herbicides, fungicides, or insecticides or with crop oil concentrate (COC), methylated seed oil (MSO), or silicone-based adjuvants. Do not harvest for forage within 7 days after application. Do not apply this product through any irrigation system.

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

**Chemical family** Triazolinone

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### **chlorsulfuron (Glean) + another broadleaf herbicide with a different mode of action**

**Rate** 0.130 to 0.261 oz ai/a (0.17 to 0.33 oz/a Glean 75 DF). Do not exceed 0.33 oz/a Glean in an 18-month period.

**Time** Apply in spring any time after most weeds emerge and after crop is in the 2-leaf through second-joint, but before boot stage.

**Remarks** Chlorsulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle but does not control night-shades. For best results with postemergence applications, add a nonionic surfactant (NIS) of at least 80% active ingredient at 0.25 to 0.5% v/v (1 to 2 qt/100 gal spray solution), unless otherwise specified, and apply to actively growing weeds. Specific weed problems have various tank-mix possibilities; see label for recommendations. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9. Chlorsulfuron can persist in soil. Carefully follow label instructions about crop rotations. Many crops may not be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold weather. Do not harvest grain sooner than 45 days after application. Do not apply this product through any irrigation system. Do not apply during fallow. Only make one application per season.

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

**Chemical family** Sulfonylurea

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### **chlorsulfuron + metsulfuron (Finesse) + another broadleaf herbicide with a different mode of action**

**Rate** 0.0078 to 0.0117 lb ai/a chlorsulfuron + 0.0016 to 0.0023 lb ai/a metsulfuron (0.2 to 0.3 oz/a Finesse 75DF)

**Time** Apply after crop is in 2-leaf through second-joint, but before boot stage.

**Remarks** Finesse controls a wide range of broadleaf weeds and inhibits Canada thistle growth. For best results, weeds should be actively growing, and a nonionic surfactant (NIS) of at least 80% active ingredient should be added at 0.125 to 0.5% v/v (0.5 to 2 quarts/100 gal spray solution). Do not use low rate or liquid nitrogen fertilizer as a substitute for NIS. For specific weed problems, various tank-mixes are possible; see the manufacturer's label for recommendations. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9 because Finesse can persist in soil. Carefully follow label instructions on crop rotations; many crops may not be planted for 2 years or longer after application. Refer to label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as cold or freezing weather. Do not make more than one application with

this product or any other chlorsulfuron-containing product per growing season.

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

**Chemical family** (both) Sulfonylurea

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### clopyralid (Stinger)

**Rate** 0.09 to 0.125 lb ae/a (0.25 to 0.33 pt/a Stinger 3SC)

**Time** Apply to actively growing weeds when crop is in 3-leaf to early boot growth stage. Only weeds emerged at application will be affected.

**Remarks** Effective on weeds in the sunflower and legume family such as clover, common cocklebur, common groundsel, may-weed chamomile, salsify, pineappleweed, sunflower, volunteer beans and lentils. Addition of an adjuvant is not usually necessary, however. If a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient and do not exceed 0.5% v/v (2 quarts/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at or following application may reduce weed control and increase risk of crop injury at all growth stages. Applications are rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the spring wheat crop is underseeded with a legume. Do not harvest for hay. Do not plant alfalfa, asparagus, mint or onions within 10.5 months after application. Do not plant dry beans, lentils, peas, potatoes (including potatoes grown for seed), and broadleaf crops grown for seed, excluding Brassica species for 18 months after application. Consult label for additional crop rotation restrictions related to annual precipitation. Do not exceed a total of 0.33 pint/a per year. Do not allow lactating dairy or meat animals to graze for 1 week after application. Do not harvest hay from treated grain fields. Do not apply by air during an air temperature inversion. Do not apply through any type of irrigation system.

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

**Chemical family** Pyridine

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### clopyralid + 2,4-D amine (Curtail or Commando)

**Rate** 0.6 to 0.8 lb ae/a (2 to 2.66 pt/a Curtail or Commando 2.38SC)

**Time** Apply in spring to young, actively growing wheat once 4 leaves have unfolded on the main stem and tillering has begun up to jointing stage (first node on stem detectable). Apply to weeds before exceeding 3 inches in height or diameter.

**Remarks** This combination is particularly effective on members of the sunflower family, including mayweed chamomile, sunflower and Canada thistle. Controlling tough winter annual weeds such as corn gromwell and fiddleneck requires tank mixing with other herbicides. Check Curtail or Commando labels for details on mixtures. Bucril or Banvel tank mixes may be useful broadening the annual weed control spectrum but may reduce control of perennials such as Canada thistle. Addition of an adjuvant is not usually necessary; however, if a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient and do not exceed 0.5% v/v (4 pt/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase risk of crop injury at all growth stages. Applications are rainfast within 6 hours after application.

Restricted entry interval (REI) is 48 hours. Do not apply this product through any type of irrigation system.

**Caution** Do not apply if the spring wheat is underseeded with a legume. Curtail and Commando can persist in soil. Do not plant wheat, barley, oats, field corn, or grasses within 30 days of applying. Do not harvest hay from treated grain fields. Do not rotate to canola, flax or sugar beets within 5 months after application. Do not rotate to asparagus, Brassica species grown for seed, cole crops, mint, onions, popcorn or sweet corn for 12 months after application. Do not rotate to alfalfa, lentils, dry beans, lentils peas, potatoes (including potatoes grown for seed), broadleaf seed crops (excluding Brassica species), or safflower for at least 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions with other crops. Do not exceed a cumulative amount of 0.25 lb ai of clopyralid /a per single crop year.

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

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

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### clopyralid + MCPA ester (Curtail M or Commando M)

**Rate** 0.083 to 0.111 lb ae/clopyralid +0.438 to 0.58 lb ae/a 2,4-D amine (1.75 to 2.33 pint/a Curtail M or Commando M 2.38 SC)

**Time** Apply in spring to actively growing weeds after grain has three unfolded leaves on the main stem, up to jointing stage (first node on stem detectable). Do not apply after the boot stage.

**Remarks** Apply before weeds exceed 3 inches in height or diameter. For Canada thistle, apply after most basal leaves emerge but before bud stage. Addition of an adjuvant is not usually necessary; however, if a surfactant is desired, use a nonionic surfactant (NIS) with at least 80% active ingredient and do not exceed 0.5% v/v (4 pt/100 gal spray solution). Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase risk of crop injury at all growth stages. Applications are rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the spring wheat is underseeded with a legume. Do not tank mix with 2,4-D or dicamba unless risk of crop injury is acceptable. Curtail M and Commando M can persist in soil. Do not plant wheat, barley, oats, field corn, or grasses within 30 days of applying. Do not rotate to canola, flax or sugar beets within 5 months after application. Do not rotate to asparagus, Brassica species grown for seed, cole crops, mint, onions, popcorn or sweet corn for 12 months after application. Do not rotate to alfalfa, lentils, dry beans, lentils peas, potatoes (including potatoes grown for seed), broadleaf seed crops (excluding Brassica species), or safflower for at least 18 months after treatment, depending on annual precipitation. Carefully follow label rotation restrictions with other crops. Do not apply this product through any type of irrigation system.

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

**Chemical family** (clopyralid) Pyridine; (MCPA) Phenoxy acetic acid

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### clopyralid + fluroxypyr (WideMatch or Colt AS)

**Rate** 0.094 to 0.125 ae/a clopyralid + 0.094 to 0.125 ae/a fluroxypyr (1 to 1.33 pint/a WideMatch or Colt AS 1.5SC)

**Time** Apply to actively growing spring wheat from the 3-leaf crop growth stage up to and including flag leaf emergence. Apply when weeds are actively growing, but before weeds are 4 inches

tall or vining. For volunteer potato suppression, apply before potato plants are 6 inches tall.

**Remarks** This combination will control a number of weed species. It is particularly effective on Canada thistle, mayweed chamomile, catchweed bedstraw, wild buckwheat, common groundsel, kochia, Russian thistle, nightshade species, and volunteer beans, lentils, peas, and potato. Frost 3 days before or after application may reduce weed control and crop tolerance. Do not apply more than 1.33 pint/a per growing season. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the spring wheat crop is underseeded with a legume. WideMatch and Colt AS residues in treated plant tissues that have not completely decayed may affect succeeding susceptible crops. Do not apply sooner than 40 days before harvest. Do not rotate to canola, cole crops (including Brassica species grown for seed), flax or sugar beets within 120 days after application. Do not rotate to alfalfa, asparagus, dry beans, mint, or onions for 12 months after application. Do not rotate to broadleaf crops grown for seed (excluding Brassica species), chickpeas, lentils, peas, or potatoes (including potatoes grown for seed) for at least 18 months after treatment. Carefully follow label rotation restrictions with other crops. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application.

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

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

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### dicamba (Banvel, Clarity, or others)

**Rate** 0.06 to 0.125 lb ae/a (2 to 4 fl oz/a Clarity 4SC or Banvel 4SC)

**Time** Apply when wheat is in two- to six-leaf stage of growth and after weeds have emerged (two- to three-leaf stage or less than 2 inches in diameter).

**Remarks** To avoid crop injury, apply to wheat at the proper growth stage. Controls some weeds not controlled by 2,4-D. Do not apply to wheat underseeded to legumes. Rainfast within 4 hours. Restricted entry interval (REI) is 24 hours.

**Caution** Do not let dicamba drift off target. Do not apply this product through any type of irrigation system. To avoid injuring desirable crops, do not apply dicamba in the vicinity of sensitive species or if air temperature is expected to exceed 85°F. Do not harvest within 7 days after application. Do not graze or harvest for dairy feed before crop matures. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application.

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

**Chemical family** Benzoic acid

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### florasulam + MCPA ester (Orion)

**Rate** 0.0044 lb florasulam + 0.31 lb MCPA ester/a (17 oz/a Orion 2.373EC)

**Time** Apply early postemergence to actively growing weeds and wheat from the 3-leaf crop growth stage up to the jointing stage. A later application, when crop is between jointing and boot stages, may control weeds emerging later; however, do not apply unless the risk of injury is acceptable. Do not apply after the boot stage.

**Remarks** Only weeds that have emerged at the time of application will be controlled. An adjuvant may be added to optimize herbicidal activity under suboptimal conditions. Orion is rainfast within 4 hours after application. If foliage is wet at the time of application, control may be reduced. Extreme growing conditions such as drought or near-freezing temperatures before, during, or after application may reduce weed control and increase crop injury. Do not graze on treated areas within 7 days after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not plant any type of corn for 3 months after application. Do not apply this product through any type of irrigation system. Do not plant alfalfa, canola, chickpea, soybean, dry bean, pea (dry and succulent), flax, lentil, potato, safflower, sugar beet, or sunflower for 9 months after application. Do not apply this product through any irrigation system. Do not apply more than 17 fl oz Orion/a per growing season. Do not apply within 60 days of wheat harvest.

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

**Chemical family** (florasulam) Triazolopyrimidine sulfonamide; (MCPA ester) Phenoxy acetic acid

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### florasulam + halauxifen (Quelex)

**Rate** 0.0047 lbs ai/a florasulam + 0.0047 lb ae/a halauxifen (0.55 to 0.75 oz/a Quelex)

**Time** Apply Quelex in the spring or fall early postemergence to the main flush of actively growing weeds in the 2 to 4 leaf stage or less than 4 inches tall. Quelex may be used as a preplant burn-down in the spring, summer, or fall when the majority of weed have emerged and are actively growing.

**Remarks** Do not tank mix any pesticide product containing glufosinate with Quelex. Use a non-ionic surfactant at 1.6 to 4 pints/100 gals of spray solution (0.2-0.5% v/v), or a COC or MSO at 4 to 8 pints/100 gal (0.5-1.0% v/v). Only weeds that have emerged at the time of application will be controlled. Rainfast within 4 hours. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than 0.75 oz Quelex/a per season. Do not apply to crops underseeded with legumes. Do not apply this product through any type of irrigation system. Preharvest interval is 60 days for grain, 21 days for forage, and 7 days for grazing.

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

**Chemical family** (florasulam) Triazolopyrimidine sulfonamide; (halauxifen) Arylpicolinate.

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### fluroxypyr (Starane Ultra, Comet)

**Rate** 0.11 to 0.25 lb ae/a fluroxypyr (0.3 to 0.7 pint/a Starane Ultra 2.8EC and 0.5 to 1.33 pints/a Comet 1.5EC)

**Time** Apply to actively growing wheat from two-leaf stage up to and including flag leaf emergence. Apply when weeds are actively growing but before they are vining or 8 inches tall.

**Remarks** Bedstraw and kochia (including sulfonylurea-resistant biotypes) are some weeds that fluroxypyr controls at the lower rate. Only weeds emerged at application will be affected. Use 0.25 lb ae/a for volunteer potato control. Moisture on foliage at application may decrease control. Applications are rainfast after 1 hour. Optimum temperature range for herbicidal activity is 55°F to 75°F. Frost up to 3 days before, or 3 days after, may reduce

weed control and crop tolerance. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than once per growing season. Do not use if wheat is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not plant any crop other than wheat, barley, or oats for 120 days after application. Do not graze livestock on treated areas, or harvest treated forage within 7 days of application. Do not apply within 14 days before cutting for hay, or 40 days before harvesting grain or straw.

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

**Chemical family** Pyridine

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### fluroxypyr + bromoxynil (Starane NXT)

**Rate** 0.06 to 0.125 lb ai/a fluroxypyr + 0.25 to 0.5 lb ai/a bromoxynil (14 to 27.4 fl oz/a Starane NXT 2.91EC).

**Time** Apply to wheat from three-leaf stage through flag leaf emergence. Apply to weeds up to 4 to 8 inches tall, depending on rate.

**Remarks** Compatible with all grass herbicides. Only weeds emerged at time of application will be controlled. Any crop may be planted 120 days after application. Applications are rainfast within 1 hour after application. Extreme growing conditions such as drought or near-freezing temperatures before, during, or after application may reduce weed control and increase crop injury. Do not use this product in combination with fungicides containing strobilurin chemistry. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply more than 27.4 fl oz of Starane NXT per season. Do not apply this product through any type of irrigation system. Do not apply within 45 days of grain, hay, or straw harvest. Do not allow livestock to graze treated areas within 45 days after application.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (fluroxypyr) Group 4: synthetic auxin

**Chemical family** (bromoxynil) Nitrile; (fluroxypyr) Pyridine

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### fluroxypyr + clopyralid + pyroxsulam (PerfectMatch)

**Rate** 0.097 lb ae/a fluroxypyr + 0.097 lb ae/a clopyralid + 0.013 lb ai/a pyroxsulam (1 pint/a PerfectMatch 1.61SE)

**Time** Apply to actively growing wheat from the 3-leaf to jointing stage. Treat after most weeds have emerged.

**Remarks** Apply with a nonionic surfactant (NIS) at 0.25% to 0.50% v/v (1 to 2 quarts/100 gal spray solution) and ammonium sulfate (AMS) at 1.5 lb/a. Warm, moist growing conditions promote active weed growth and enhance activity of PerfectMatch. Weeds hardened off by cold weather or drought may not be adequately controlled or suppressed, and may re-grow. PerfectMatch is rainfast within 4 hours after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not use on wheat varieties that are sensitive to ALS herbicides. Do not make a liquid fertilizer application 7 days before or after PerfectMatch application unless risk of crop response is acceptable. Do not apply if the spring wheat is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not apply more than 1 pint/a per growing season. Limit NIS rate to 0.25% when tank mixing with up to 6 fl oz of EC formulated products per acre. Do not use any surfactant when total EC products exceed 6 fl oz/acre. Do not apply within 60 days of harvest. Do not allow livestock to graze

treated crop within 7 days after application. Do not cut for hay within 28 days after application.

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

**Chemical family** (pyroxsulam) Triazolopyrimidine; (fluroxypyr and clopyralid) Pyridine

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### fluroxypyr + florasulam (Starane Flex)

**Rate** 0.878 lb ae/a fluroxypyr + 0.0044 lb ai/a florasulam (13.5 fl oz/a Starane Flex 0.875 EC)

**Time** Apply to actively growing wheat from the three-leaf growth stage up to flag leaf emergence. Apply when susceptible weeds are less than 4 inches tall and are actively growing.

**Remarks** Only weeds that have emerged at the time of application will be controlled. Weeds hardened off by cold weather or drought stress may not be adequately controlled or suppressed, and regrowth may occur. Generally, this product does not require the use of an adjuvant to achieve satisfactory weed control. An adjuvant may be added when applications are made under conditions of cool temperature, low relative humidity or drought, or when a tank-mix partner recommends the use of an adjuvant. Livestock may be grazed on treated crops 7 days following application. Applications are rainfast within 4 hours after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply to crops underseeded with legumes. Do not apply this product through any type of irrigation system. This product has potential to leach. Do not apply excessive irrigation. Do not apply within 60 days of harvest. Do not apply more than 13.5 fl oz/a of Starane Flex per growing season. Extreme growing conditions, such as drought or near freezing temperatures prior to, at, or following time of application, may reduce weed control and increase the risk of crop injury at all stages of growth. Do not use more than once per season or use in successive years at the same site.

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

**Chemical family** (fluroxypyr) Pyrimidine, (florasulam) Triazolopyrimidine

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### fluroxypyr + thifensulfuron-methyl (Sentrallas)

**Rate** 1.12 to 2.24 oz ae/a fluroxypyr + 0.22 to 0.44 oz ai/a thifensulfuron-methyl (7 to 14 fl oz/a Sentrallas 24.9% OD)

**Time** Apply to actively growing wheat after the crop is in the 2-leaf stage, but before the flag leaf is visible. Annual broadleaf weeds must be past the cotyledon stage and actively growing.

**Remarks** Tank mix compatibility with many commonly used broadleaf and grass herbicides, fungicides, insecticides, liquid fertilizers, and spray adjuvants (see current product label for specific restrictions, precautions, and details). For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. To reduce potential of crop injury, tank mix with 2, 4-D ester and apply after the crop is in the tillering stage of growth. Thorough coverage of target weeds is essential. Rain-fast 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not exceed 14 fl oz/a when making a single application or 17.8 fl oz/a for the entire season. Do not apply through any type of irrigation system, to crops underseeded to legumes or grasses as injury to forage may result, and tank mix with Malathion because crop injury may result. Do not graze or harvest treated forage within 7 days of application, and do not harvest hay within 30 days of application or grain within 45 days of application. Do not apply to wheat

that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result. Risk of injury is greatest when crop is in the 2 to 5 leaf stage.

**Site of action** Group 4: synthetic auxins (fluroxypyr) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (fluroxypyr) Pyridine carboxylic acid; (thifensulfuron-methyl) Sulfonylurea

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### **fluroxypyr + thifensulfuron-methyl + metsulfuron-methyl (Travallas)**

**Rate** 1.12 to 1.92 oz ae/a fluroxypyr + 0.22 to 0.38 oz ai/a thifensulfuron-methyl + 0.022 to 0.038 oz ai/a metsulfuron-methyl (7 to 12 fl oz/a [10 to 12 fl oz/a in the states of Idaho, Oregon, and Washington only] Travallas 25.2% OD)

**Time** Apply to actively growing wheat after the crop is in the 2-leaf stage, but before the flag leaf is visible. Annual broadleaf weeds must be past the cotyledon stage and actively growing.

**Remarks** Tank mix compatibility with many commonly used broadleaf and grass herbicides, fungicides, insecticides, liquid fertilizers, and spray adjuvants (see current product label for specific restrictions, precautions, and details). Use of spray adjuvants are recommended and ammonium nitrogen fertilizer may be used. For best results, apply to young, actively growing weeds that are less than 4 inches in height or diameter. Thorough coverage of target weeds is essential. Rain-fast 1 hour after application. Restricted entry interval (REI) is 24 hours.

**Caution** Do not exceed 12 fl oz/a per application (Idaho, Oregon, and Washington only). Do not make more than one application per season. Should not be used on soils having a pH above 7.9, because extended soil residual activity could extend crop rotation intervals beyond normal. Do not apply to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result. Risk of injury is greatest when crop is in the 2- to 5-leaf stage. See label for crop rotation intervals. Do not apply through any type of irrigation system, to crops underseeded to legumes or grasses as injury to forage may result, and tank mix with Malathion because crop injury may result. Do not graze or harvest treated forage within 7 days of application, and do not harvest hay within 30 days of application or grain within 45 days of application.

**Site of action** Group 4: synthetic auxins (fluroxypyr) Group 2: acetolactate synthase (ALS) inhibitor

**Chemical family** (fluroxypyr) Pyridine carboxylic acid; (thifensulfuron-methyl) & (metsulfuron-methyl) Sulfonylurea

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### **MCPA (MCPA Amine or MCPA Ester, several trade names)**

**Rate** 0.25 to 0.75 lb ae/a for MCPA amine and 0.23 to 0.46 lb ae/a for MCPA ester

**Time** The 0.25 lb ae rate can be applied after the grain has four leaves. Higher rates can be used after grain is fully tillered but before jointing.

**Remarks** Individual MCPA labels may vary slightly on use rates, application timing, and grazing interval. This is particularly true with the amine, sodium salt, and ester formulations. Check label to ensure proper rate and application timing. If underseeded with legumes, MCPA amine use rate is 0.125 to 0.25 lb ae/a. Grazing interval varies with specific product label. Restricted entry interval (REI) is 12 hours for the MCPA ester formulation and 48 hours for the MCPA amine formulation.

**Caution** Do not permit MCPA to drift off target. Do not apply more than 0.75 lb ae/a per year. Do not apply this product through any type of irrigation system. Do not graze meat animals on treated areas within 7 days of slaughter. Do not forage or graze dairy animals on treated areas within 7 days after treatment.

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

**Chemical family** Phenoxy acetic acid

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### **MCPA + fluroxypyr + clopyralid (Hat Trick or Weld)**

**Rate** 0.34 to 0.45 lb ae/a MCPA + 0.096 to 0.128 lb ae/a fluroxypyr + 0.094 to 0.125 lb ae/a clopyralid (1.5 to 2 pints/a Hat Trick 2.82EC) for Hat Trick herbicide or 0.22 to 0.44 lb ae/a MCPA + 0.08 to 0.16 lb ae/a fluroxypyr + 0.0625 to 0.125 lb ae/a clopyralid (1 to 2 pints/a Weld 2.89EC) for Weld herbicide.

**Time** Apply to actively growing wheat from the 3-leaf stage until wheat flag leaf emergence for Hat Trick herbicide and up to and including flag leaf emergence for Weld herbicide. Be sure to apply to actively growing weeds, but before weeds are 4 inches tall or vining. Consult the label for information about specific weeds.

**Remarks** This product is rainfast within 6 hours after application. If foliage is wet at the time of application, control may be decreased. Extreme growing conditions such as drought or near freezing temperatures prior to, at, or following application may reduce weed control and increase the risk of crop injury at all growth stages. The addition of an adjuvant may optimize herbicidal activity when applications are made at lower use rates/carrier volumes, under conditions of cool temperature, low humidity, or drought, or to small, heavily pubescent kochia. Best control is achieved when kochia is a least 1 inch tall and not taller than 4 inches. Only weeds that have emerged at time of application will be controlled. Rainfast within 6 hours after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply if the spring wheat is underseeded with a legume. Do not apply this product through any type of irrigation system. Do not allow livestock to graze treated areas or harvest treated forage within 7 days of application. Do not harvest grain and straw within 40 days of application. Refer to label for specific crop rotation restrictions. Do not apply more than 3.0 pts/a per year.

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

**Chemical family** (MCPA) Phenoxy acetic acid, (fluroxypyr and clopyralid) Pyridine

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### **metsulfuron (Ally XP) + another broadleaf herbicide with a different mode of action**

**Rate** 0.06 oz ai/a (0.1 oz/a Ally 60XP)

**Time** In nonirrigated wheat, apply postemergence after wheat has two leaves but before boot stage; see label for postemergence application timing when using tank-mixes. In irrigated wheat, apply after crop begins tillering, but before boot.

**Remarks** Metsulfuron controls a wide range of broadleaf weeds and inhibits Canada thistle growth. For best results add a nonionic surfactant (NIS) of at least 80% active ingredient at 0.0625 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution). For weeds that are difficult to control, apply while they are actively growing and not more than 2 inches tall or wide. To broaden the spectrum of control, tank mix with a suitable registered herbicide such as 2,4-D, bromoxynil, dicamba, fluroxypyr or MCPA. Time application to coincide with recommendation for specific

tank-mix partner. The first post-treatment irrigation should be delayed at 3 days after herbicide application, and should not exceed 1 inch of water. May be tank mixed with 2,4-D or glyphosate and applied as a harvest aid. Do not apply to wheat under-sown with legumes. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use with liquid fertilizer solutions with pH less than 3.0. Do not use on soils above pH 7.9. Metsulfuron can persist in soil. Carefully follow label instructions about crop rotations. Many crops cannot be planted within 2 years or longer after applying. One 0.1 oz/a application within one calendar year on nonirrigated wheat. Do not apply this product through any type of irrigation system. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather. Do not harvest sooner than 10 days after application.

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

**Chemical family** Sulfonylurea

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**metsulfuron + thifensulfuron + tribenuron (Ally Extra SG) + another broadleaf herbicide with a different site of action**

**Rate** 0.155 to 0.259 oz ai/a (0.3 to 0.5 oz/a Ally Extra 51.8SG)

**Time** Apply after the crop is in the 2-leaf stage, but before the flag leaf is visible. Apply to young, actively growing weeds in the spring summer or fall.

**Remarks** Ally Extra may be tank mixed with other suitable registered herbicides. Use the 0.5 oz/a rate for heavy weed infestations. For best results use 2, 4-D or MCPA at 1/8 to 3/8 lb ai/a. Include a nonionic surfactant (NIS) having at least 60% active ingredient at 0.0625 to 0.5% v/v (0.5 to 4 pint/100 gal of spray solution). Rainfall or snowfall within the first 6 hours after application may result in reduced weed control. Restricted entry interval (REI) is 12 hours.

**Caution** See label for Durum and Wampum variety in spring wheat information. Do not apply to wheat that is stressed by severe weather conditions, drought, low fertility, water saturated soil, disease, or insect damage, as crop injury may result. Risk of injury is greatest when crop is in the 2- to 5-leaf stage. Do not apply through any type of irrigation system. Do not use with liquid fertilizer solutions with pH less than 3.0. Do not use on soils above pH 7.9. Ally Extra can persist in soil. Carefully follow label instructions on crop rotations. Many crops cannot be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather. Do not harvest sooner than 45 days after application. Do not apply more than 0.5 oz/a per year. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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**propriflufenuron (Peak) + another broadleaf herbicide with a different mode of action**

**Rate** 0.22 to 0.289 oz ai/a (0.38 to 0.5 oz/a Peak 57WDG)

**Time** Apply postemergence from the 3-leaf to the second-joint stage of growth.

**Remarks** Results are best when weeds are young and actively growing. If tank mixing with another broadleaf herbicide, proflufenuron may be applied at 0.25 to 0.5 oz/a. Apply with nonionic surfactant (NIS) of at least 80% ai at 1 to 2 quarts/100 gal spray solution, or a crop oil concentrate (COC) of at least 12% emulsifier at 1 to 4 pints/a. Rainfall or overhead irrigation within 4 hours after application may reduce weed control. Do not apply if cold, wet conditions that stress wheat are expected within 1 week after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let spray drift to non-target crops. Do not apply this product through any type of irrigation system. See label for cautions on tank-mix or sequential applications with organophosphate insecticides and applications just before or during adverse conditions such as freezing weather. Do not harvest grain until 60 days after application. Do not apply more than 1.0 oz/a during cropping season. Carefully follow crop rotation instructions on label. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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**pyraflufen-ethyl (Vida)**

**Rate** 0.00065 to 0.0024 lb ai/a pyraflufen-ethyl (0.5 to 2.0 fl oz/a Vida 0.208EC)

**Time** May be applied preplant burndown or preemergence at 0.5 to 2 fl oz/a + other labeled herbicides, or postemergence from wheat emergence to flag leaf appearance. Apply when weeds are less than 4 inches tall or 3 inches in diameter.

**Remarks** Use 1.0 fl oz/a rate for preplant burndown only. Use higher rates (up to 0.75 fl oz/a) and volume for control of larger weeds (4 inches tall). Control may be reduced with weeds larger than 4 inches tall. Addition of a nonionic surfactant (NIS) at 0.5% v/v is recommended for optimum weed control. Vida is rainfast within 1 hour after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply postemergence more than 2 times per crop season, and no more than 1 fl oz/season. Allow a minimum of 30 days between applications. Do not apply this product through any type of irrigation system. Do not graze wheat within 7 days of application. Do not plant rotational crops other than potato, corn, soybeans, or wheat for 30 days following the last application.

**Site of action** Group 14, Protoporphyrinogen oxidase (PPO) inhibitor

**Chemical family** Phenylpyrazole

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**saflufenacil (Sharpen)**

**Rate** 0.022 to 0.045 lb ai/a (1.0 to 2.0 oz/a Sharpen 2.85SC)

**Time** Apply for burndown or residual control of weeds early preplant to preemergence. Sequential applications may be made as needed prior to wheat emergence. May also be used as a harvest aid/desiccant.

**Remarks** Residual preemergence applications of Sharpen must be activated by at least 0.5 inch of rainfall or sprinkler irrigation prior to weed seedling emergence. Do not apply more than a maximum cumulative amount of 4.0 oz/a Sharpen per cropping season. An adjuvant system is required for optimum broadleaf burndown activity. This includes methylated seed oil (MSO) at 1% v/v (1 gal/100 gal spray solution) plus ammonium sulfate (AMS) at 1 to 2% w/v (8.5 to 17 lb/100 gal spray solution) or urea

ammonium nitrate (UAN) at 1.25 to 2.5% v/v (1.25 to 2.5 gal/100 gal spray solution). Do not use nonionic surfactant (NIS) as a substitute for MSO. Performance will depend on amount of rainfall for activation, soil texture, and broadleaf species population. Rainfast with 1 hour of application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not apply following wheat emergence or crop injury will occur. Do not feed or graze for 30 days after application.

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

**Chemical family** Pyrimidinedione

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### thifensulfuron (Harmony SG) + another broadleaf herbicide with a different mode of action

**Rate** 0.225 to 0.045 oz ai/a (0.45 to 0.9 oz/a Harmony 50SG)

**Time** After crop is in 2-leaf stage but before flag leaf is visible.

**Remarks** Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. Can be tank mixed with grass herbicides. Include a nonionic surfactant (NIS) with at least 60% NIS at 0.0625 to 0.5% v/v (0.5 to 4 pt/100 gal spray solution). Crop oil concentrate (COC) or modified seed oil (MSO) may be used at 1% v/v (1 gal/100 gal spray solution or 2% v/v (2 gal/100 gal spray solution) under arid conditions. Sequential treatments may be made provided total amount applied to crop does not exceed 1.5 oz/a. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 4 hours.

**Caution** Do not let spray drift to adjacent crop or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spray equipment with an approved tank cleaner. Do not apply this product through any type of irrigation system. Do not plant any crop except wheat, barley, soybeans, field corn, or oats for 45 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** Sulfonylurea

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### thifensulfuron + tribenuron (2:1 formulations) + another broadleaf herbicide with a different mode of action

**Rate** 0.15 to 0.3 oz ai/a thifensulfuron + 0.075 to 0.15 oz ai/a tribenuron (0.45 to 0.9 oz/a Harmony Extra 50SG)

**Time** Apply after wheat reaches two-leaf stage but before flag leaf is visible.

**Remarks** This includes Harmony Extra SG, Harmony Extra XP, TNT Broadleaf and other generics. Be aware that, although they contain the same ratio of thifensulfuron to tribenuron, these products are formulated differently. Be sure to use the correct amount of herbicide. Include a nonionic surfactant (NIS) of at least 80% active ingredient at 0.25 to 0.5% v/v (1 to 2 quarts/100 gal spray solution). At least 60% ai at 0.06 to 0.50% v/v (½ pint to 4 pints/100 gal of spray solution). In addition to a spray adjuvant, an ammonium nitrogen fertilizer may be used. Apply when weeds are young and actively growing, and when conditions include temperatures of 60°F or higher and adequate soil moisture before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Weed

control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply to wheat crops underseeded with another crop. Do not let spray drift to adjacent crops or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spray equipment. Wheat and barley may be planted any time after application. Sugar beets, winter rape, and canola may be planted 60 days after application. Do not use with liquid fertilizer solutions with a pH less than 3.0. All other crops may be planted 45 days after application. Do not harvest grain within 45 days after application. Do not apply this product through any type of irrigation system.

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

**Chemical family** (both) Sulfonylurea

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### thifensulfuron + tribenuron (1:1 formulations, Affinity BroadSpec and Edition BroadSpec) + another broadleaf herbicide with a different mode of action

**Rate** 0.1 to 0.25 oz ai/a thifensulfuron + 0.1 to 0.25 oz ai/a tribenuron (0.4 to 1 oz/a Affinity BroadSpec and Edition BroadSpec 50SG)

**Time** Apply after wheat is in 2-leaf stage but before flag leaf is visible.

**Remarks** Affinity BroadSpec and Edition BroadSpec are 1:1 formulations of thifensulfuron and tribenuron. Must be tank-mixed when applying 0.4 to 0.6 oz/a. Add a nonionic surfactant (NIS) at 0.0625 to 0.5% v/v (0.25 to 2 quarts/100 gal spray solution). Use with another broadleaf herbicide with a different mode of action. Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 1.0 oz/a per crop season. Do not let this herbicide drift off target. Do not apply this product through any type of irrigation system. Do not use with liquid fertilizer solutions with a pH less than 3.0. Do not plant any crop except wheat or barley for 45 days after application. Sugar beets, winter rape, and canola cannot be planted until 60 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) sulfonylurea

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### thifensulfuron + tribenuron (4:1 formulations, Affinity TankMix and Edition TankMix) + another broadleaf herbicide with a different mode of action

**Rate** 0.24 to 0.4 oz ai/a thifensulfuron + 0.06 to 0.1 oz ai/a tribenuron (0.6 to 1 oz/a Affinity TankMix and Edition TankMix 50SG)

**Time** Apply after spring wheat is in 2-leaf stage, but before flag leaf is visible.

**Remarks** Affinity TankMix and Edition TankMix are 4:1 formulations of thifensulfuron and tribenuron. Add a nonionic surfactant (NIS) at 0.25 to 0.5% v/v (1 to 2 qt/100 gal spray solution). Use with another broadleaf herbicide with a different mode of action. Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate

before, during, and immediately after treatment. See most recent grass herbicide label for tank-mix restrictions. Sequential treatments may be made provided total amount applied to crop does not exceed 1.8 oz/a per year. Weed control may be reduced if rainfall or snowfall occurs soon after application. Restricted entry interval (REI) is 12 hours.

**Caution** Do not let this herbicide drift off target. Do not apply this product through any type of irrigation system. Do not use with liquid fertilizer solutions with a pH less than 3.0. Do not plant any crop except wheat or barley for 45 days after application. Sugar beets, winter rape, and canola cannot be planted until 60 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** (both) sulfonylurea

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### **thifensulfuron + tribenuron + metsulfuron (Ally Extra SG) + another broadleaf herbicide with a different mode of action**

**Rate** 0.082 to 0.137 oz ai/a thifensulfuron + 0.041 to 0.068 oz ai/a tribenuron + 0.033 to 0.054 oz ai/a metsulfuron (0.3 to 0.5 oz/a Ally Extra 51.8 SG)

**Time** Apply after the crop is in the 2-leaf stage, but before the flag leaf is visible. The only exception is for Wampum spring wheat. Make applications to this variety after the crop is tillering, but before boot state. Apply in combination with 2,4-D.

**Remarks** Ally Extra may be tank mixed with other suitable registered herbicides. Include a nonionic surfactant (NIS) having at least 80% active ingredient at 0.125 to 0.25% v/v (1 to 2 pints/100 gal spray solution). Rain or snowfall within the first 6 hours after application may result in reduced weed control. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply this product through any type of irrigation system. Do not use on soils above pH 7.9. Ally Extra can persist in soil. Carefully follow label instructions on crop rotations. Many crops cannot be planted within 2 years or longer after applying. See label for cautions on tank-mix or sequential applications with organophosphate insecticides, and applications just before or during adverse conditions such as cold or freezing weather.

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

**Chemical family** Sulfonylurea

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### **triasulfuron (Amber) + another broadleaf herbicide with a different mode of action**

**Rate** 0.21, 0.26, or 0.35 oz ai/a (0.28, 0.35, or 0.47 oz/a Amber 75DF)

**Time** Apply at any preboot-growth stage.

**Remarks** Control is best when weeds are actively growing and less than 2 inches tall or wide. Add a nonionic surfactant (NIS) of at least 80% active ingredient at 0.25 to 0.5% v/v (1 to 2 quarts/100 gal spray solution). Use 0.35 to 0.47 oz/a if the weeds are at or above the maximum height. Preplant or preemergence applications can be made to control or suppress certain weeds. Restricted entry interval (REI) is 4 hours.

**Caution** Triasulfuron can persist in soil. Follow label instructions when rotating to barley. At these rates, wheat can be reseeded immediately after application; all other crops require

a field bioassay. Do not plant Durum wheat less than 8 months after an application. Other spring and winter wheat varieties may be replanted at any time. Do not let spray drift to nontarget crops. Do not apply when wheat is stressed due to temperature extremes, excessive or too little moisture, disease, insects, or when extremes in temperature or rainfall are expected within one week of application. See label for use restrictions in sections of Washington and Oregon west of the Cascades. Do not apply with or sequentially to malathion. Do not apply more than 0.56 oz/a in one crop year. Do not apply this product through any type of irrigation system.

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

**Chemical family** Sulfonylurea

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

**Rate** 0.022 triasulfuron + 0.138 lb ai/a dicamba (4 oz/a Rave 63.8 WDG)

**Time** Apply after emergence up to the 6-leaf growth stage.

**Remarks** Include nonionic surfactant (NIS) at 0.125 to 0.25% v/v (1 to 2 pints/100 gal spray solution) when water is the carrier. Controls many broadleaf weeds and may be tank mixed with Aim, Ally, Buctril, Bronate, MCPA, and 2,4-D. Rain or sprinkler irrigation within 4 hours of application may reduce herbicide effectiveness. Restricted entry interval (REI) is 24 hr

**Caution** Washington growers must abide by all sulfonylurea aerial application rules. Do not allow spray to drift to nontarget crops or desirable plants. Do not apply this product through any type of irrigation system. Do not apply to crops underseeded with legumes. Preharvest interval is 37 days for hay or grain.

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

**Chemical family** (triasulfuron) sulfonylurea; (dicamba) benzoic acid

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### **tribenuron (Express SG) + another broadleaf herbicide with a different mode of action**

**Rate** 0.125 to 0.25 oz ai/a (0.25 to 0.5 oz/a Express 50SG)

**Time** After wheat is in 2-leaf stage but before flag leaf is visible.

**Remarks** Results are best when weeds are young and actively growing, temperature is 60°F or higher, and soil moisture is adequate before, during, and immediately after treatment. Controls only weeds that have emerged. Can be tank mixed with 2, 4-D, MCP, Bromoxynil and others. See label for full list. Include a surfactant at 0.06 to 0.5% v/v (0.5 to 4 pints/100 gal spray solution) with at least 60% nonionic surfactant (NIS). Crop oil concentrate (COC) or modified seed oil (MSO) may be used at 1% v/v (1 gal/100 gal spray solution) or under arid conditions use 2% v/v (2 gal/100 gal spray solution). See most recent grass herbicide label for tank-mix restrictions. Restricted entry interval (REI) is 12 hours.

**Caution** Do not allow spray to drift to adjacent crops or land. Do not apply during an air temperature inversion. Immediately after spraying, thoroughly clean mixing and spraying equipment. Do not apply through any type of irrigation system. Do not apply to wheat underseeded with another crop. Delay application of this product for at least 60 days after any in-furrow organophosphate insecticide applications. Wheat and barley may be planted any time after application. Oats may be replanted 1 day later in soils with pH <7.9. If pH is >7.9, wait 7 days. Plant sugar beets, winter rape, or canola no less than 60 days after application. All

other crops may be planted 45 days after application. Do not harvest grain within 45 days after application.

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

**Chemical family** Sulfonylurea

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## Preharvest Weed Control

### 2,4-D (several trade names)

**Rate** 0.5 lb ae/a

**Time** Apply when grain is in the hard dough stage.

**Remarks** Controls weeds that interfere with harvest or suppresses perennial weeds. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not apply to fields underseeded to legumes. Do not graze treated grain fields within 14 days after treatment. The preharvest interval is 14 days. Maximum of 1.75 lb ae (3.6 pints/a) per crop cycle. Limited to one preharvest application per crop cycle.

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

**Chemical family** Phenoxy acetic acid

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### carfentrazone (Aim EC)

**Rate** Apply up to 0.031 lb ai/a (apply up to 2 fl oz/a Aim 2EC)

**Time** Apply when crop is mature and grain has begun to dry down. Do not apply within 7 days of harvest.

**Remarks** Use MSO or COC at 1 to 2 % v/v (1 to 2 gal/100 gal of spray solution) for harvest aid. A high-quality sprayable liquid nitrogen fertilizer may be used at 2% to 4% v/v (2 to 4 gal/100 gal spray solution) or ammonium sulfate (AMS) at 2 to 4 lb/a in addition to the MSO or COC. Coverage is essential for satisfactory performance. Repeat application if necessary. Restricted entry interval (REI) is 12 hours.

**Caution** If applied as a tank-mixture, refer to the other product's label for restrictions on tank mixing, and follow all label precautions, instructions, and rotational cropping restrictions. Do not apply this product through any irrigation system.

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

**Chemical family** Triazolone

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### dicamba (Banvel, Clarity, or others)

**Rate** 0.25 lb ae/a (8 fl oz/a Clarity 4SC or Banvel 4SC)

**Time** Apply when wheat is in the hard dough stage and the green color is gone from the nodes (joints) of the stem. Best results will be obtained if application can be made when weeds are actively growing, but before weeds canopy.

**Remarks** A waiting interval of 7 days is required before harvest. Dicamba may be tank mixed with other herbicides such as metsulfuron, glyphosate and 2,4-D for additional broadleaf or grass weed control. Restricted entry interval (REI) is 24 hours.

**Caution** Do not apply this product through any irrigation system. Do not use preharvest-treated wheat for seed unless a germination test is performed on the seed with an acceptable result of 95% germination or better.

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

**Chemical family** Benzoic acid

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### glyphosate (several trade names)

**Rate** 0.75 lb ae/a

**Time** Apply after wheat reaches hard dough stage and grain moisture is less than 30%.

**Remarks** Be aware that glyphosate is formulated as 3 lb, 4 lb, 4.17 lb, 4.5 lb, and 5 lb ae/gal; be sure to use the correct amount of herbicide. Add 0.5 to 1% v/v (2 to 4 quarts/100 gal spray solution) nonionic surfactant (NIS) if needed. Apply in 3 to 10 gal/a by air or ground. Preharvest interval is 7 days. Restricted entry interval (REI) is 4 hours.

**Caution** Do not let glyphosate drift off target. Do not apply to wheat grown for seed.

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

**Chemical family** Glycine

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### metsulfuron (Ally XP) + 2,4-D or glyphosate

**Rate** 0.06 oz ai/a (0.1 oz/a Ally 60XP)

**Time** Make applications after the crop has reached the hard dough stage, but no later than 10 days before harvest.

**Remarks** Used in combination with 2,4-D at 0.25 to 0.5 lb ai/a plus nonionic surfactant (NIS) at 0.25 to 0.5% v/v (1 to 2 quarts/100 gal spray solution) or glyphosate at 0.375 to 0.75 lb ae/a will typically aid in dry down of many broadleaf weeds. Weeds must be actively growing for herbicide to be effective. Consult glyphosate label or local recommendations for the amount of adjuvant to include. Restricted entry interval (REI) is 4 hours.

**Caution** Do not use on soils above pH 7.9. Metsulfuron can persist in soil. Do not apply this product through any irrigation system. Carefully follow label instructions regarding crop rotations. Many crops cannot be planted within 2 years or longer after applying.

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

**Chemical family** Sulfonylurea

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### saflufenacil (Sharpen)

**Rate** 0.022 to 0.045 lb ai/a (1 to 2 fl oz/a Sharpen 2.85SC)

**Time** Apply only to wheat that has reached physiological maturity (hard-dough stage; grain contains less than 30% moisture) or according to Extension Service recommendations in the use area. Allow up to 7 days for optimum desiccation effect depending on environmental conditions.

**Remarks** A methylated seed oil (MSO) plus ammonium-based adjuvant system is required for optimum desiccation activity and weed control. See label for more information on adjuvants and tank-mixes. Pre-harvest interval is 3 days. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply more than a maximum cumulative amount of 2.0 fl oz/a of Sharpen per cropping season from desiccation uses. Do not apply Sharpen on wheat (all types) grown for seed production. Do not apply this product through any irrigation system.

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

**Chemical family** Pyrimidindione

# Chemical Fallow East of the Cascades

Judit Barroso

Revised March 2019

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

**Rate** 0.16 to 0.32 lb ae/a 2,4-D + 0.19 to 0.38 lb ae/a glyphosate. Use the higher rate in no-till, or when plants are beyond seedling stage.

**Time** Apply in 3 to 10 gal/a water by ground or 3 to 5 gal/a by air. Apply on land to be fallowed before seeding crops, or before crop emerges, but before weeds are taller than 6 inches. Spray bindweed when runners are at least 10 inches long.

**Remarks** Use the higher rate to improve control of coast fiddleneck, corn gromwell, purple mustard, and other winter annuals. Adding 2% dry ammonium sulfate (AMS) by weight (or liquid equivalent) may improve performance on annual weeds. Restricted entry interval (REI) is 12 hours for the low volatile ester (LVE) formulation and 48 hours for the amine formulation.

**Caution** Do not apply on frost-damaged or severely stressed weeds. Apply to green, vigorous seedlings and volunteer cereals.

**Site of action** (glyphosate) Group 9: inhibits EPSP synthase; (2,4-D) Group 4: synthetic auxin

**Chemical family** (glyphosate) none generally accepted; (2,4-D) phenoxy acetic acid

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## carfentrazone (Aim EC)

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

**Time** Apply to actively growing weeds up to 4 inches tall, and to rosettes less than 3 inches across.

**Remarks** Adjust rate for weed species and density of weed stand. Optimum broad-spectrum control of annual and perennial weeds and grasses requires a tank-mix with a burndown herbicide such as glyphosate, glufosinate, or paraquat. The use of a nonionic surfactant (NIS), crop oil concentrate (COC), or methylated seed oil (MSO) is required. Add 0.25% (v/v) nonionic surfactant or 1.5 to 2% (v/v) of a crop oil concentrate or methylated seed oil. After applying Aim EC, registered crops may be planted any time, subject to specific crop restrictions that may be found on the label. All other crops may be planted 12 months after application. Good spray coverage is essential. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 0.031 lb ai/a Aim EC per season.

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

**Chemical family** triazolone

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

**Rate** 0.095 to 0.126 lb ae/a clopyralid + 0.50 to 0.67 lb ae/a 2,4-D (2 to 2.66 pints/a Curtail)

**Time** Apply to actively growing, young weeds, either post-harvest or in the spring/fallow.

**Remarks** Extreme growing conditions (i.e., drought or near freezing temperatures) prior to, at, or following application may reduce weed control. Days to plant back varies from 30 days (wheat barley, field corn, oats, grasses) to 5 months (canola, rape-seed, flax sugar beets), and from 10.5 months to 18 months for

other crops. Plantback restrictions may be based on rainfall and soil types. Compatible with most non-pressurized liquid fertilizers, however, a compatibility test is recommended before mixing. Restricted entry interval (REI) for workers is 48 hours.

**Caution** Wear protective clothing when spraying and handling. Avoid contact, especially with eyes. Seven day pre-harvest for forage cut for hay. Plant only labeled crops within 29 days following application.

**Site of action** Group 4 synthetic auxin

**Chemical family** pyridine carboxylic acid

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## dicamba (Banvel, Clarity, and others) + glyphosate (several products)

**Rate** 0.25 to 0.5 lb ae/a dicamba + 0.19 to 0.375 lb ae/a glyphosate

**Time** For best performance, apply when weeds are in 2-leaf or 3-leaf stage and rosettes are less than 2 inches across.

**Remarks** Use lower rates on actively growing weeds less than 4 inches tall. Use higher rates when weeds are drought-stressed or 4 to 6 inches tall. Control of annual and perennial grasses requires a tank-mix with a burndown herbicide such as glyphosate, glufosinate, or paraquat. No rotational cropping restrictions apply at 120 days or more following application. Restricted entry interval (REI) is 24 hours.

**Caution** A 45-day waiting period is required between a Banvel or Clarity application and planting wheat. Do not graze for 8 weeks after application.

**Site of action** (dicamba) Group 4: synthetic auxin; (glyphosate) Group 9: inhibits EPSP synthase.

**Chemical family** (dicamba) benzoic acid; (glyphosate) none generally accepted

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## diflufenzopyr + dicamba (Distinct)

**Rate** 0.25 to 0.5 lb ae/a diflufenzopyr + 0.063 to 0.125 lb ae/a dicamba (2.0 to 4.0 oz/a Distinct)

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

**Remarks** Thorough spray coverage of weeds is necessary. Make applications with an adjuvant as directed on the Distinct label. Avoid disturbing (e.g. with tillage) for at least 7 days following application to allow best weed control. A reduced rate of Distinct (2 to 4 oz/a) can be combined with glyphosate or another herbicide effective on the target weed species. Control of annual and perennial grasses requires a tank-mix with a burndown herbicide such as glyphosate, glufosinate, or paraquat. Restricted entry interval (REI) is 12 hours.

**Caution** Do not plant any crops within 120 days after last application of Distinct with some exceptions as specified on the Distinct label. Do not apply through any type of irrigation system. Do not graze or harvest hay from treated areas.

**Site of action** Group 19: Inhibits indole acetic acid transport; Group 4: synthetic auxin

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

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**flumioxazin (Valor SX)**

**Rate** 0.064 to 0.128 lb ai/a (2 to 4 oz/a Valor SX)

**Time** Apply in the fall or early spring in combination with a burndown herbicide such as glyphosate to control emerged weeds.

**Remarks** Weed species controlled by residual activity are listed on the label. Consult label for restrictions on planting rotational crops following Valor SX application in fallow. Do not apply to frozen or snow covered soil. Restricted entry interval (REI) is 12 hours.

**Caution** Do not perform any tillage operation after application or residual weed control will be reduced. Allow at least 4 months after application to plant wheat. Longer plant-back restrictions may apply.

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

**Chemical family** N-phenylphthalimide

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**glufosinate ammonium (Rely 280)**

**Rate** 0.40 to 0.53 lb ai/a (22 to 29 fl oz/a plus ammonium sulfate)

**Time** Control is best on weeds 2 to 4 inches tall.

**Remarks** Small grains can be planted 70 days after Rely 280 application. See label for further crop rotation restrictions. Apply in a minimum of 15 gal/a water by ground application and 10 gal/a by aerial application. To improve total weed control, a tank-mix with 2,4-D, dicamba, or other labeled broadleaf herbicide product is recommended. Adding 2% dry ammonium sulfate (AMS) by weight is required. Restricted entry interval (REI) is 12 hours.

**Site of action** Group 10: inhibits glutamine synthetase.

**Chemical family** Phosphinic acid.

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**glyphosate (several products)**

**Rate** 0.28 to 0.38 lb ae/a, or 0.47 to 0.56 lb ae/a for grass in boot stage or for broadleaf weeds that have bolted.

**Time** Apply on land to be fallowed before seeding crops, or apply before crop emerges. Control is best on weeds 2 to 4 inches tall. Use low rates on weeds less than 4 inches tall and not moisture-stressed.

**Remarks** Apply in 3 to 5 gal/a water by air or 5 to 10 gal/a water by ground. To improve control of kochia, lambsquarters, prickly lettuce, pigweed, and Russian thistle, add a 2,4-D, dicamba, or other labeled broadleaf herbicide product. Use lower rate on downy brome, foxtails, mustards, and volunteer wheat. Some glyphosate products may require additional surfactant as specified on the individual product label. Adding 2% dry ammonium sulfate (AMS) by weight (or liquid equivalent) may improve performance on annual weeds. Restricted entry interval (REI) is 4 hours.

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

**Chemical family** None generally accepted

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**metribuzin (several products)**

**Rate** 0.38 to 0.62 lb ai/a (12.2 to 19.8 oz/a Tricor 4F, 8.1 to 13.2 oz/a Metribuzin 75)

**Time** Results are best if applied before weeds emerge or during early stages of weed growth (less than 2 inches tall or across).

**Remarks** Can be used up to 0.75 lb ai/a if applied in the fall. Treat fields after small grains have been harvested in a wheat-fallow rotation. Moisture (0.5 inch or more) is needed to activate herbicide. Fall treatment controls weeds through winter until late spring. May apply with paraquat, glyphosate, and others (see label). Restricted entry interval (REI) is 12 hours.

**Caution** Do not graze treated fields. Do not reseed to winter wheat within 10 months after a fall application or 4 months (120 days) after a spring application. Do not plant spring cereals following fall application for fallow. Do not apply more than once per fallow period.

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

**Chemical family** triazinone

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**paraquat (various product names)**

**Rate** 0.5 to 1 lb ae/a paraquat (2 to 4 pints/a Gramoxone Inteon, 1.3 to 2.6 pints/a Firestorm)

**Time** Apply to emerged weeds in fall or spring fallow land.

**Remarks** Results are best when a delay between tillage and planting allows weeds to emerge. Controls only annual weeds. Always use a nonionic surfactant (NIS), crop oil concentrate (COC), or methylated seed oil (MSO) with the application. Restricted entry interval (REI) is 12 hours.

**Caution** **A restricted-use herbicide.** Wear protective clothing when spraying and handling. Avoid contact, especially with eyes. Do not graze treated fields. Dry, dusty conditions will decrease activity. Do not apply if crop has emerged.

**Site of action** Group 22: photosystem I inhibitor

**Chemical family** Bipyridilium

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**pyraflufen ethyl (Vida)**

**Rate** 0.0008 to 0.0033 lb ai/a (0.5 to 2 fl oz/a Vida)

**Time** Apply to actively growing weeds up to 4 inches tall, and to rosettes less than 3 inches across.

**Remarks** Adjust rate for weed species and density of weed stand. Adding a crop oil concentrate (COC) or nonionic surfactant (NIS) is recommended. After applying Vida, plant registered crops any time. Plant crops not listed on the label 30 days after application. Good spray coverage is essential. Use an approved agricultural buffering agent to pH 5.0 or less if using Vida in a water source of  $\geq$  pH 5.0. Always buffer the water source BEFORE adding Vida herbicide to the spray tank. Control of annual and perennial grasses requires a tank-mix with a burndown herbicide such as glyphosate, glufosinate, or paraquat. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed three applications or 5.5 fl oz/a during the fallow period. Allow 30 days between applications. Do not allow livestock to graze in treated areas.

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

**Chemical family** Phenylpyrazole

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**pyrasulfotole + bromoxynil (Huskie)**

**Rate** 0.026 to 0.036 lb ai/a pyrasulfotole + 0.15 to 0.21 lb ai/a bromoxynil (11 to 15 fl oz/a Huskie)

**Time** Apply to actively growing weeds at growth stages recommended on label.

**Remarks** Adjust rate for weed species and density of weed stand. Adding a nonionic surfactant (NIS) or ammonium sulfate (AMS) may improve weed control under stress conditions. Good spray coverage is essential. For broad-spectrum control of annual and perennial grasses, tank-mix Huskie with glyphosate or glufosinate. Restricted entry interval (REI) is 24 hours.

**Caution** Follow crop rotation guidelines listed on label. Do not allow livestock to graze in treated areas with 25 days of application.

**Site of action** 6 and 27: Photosystem II inhibitor + HPPD Inhibitor

**Chemical family** (bromoxynil) nitrile + (pyrasulfotole) isoxazole

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**saflufenacil (Sharpen)**

**Rate** 0.02 to 0.04 lb ai/a (1 to 2 fl oz/a Sharpen) + recommended adjuvants (see label)

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

**Remarks** Sharpen controls mainly broadleaf weeds. Control of annual and perennial grasses requires a tank-mix with a burndown herbicide such as glyphosate, glufosinate, or paraquat. A methylated seed oil (MSO) plus ammonium sulfate (AMS) or urea ammonium nitrate (UAN) is required for burndown activity. See label for more information on adjuvants and tank-mixes. Restricted entry interval (REI) is 12 hours.

**Caution** Do not exceed 6 fl oz/a per year. 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** pyrimidinedione

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**sulfentrazone + carfentrazone (Spartan Charge)**

**Rate** 0.09 to 0.25 lb ai/a sulfentrazone + 0.01 to 0.03 lb ai/a carfentrazone (3.75 to 10.2 fl oz/a Spartan Charge)

**Time** Apply in fallow when weeds are small and actively growing. Sufficient precipitation must occur after application to insure herbicide activation.

**Remarks** Use rate depends on soil texture and percent soil organic matter. Refer to label for rate information. For optimum control of emerged weeds, a nonionic surfactant (NIS), crop oil concentrate (COC), methylated seed oil (MSO), or equivalent adjuvant is required as specified on the label. Optimum broad-spectrum grass and broadleaf weed post-emergence control requires a tank-mix with a burndown herbicide such as glyphosate. Residual weed control requires adequate precipitation for herbicidal activation. Herbicide application rate and residual activity is dependent on several factors including precipitation after application, soil moisture at time of application, soil type, soil pH, and organic matter. Where irrigation is not available and rainfall has not provided adequate activation, a shallow incorporation (less than 2 inches) is recommended. Restricted entry interval (REI) is 12 hours.

**Caution** Do not apply to frozen soils or existing snow cover. Do not use on course soils classified as sand which have less than 1% organic matter. Do not apply more than 10.2 fl oz/a per 12 month period. Follow label restrictions for crop rotational intervals.

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

**Chemical family** triazinone

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**triasulfuron + dicamba (Rave)**

**Rate** 0.11 to 0.22 lb ai/a triasulfuron + 0.07 to 0.14 lb ai/a dicamba (2 to 4 oz/a Rave)

**Time** Fall or spring. Fall applications must be made before weeds are exposed to extended freezing. Apply in 5 to 20 gal/a water by ground or 2 to 10 gal/a by air.

**Remarks** Include a nonionic surfactant (NIS) in spray mixture at 1 to 2 pints/100 gal. Do not apply through irrigation systems. Do not apply if rain is expected within 4 hours. Apply only once per year. Restricted entry interval (REI) is 24 hours.

**Caution** Wait at least 8 months after application to plant durum wheat. Other winter and spring wheat varieties may be planted after 12 days. See label for other crop rotation restrictions. Do not exceed 5 oz/a per year.

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

**Chemical family** (triasulfuron) sulfonylurea; (dicamba) benzoic acid

# Conservation Reserve Program

Andy Hulting and Ed Peachey

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The Conservation Reserve Program (CRP) is designed to control erosion, improve water quality and enhance wildlife habitat on environmentally sensitive land by planting permanent crops. A combination of desirable plants including trees, grasses, legumes, and shrubs must be planted and maintained for the duration of the contract which usually runs for 10 to 15 years. CRP land may not be harvested or grazed by domestic animals except under emergency circumstances following natural disasters, or certain other managed conditions. In addition to grasses, most new acreage in this program may include plantings of alfalfa and/or clovers. A portion of the qualifying acreage may also include other broadleaf plants such as flax, yarrow, and sagebrush. This combination of desirable grasses and broadleaf plants makes weed management difficult. Read herbicide labels carefully. Use the following text as a starting point to select the proper herbicides to apply in CRP. Be prepared for some level of damage to desirable plants following herbicide applications, especially to legume species.

By law, certain noxious weeds must be controlled. The list of weeds is created at the county level; it varies depending on locality. Also, weed control in the first year is crucial for good stand establishment of the desirable CRP species.

**Caution** Herbicides applied to CRP land may be extremely harmful to nearby crops. When CRP land adjoining cropland is sprayed by air or ground, take exceptional care to avoid drift onto cropland.

## General

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

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

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

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

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

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

**Chemical family** Phenoxy acetic acid

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

**Rate** 1 to 3 quarts/a

**Time** Apply postemergence to grasses with at least six leaves and to forage legumes (seedling or established alfalfa, seedling birdsfoot trefoil, seedling alsike clover, seedling ladino clover, or seedling red clover) that are emerged and actively growing.

**Remarks** Weeds must be small to achieve adequate control.

**Caution** Do not use on sweet clover, peas, or other legumes not mentioned above. Do not spray when temperatures exceed 90°F.

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

**Chemical family** Phenoxy acetic acid

### aminopyralid (Milestone)

**Rate** 0.0625 to 0.109 lb ae/gal (4 to 7 fl oz/a Milestone), depending on specific weed species

**Time** Annual and biennial thistles and knapweeds: optimum time is from rosette to bolting stage, or in the fall on seedlings. Perennial thistles and knapweeds, leafy spurge: optimum time is when fully emerged in spring up to bud growth, and in the fall before a killing frost.

**Remarks** Uniform coverage is needed for best results. Residual activity will help control later-emerging weeds. Consult label for grazing and haying restrictions.

**Caution** Do not use if loss of legume species or other broadleaf species cannot be tolerated.

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

**Chemical family** Pyridine

### aminopyralid + 2,4-D (ForeFront)

**Rate** 0.077 to 0.103 lb ae/a aminopyralid + 0.624 to 0.833 lb ae/a 2,4-D (1.5 to 2 pints/a ForeFront), depending on specific weed species, or up to 5 pints/a as a spot treatment.

**Time** Use lower rates on small, actively growing broadleaf weeds; increase rate as season progresses and plants mature.

**Remarks** Consult label for grazing and haying restrictions.

**Caution** Do not use if loss of legumes species or other broadleaf species cannot be tolerated.

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

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

### aminopyralid + metsulfuron (Chaparral)

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

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

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

**Caution** Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants in CRP) will be seriously injured or killed.

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

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

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**aminopyralid + triclopyr (Capstone)**

**Rate** 0.05 to 0.075 lb ae/a aminopyralid + 0.5 to 0.75 lb ae/a triclopyr (4.0 to 6.0 pints/a Capstone)

**Time** Apply to actively growing broadleaf weeds and woody plants. Consult label for application rates for specific weed and tree species.

**Remarks** A nonionic surfactant applied at 0.25% to 0.5% v/v of spray solution enhances control under adverse environmental conditions. Application rate depends on weed species and stage of growth. Consult label for grazing and haying restrictions.

**Caution** Do not let spray drift onto desirable vegetation. Many forbs (desirable broadleaf plants in CRP) will be seriously injured or killed.

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

**Chemical family** (both) Pyridine

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**atrazine (several products)**

**Rate** 1 to 2 lb ai/a (1 to 2 quarts/a product)

**Time** For use in establishment or renovation of CRP grasslands. Preemergence applications of atrazine generally result in the greatest levels of weed suppression.

**Remarks** See atrazine labels for listing of specific grass species that are tolerant to atrazine applications. Atrazine will control a wide variety of grass and broadleaf weed species common in CRP.

**Caution** Atrazine labels for use in CRP vary by state and by specific products. In Oregon, do not apply more than 2.0 lb ai/a of atrazine for any application, and make no more than one application per year. Restrictions on grazing and haying under emergency conditions vary by label.

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

**Chemical family** triazine

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**bromoxynil (several products)**

**Rate** 0.25 to 0.50 lb ae/a

**Time** Apply spring or fall after grasses have reached the two- to three-leaf stage to control broadleaf weeds. If alfalfa is planted, apply after the four-trifoliate leaf stage.

**Remarks** Can be applied safely to alfalfa. Most effective on small weeds, defined as the four-leaf stage, 2 inches high, or 1 inch in diameter, whichever comes first.

**Caution** Do not apply to alfalfa when air temperature is expected to exceed 80°F.

**Site of action** Group 6: photosystem II inhibitor

**Chemical family** Nitrile

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**bromoxynil + MCPA (Bronate or WildCard XTRA)**

**Rate** 0.25 to 0.50 lb ai/a each (1 to 2 pints/a Bronate or WildCard XTRA)

**Time** Apply in spring or fall after grasses have reached the three-leaf stage to control broadleaf weeds.

**Caution** Do not apply to grasses seeded with alfalfa; legumes may be severely injured.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA) Group 4: synthetic auxin

**Chemical family** (bromoxynil) nitrile; (MCPA) phenoxy acetic acid

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**bromoxynil + MCPA + fluoxypyr (Carnivore)**

**Rate** 0.20 to 0.41 lb ai/a bromoxynil + 0.20 to 0.41 lb ae/a MCPA + 0.08 to 0.167 lb ae/a fluoxypyr (1 to 2 pints/a Carnivore)

**Time** Apply to weeds up to the 4-leaf stage, or 8 inches high. Certain larger weeds may be controlled; see label for size recommendations and application timings.

**Remarks** Do not apply when weeds are under moisture stress. Do not apply more than 2.4 pints/a of Carnivore per growing season. Selective control of broadleaf weeds and volunteer potatoes.

**Site of action** (bromoxynil) Group 6: photosystem II inhibitor; (MCPA and fluoxypyr) Group 4: synthetic auxin

**Chemical family** (bromoxynil) nitrile; (MCPA) phenoxy acetic acid; (fluoxypyr) pyridine

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**bromoxynil + pyrasulfotole (Huskie)**

**Rate** 0.228 to 0.254 lb ai/a (13.5 to 15 oz/a Huskie)

**Time** 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. Huskie may be tank mixed with a variety of other broadleaf herbicides labeled for use in CRP; see label for instructions.

**Caution** 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) nitrile; (pyrasulfotole) isoxazole

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**carfentrazone (Aim EC)**

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

**Time** Treat when weeds are small.

**Remarks** Apply with ground equipment using at least 10 gal/a of finished spray. See label for control of specific weeds and adjuvant recommendations.

**Caution** Allow at least 7 days between applications; do not exceed 5.9 fl oz/a or three treatments per season.

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

**Chemical family** Triazinone

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**carfentrazone + glyphosate (Rage)**

**Rate** 0.005 to 0.0075 lb ai/a carfentrazone + 0.625 to 0.938 lb ai/a glyphosate (1 to 1.5 pints/a Rage) for annual weeds less than 6 inches tall. Apply at least 2.5 pints/a Rage for annual weeds greater than 6 inches tall. See label for additional instructions on annual and perennial weeds.

**Time** Apply to actively growing annual and perennial weeds. Do not disturb foliage for at least 7 days following application.

**Remarks** A nonionic surfactant (NIS), methylated seed oil (MSO), or crop oil concentrate (COC) is required. Ammonium sulfate (AMS) at 2 to 4 lb/a may be used in addition to the non-ionic surfactant, methylated seed oil, or crop oil concentrate. Do

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not reduce product use rate when AMS is used. See label for use of adjuvants.

**Caution** Do not exceed 272 fl oz/a Rage per season. Rage will kill any desirable seedlings it contacts.

**Site of action** Group 14: protoporphyrinogen oxidase inhibitor, Group 9: inhibits EPSP synthase

**Chemical family** (carfentrazone) triazinone; (glyphosate) glycine

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### chlorsulfuron (several products)

**Rate** 0.012 to 0.062 lb ai/a

**Time** Preemergence or postemergence in early stages of weed growth.

**Remarks** Label lists specific rates by weed species. Treat Canada thistle prebloom to bloom and/or at fall rosette.

**Caution** Chlorsulfuron severely injures broadleaves such as clover and alfalfa.

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

**Chemical family** Sulfonylurea

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### clopyralid (Transline, Stinger, or Clopyr Ag)

**Rate** 0.124 to 0.49 lb ae/a (0.33 to 1.33 pints/a product). Higher rates are for deep-rooted perennial weeds and less-than-ideal conditions.

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

**Remarks** Conifers and non-leguminous broadleaf trees are generally tolerant. Alfalfa is moderately tolerant. Sweet clover is tolerant.

**Caution** Ground application only.

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

**Chemical family** Pyridine

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

**Rate** 0.19 to 0.38 lb ae/a clopyralid + 1 to 2 lb ae/a 2,4-D (2 to 4 quarts/a Curtail). High rates are for deep-rooted perennial weeds.

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

**Caution** Do not use if broadleaf plants are a desired cover. Read label for plant-back restrictions if rotating ground out of CRP. Do not apply by air during an air temperature inversion.

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

**Chemical family** Pyridine

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### clopyralid + fluroxypyr (WideMatch or Colt AS)

**Rate** 0.125 to 0.25 lb ae/a each (1.33 to 2.66 pints/a product), not to exceed 0.49 lb ae/a (5.33 pints/a) per season

**Time** Apply broadcast postemergence, when weeds are actively growing, but before 8 inches tall. To control perennial weed such as Canada thistle, apply when basal leaves are fully emerged up to bud stage.

**Caution** Do not use if broadleaf plants are a desired cover. Read label for plant-back restrictions if rotating ground out of CRP. Do not apply by air during an air temperature inversion.

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

**Chemical family** (both) pyridine

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### dicamba (Banvel or Clarity) + 2,4-D

**Rate** 0.12 to 2 lb ae/a dicamba + 0.25 to 1 lb ae/a 2,4-D

**Time** After grasses have three leaves in the establishment year, or in fall or spring on grasses more than 1 year old.

**Remarks** Use up to 0.25 lb ae/a dicamba and up to 0.5 lb ae/a 2,4-D in the establishment year. Do not spray stressed grasses.

**Caution** Legumes are sensitive to dicamba and 2,4-D

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

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

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

**Rate** Refer to label for rate selection based on targeted weed or brush species. Application rates of 4 pints/a for spot treatments only.

**Remarks** Do not spray when grasses are stressed.

**Caution** Legumes are sensitive to dicamba and 2,4-D.

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

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

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### dicamba + diflufenzopyr (Distinct or Overdrive)

**Rate** 0.125 to 0.25 lb ae/a dicamba + 0.05 to 0.10 lb ae/a diflufenzopyr (4 to 8 oz/a Distinct or Overdrive)

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

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

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) and legumes can be seriously injured or killed by applications. Use with a nonionic surfactant or methylated seed oil to maximize weed control efficacy.

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

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

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### dicamba + halosulfuron (Yukon)

**Rate** 0.03 to 0.06 lb ai/a halosulfuron + 0.14 to 0.28 lb ae/a dicamba (4 to 8 oz/a Yukon)

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

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

**Caution** Do not allow drift to desirable vegetation. Do not apply to newly seeded areas until grass is well established. Many forbs (desirable broadleaf plants) and legumes can be seriously injured or killed by applications. Use with a nonionic surfactant or methylated seed oil to maximize weed control efficacy. Do not apply more than 8 oz of Yukon per year.

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

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

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**fluroxypyr (several products)**

**Rate** 0.14 to 0.245 lb ai/a fluroxypyr

**Time** For best performance, apply to emerged and actively growing broadleaf weeds less than 4 to 8 inches in height. Only weeds that have emerged at time of application will be controlled.

**Remarks** Do not use on land with desirable legumes, clovers, or other sensitive broadleaf plants.

**Caution** Grazing or haying CRP treated with fluroxypyr is prohibited.

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

**Chemical family** Pyridine

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**fluroxypyr + 2,4-D (Starane + Salvo)**

**Rate** 0.125 to 0.25 lb ae/a fluroxypyr + 0.49 to 1.0 lb ae/a 2,4-D (1.33 to 2.66 pints/a Starane + Salvo)

**Time** Weeds must be small, actively growing, and less than 8 inches tall.

**Caution** Do not use on land with desirable legumes, clovers, or other sensitive broadleaf plants.

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

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

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**glyphosate (several products)**

**Rate** 0.28 to 0.38 lb ae/a to control small (2 to 4 inch) grasses and certain broadleaf weeds. For perennial weeds, use 0.75 to 3.75 lb ae/a. Consult labels for rates for specific weeds.

**Time** Apply to actively growing weeds any time before planting, or before desirable grasses or legumes emerge. For selective broadcast applications, apply in early spring before desirable grasses break dormancy. Late fall applications can be made after desirable grasses have gone dormant.

**Remarks** Add 2 quarts of a nonionic surfactant, 80% ai or more, to each 100 gal of spray solution. Ammonium sulfate added to spray solution at 17 lb/100 gal may increase effectiveness on environmentally stressed plants. See label for additive rates for nonionic surfactants and ammonium sulfate.

**Caution** Glyphosate will kill any crop seedlings it contacts.

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

**Chemical family** Glycine

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**halosulfuron (Sanda)**

**Rate** 0.03 to 0.06 lb ai/a halosulfuron (0.66 to 1.33 oz/a Sanda)

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

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

**Caution** Do not allow drift to desirable vegetation. Do not apply more than 1.33 oz of Sanda per year. There are no grazing restrictions following Sanda applications. Forage preharvest interval is 37 days.

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

**Chemical family** Sulfonylurea

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**MCPA (several products)**

**Rate** 0.46 to 1.39 lb ae/a (1 to 3 pints/a MCPA-amine)

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

**Remarks** Controls certain annual broadleaf and perennial weeds in CRP.

**Caution** Do not use this treatment if alfalfa is present and desired. Do not use if temporary injury to clovers cannot be tolerated. Do not use on newly seeded areas until grass is well established.

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

**Chemical family** Phenoxy acetic acid

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**metsulfuron (several products)**

**Rate** 0.1 to 1 oz/a

**Time** Apply after weeds emerge, to grasses in the three- to four-leaf stage. Use higher rates on established grasses only.

**Remarks** Metsulfuron is labeled for use on many native and improved perennial grasses used in the CRP. See label for grass species. It controls a wide range of broadleaf weeds (including Himalayan blackberries) and inhibits Canada thistle growth. It will not control nightshades. For best results, weeds should be actively growing; add a surfactant of at least 80% ai at 1 to 2 quarts/100 gal. Cimarron Max (metsulfuron + dicamba + 2,4-D) and Cimarron Plus and Cimarron X-tra (metsulfuron + chlorsulfuron) are labeled for CRP.

**Caution** Do not use on soils with a pH greater than 8. Metsulfuron can persist in soil. Carefully follow label instructions on crop rotations when land is taken out of CRP. This material is not recommended for plantings that include a legume.

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

**Chemical family** Sulfonylurea

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**paraquat (Cyclone, Gramoxone Inteon, BonFire, or Firestorm)**

**Rate** 0.25 to 1 lb ai/a (2 to 4 pints/a product)

**Time** Apply any time before or after planting until desirable plants emerge.

**Remarks** For best results, use when weeds are small. Always use a nonionic surfactant, crop oil concentrate, or methylated seed oil with the application.

**Caution** A restricted-use herbicide.

**Site of action** Group 22: photosystem I electron diversion

**Chemical family** Bipyridilium

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**pendimethalin (Prowl H<sub>2</sub>O, Framework, or Stealth)**

**Rate** 0.41 to 1.03 lb ai/a (1 to 2.5 pints/a ProwlH20)

**Time** Apply preplant incorporated or preemergence before annual grasses and broadleaf weeds germinate.

**Remarks** Rate depends on soil type and organic matter content. If cover crop is lost because of bad weather, any crop registered for pendimethalin use and application method can be replanted the same year. If replanting, do not rework soil deeper than the pendimethalin-treated zone.

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**Caution** Do not feed or graze CRP legume cover crops established after application. Do not use on peat or muck soils. The legume cover crop may be reduced somewhat.

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

**Chemical family** Dinitroaniline

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### pendimethalin + dimethenamid (Freehand 1.75G)

**Rate** 1.0 to 2.0 lb ai/a pendimethalin + 0.75 to 1.5 lb ai/a dimethenamid (100 to 200 lb/a Freehand 1.75G)

**Time** Apply preemergence, before annual grasses and broadleaf weeds germinate.

**Remarks** For weed management during hardwood or conifer tree establishment or regeneration in CRP. Freehand may be applied at tree planting, or to established trees.

**Caution** Do not allow Freehand to come into direct contact with seedling tree roots. Do not apply to newly planted tree seedlings until soil is thoroughly packed or settled around the tree roots.

**Site of action** Group 3: microtubule assembly inhibitor; Group 15: inhibits very long chain fatty acid synthesis

**Chemical family** (pendimethalin) Dinitroaniline; (dimethenamid) Chloroacetamide

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### picloram (Tordon)

**Rate** 0.06 to 0.5 lb ae/a (0.25 to 2 pints/a Tordon)

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

**Remarks** To control many annual and perennial broadleaf weeds.

**Caution** A restricted-use herbicide. Legumes are highly sensitive to Tordon. Carefully follow label instructions on crop rotations when land is taken out of CRP.

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

**Chemical family** Pyridine

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### pyraflufen (Edict 2SC IVM)

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

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

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

**Caution** Do not exceed two applications per season. Allow a minimum of 14 days between applications. Do not apply more than 7 oz/a per season.

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

**Chemical family** Phenylpyrazole

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### quinclorac (Paramount, Facet)

**Rate** 0.14 to 0.75 lb ai/a

**Time** For the control and suppression of broadleaf perennial weeds and some broadleaf annual species. For field bindweed control apply in fall, but before a killing frost. Field bindweed

should be actively growing and at least 4 inches long. Repeat applications are necessary to maintain adequate control.

**Remarks** Adequate soil moisture and/or light rain after application is required for root uptake. Adding methylated seed oil or crop oil concentrate is required for consistent control. Nitrogen solutions or ammonium sulfate can be added to enhance control but should not replace the MSO or COC.

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

**Chemical family** Quinoline carboxylic acid

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### saflufenacil (Sharpen)

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

**Time** Apply to CRP grasses for burndown and residual broadleaf weed control in the fall or spring.

**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 6 fl oz/a per year. Sharpen may cause transitory injury to cool-season grasses under certain conditions. Sharpen may cause severe injury to desirable broadleaf species and legumes.

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

**Chemical family** Pyrimidindione

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### sulfometuron-methyl (SFM 75)

**Rate** 0.35 to 0.375 lb ai/a (0.75 to 8 oz/a SFM 75)

**Time** For preemergence and postemergence control of many grass and broadleaf weeds in CRP.

**Remarks** Apply when weeds are actively germinating and emerging. Application rates are dictated by weed species and the amount of annual precipitation, with higher applications needed in wetter regions.

**Caution** Review label for list of tolerant grasses and grass or crop replant intervals following treatment with SFM 75.

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

**Chemical family** Sulfonylurea

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### triclopyr (Remedy)

**Rate** 0.5 to 1 lb ae/a (1 to 2 pints/a Remedy) or up to 1.5 lb ae/a (1.5 quarts/a) for deep-rooted perennial broadleaf and susceptible woody species

**Time** Apply when woody plants and weeds are actively growing. Adequate soil moisture before and after treatment is important.

**Remarks** Triclopyr premixed with clopyralid is available as Redeem R&P.

**Caution** Legumes are sensitive to Remedy.

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

**Chemical family** Pyridine

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

**Rate** 0.5 to 1 lb ae/a 2,4-D + 0.25 to 0.5 lb ae/a triclopyr (1 to 2 quarts/a Crossbow) to control annual broadleaf weeds or seedling perennial broadleaf weeds. Use up to 1.5 gal/a Crossbow for established perennials.

**Time** Apply only when perennial grasses are established and when weeds are growing well. Conditions that stress the grasses will increase potential for injury to grasses.

**Caution** Legumes are sensitive to Crossbow.

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

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

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### triasulfuron + dicamba (Rave)

**Rate** 0.011 to 0.028 lb ai/a triasulfuron + 0.063 to 0.156 lb ai/a dicamba (2 to 5 oz/a Rave)

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

**Remarks** Label lists established grasses to which Rave can be applied.

**Caution** Do not apply Rave until at least 60 days after desirable grasses emerge.

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

**Chemical family** (triasulfuron) sulfonylurea; (dicamba) benzoic acid

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## Winter Annual Grasses

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### imazapic (several products)

**Rate** 0.031 to 0.094 lb ae/a (2 to 6 oz/a); 0.125 to 0.188 lb ae/a (8 to 12 oz/a) for perennial weed control/suppression

**Time** Apply preemergence and postemergence. Controls certain broadleaves and annual grasses. Maximum weed size 2 to 6 inches on postemergence applications.

**Remarks** Some brush and tree species are tolerant to imazapic as a directed application under the canopy. See label for list of tolerant plants.

**Caution** Always use adjuvant; see label for details.

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

**Chemical family** Imidazolinone

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### imazethapyr (several products)

**Rate** 0.0625 lb ae/a

**Time** Apply postemergence to seedling legumes or to established legumes when weeds are actively growing, but before they exceed 3 inches. May be applied in fall or spring to established legumes.

**Remarks** Apply only once per year. Apply to these legumes: alfalfa, clovers, crownvetch, birdsfoot trefoil, and lespedeza. May be applied to these grasses: big bluestem, little bluestem, switchgrass, Russian wildrye, intermediate wheatgrass, crested wheatgrass, western wheatgrass, tall wheatgrass, smooth brome, canarygrass, and orchardgrass.

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

**Chemical family** Imidazolinone

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### pronamide (Kerb)

**Rate** 0.2 lb ai/a (0.4 lb/a Kerb)

**Time** Between mid-October and mid-December.

**Remarks** For CRP fields with an acceptable stand of grass that has been established at least 1 year. Sufficient moisture is

required after application to move herbicide into the root zone of susceptible germinating weeds.

**Caution** A restricted-use herbicide. Species showing satisfactory tolerance to pronamide are tall fescue, creeping foxtail, orchardgrass, crested wheatgrass, intermediate wheatgrass, slender wheatgrass, tall wheatgrass, and western wheatgrass.

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

**Chemical family** Benzamide

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### propoxycarbazone-sodium (Lambient)

**Rate** 0.04 to 0.05 lb ai/a propoxycarbazone-sodium (0.9 to 1.2 oz/a Lambient)

**Time** For postemergence control of grass and broadleaf weed species common to CRP, including downy brome. For best control of brome species, apply at the 2- to 3-leaf growth stage.

**Remarks** See Lambient label for the list of CRP grasses that are tolerant to propoxycarbazone-sodium and for list of broadleaf weeds controlled. Use with a nonionic surfactant and UAN or AMS may be added to the spray solution to enhance weed control.

**Caution** Do not exceed more than 1.2 oz of Lambient per year. See label for guideline on recropping intervals following application to CRP.

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

**Chemical family** Sulfonylaminocarbonyltriazolinone

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### sulfosulfuron (Outrider)

**Rate** 0.06 to 0.09 lb ai/a sulfosulfuron (1.33 to 2.0 oz/a Outrider)

**Time** For postemergence control of grass and broadleaf weed species common to CRP, including downy brome and tarweed. For best control of brome species, apply at the two- to three-leaf growth stage.

**Remarks** See Outrider label for the list of CRP grasses that are tolerant to sulfosulfuron. Use with a 90% ai nonionic surfactant at a rate of 1 quart/100 gal of spray solution.

**Caution** Sequential applications of Outrider may be made 30 days apart, but do not exceed more than 2.66 oz of Outrider per year. Do not apply to newly-seeded CRP grasses prior to the 3-leaf growth stage or reseed tolerant grasses into treated areas prior to 14 days after application.

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

**Chemical family** Sulfonylurea

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### triasulfuron (Amber)

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

**Time** Postemergence to actively growing broadleaf weeds.

**Remarks** Label lists established desirable grasses to which applications can be made. Downy brome and cheat can be partially controlled by Amber at 0.56 oz/a before those grasses emerge.

**Caution** Triasulfuron will severely injure desirable broadleaves such as clovers and alfalfa.

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

**Chemical family** Sulfonylurea