

SECTION J.

POTATO

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Herbicides Labeled for Use in Potato After Planting: Application Timing and Activity (Soil and Foliar)				
Must be Applied Preemergence to Potatoes		Can be Applied Preemergence or Postemergence to Potatoes ³		Postemergence Only
Foliar Active Only For Burndown of Emergent Weeds	Soil Active For Control of Weeds Not Yet Emerged	Soil Active Only Will Not Control Emergent Weeds	Both Soil and Foliar Active Can Control Non-Emerged and Emergent Weeds	
carfentrazone-ethyl (Aim EC) <i>In Canada can only be used as a pre-plant burndown</i>	dimethenamid-p (Outlook; <i>Frontier Max in Canada</i>)	EPTC (Eptam)	rimsulfuron (Matrix, <i>labeled as Prism in Canada</i>)	rimsulfuron (Prism) <i>Only for use in Canada and only postemergence</i>
glyphosate	ethalfluralin (Sonalan HFP)	S-metolachlor (Dual Magnum/Dual II Magnum)	metribuzin (TriCor)	metribuzin + rimsulfuron (co-pack) (Titus Pro) <i>Only for use in Canada</i>
paraquat <i>Not for use in Canada at this timing</i>	fomesafen (Reflex)	metolachlor (Me-too-Lachlor)		ONLY FOR EMERGED GRASSES
glyphosate + S-metolachlor (pre-mix) (Sequence)	flumioxazin (Chateau ¹)	pendimethalin (Prowl H2O, Prowl 3.3EC)		sethoxydim (Poast Plus/Poast Ultra)
	linuron (Linex /Lorox ¹)	trifluralin (Treflan HFP)		clethodim (Select)
	pyroxasulfone (Zidua)	S-metolachlor + metribuzin (pre-mix) (Boundary)		fluazifop- p-butyl (Venture ²) <i>Only for use in Canada</i>
	sulfentrazone ¹ Sulfentrazone MTZ ¹ (pre-mix of sulfentrazone and metribuzin);			
	Sencor STZ ^{1,2} (co-pack of metribuzin and sulfentrazone <i>sold in Canada</i>)			

Both U.S. and Canadian trade names are shown.

Herbicide Timing Program can be Preemergence (PRE) only, PRE + Postemergence (POST), or POST only.

¹ These herbicides also have foliar activity and can control emerged weeds but MUST be applied before potato emergence.

² Labeled for use only in Canada.

³ Some of these herbicides may be applied sequentially: preemergence + postemergence or postemergence + postemergence. Follow the label for your area.

NOTE: Information for Preplant/Preplant incorporated timing and end-of-season vine kill herbicides is in the labeled sections below but not included in this table due to space constraints.

Preplant or Preplant Incorporated Before Planting Potatoes: Control of Weeds, Volunteer Grain, or Grass Cover Crops

carfentrazone-ethyl (Aim EC or several trade names, 2 lb ai/gal)

Foliar active

Rate for the preplant timing application Up to 0.031 lb ai/A (2 fl oz/A carfentrazone-ethyl)

Application methods Ground application in a minimum of 10 gal/A or aerial in a minimum of 3 gal/A. Use higher spray volumes when there is a dense weed population or crop canopy. Apply carfentrazone-ethyl with a crop oil concentrate (COC) at 1% v/v or a methylated seed oil (MSO) at a minimum of 1 quart/A or 1% v/v when applied in volumes of more than 20 gal/A.

Remarks Apply to actively growing weeds not more than 4 inches tall or rosettes 3 inches in diameter. Coverage is essential for good control. Tank-mixes with other herbicides may increase spectrum of control. Carfentrazone-ethyl is also formulated as a 40% WDG. Calculate rates with this product accordingly.

Caution Do not exceed 0.031 lb ai/A (2 fl oz carfentrazone-ethyl) for preplant (and/or preemergence) burndown treatments. Do not exceed 0.181 lb ai/A (11.6 fl oz carfentrazone-ethyl) total per crop season. This total allowable usage applies to all applications made to the field per calendar year including burndown treatments and harvest-aide.

Tank-mixtures Tank-mixes with other herbicides labeled for preplant burndown applications in potato, such as glyphosate or paraquat, may increase spectrum of control. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions Following an application of carfentrazone-ethyl, a registered crop may be planted at any time.

Rotational cropping restrictions A field may be rotated to a registered crop at any time after an application. All other crops may be planted after 12 months.

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

Chemical family Triazolinone

EPTC (Eptam 7E)

Soil active, only

Rate for the preplant and preplant impregnated on dry bulk fertilizer application timing 3.5 to 9 pints/A (3 to 7.9 lb ai/A). For quackgrass control, preplant: 4.5 pints/A (4 lb ai/A). For hairy nightshade, preplant: use a minimum of 5 pints/A (4.4 lb ai/A)

Application methods Soil surface must be free of dew and incidental moisture, and dry to at least 0.5 inch deep. EPTC is highly volatile. Incorporate into soil to prevent losing the herbicide. Any cultivation after application should be shallow (this means half the depth that the herbicide was incorporated). Whenever possible, apply and incorporate in the same operation. If application and incorporation are separate, Eptam must be incorporated the same day as it is applied. Preplant: apply and incorporate just before planting.

Incorporation methods Preplant: incorporate 2 to 3 inches deep with power-driven cultivation equipment, or set tandem disks, field cultivators, or rotary-driven or spring-toothed cultivators to cut 4 to 6 inches deep. See label for equipment-specific recommendations. If potatoes are to be hilled after applying, be sure to mix herbicide 3 inches deep or more.

For semiarid areas of eastern Washington, eastern Oregon, and Idaho only: 1) if EPTC is applied preplant and incorporated separately, incorporate the same day as application; 2) apply and incorporate dry bulk fertilizer impregnated with EPTC on the same day; 3) sprinkler-incorporate EPTC immediately after ground application with 0.5 to 0.75 inch water.

Application and incorporation must be within 5 days after the last tillage; results will be poor if weeds have germinated.

Remarks EPTC is not effective on emerged weeds.

Caution Do not exceed 14 pints/A (12.25 lb ai/A) per crop year. Preharvest interval is 30 days. Tillage after applying Eptam brings untreated soil to the surface; weed control may be reduced.

Tank-mixtures Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a preplant tank-mixture. The most restrictive labeling applies to use of preplant tank-mixtures. Trifluralin can only be applied in a

single preplant application when tank mixed with EPTC. See the registered labels for rates.

Re-cropping restrictions No re-cropping or rotational restrictions for EPTC on the label.

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

Chemical family Thiocarbamate

glyphosate (Glyphosate Original, Roundup PowerMAX, Roundup WeatherMAX, Roundup Custom, Roundup Original Max, or several trade names)

Foliar active, only

Rate for the preplant timing application 0.38 to 0.75 lb ae/A for volunteer grains. See labels for specific grains and rates.

Note: Apply when annual grain is less than 18 inches tall and before planting potatoes.

Application methods Ground or aerial: apply in 3 to 10 gal/A water by ground or 3 to 5 gal/A water by air. Some glyphosate formulations require using nonionic surfactant; see label for details on additive use. Adding 1 to 2% dry ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal spray mix may increase performance. Also may use the equivalent rate of AMS in a liquid formulation.

Remarks Good growing conditions enhance volunteer grain control with glyphosate.

Caution Glyphosate has no soil-residual activity and will not control weeds emerging after application. Follow all use restrictions and precautions on the label.

Tank-mixtures Tank mixtures are not stated/Approved on most glyphosate labels. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

metolachlor (Me-Too-Lachlor, Stalwart, or several trade names, 8 lb ai/gal)

Soil active, only

Rate for the preplant timing application 1 to 2 pints/A (1 to 2 lb ai/A product). Use lower rate on coarse soils or soils low in organic matter (OM). Use higher rate on soils that are relatively fine or high in OM. Up to 2.75 pints/A can be used on soils with 6% to 20% OM.

Time If applied preplant: do not apply as a preemergence treatment.

Application methods Ground or aerial. Metolachlor may be applied impregnated on dry fertilizer.

Incorporation methods Preplant: incorporate into top 2 inches of soil using a finishing disk, harrow, rolling cultivator, or similar implement within 14 days of planting. Evenly distribute herbicide in top 2 inches of soil. Do not damage potato seed pieces or sprouts with incorporation equipment.

Remarks Effectiveness will be reduced if later cultivation exposes untreated soil. If conditions are cool and wet after application, Metolachlor may delay maturity and/or reduce yield of Superior and other early-maturing varieties.

Caution Do not use on muck or peat soils.

Tank-mixtures Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in these preplant tank-mixtures. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions If a crop treated with metolachlor fails, any metolachlor-labeled crop may be planted immediately. Do not make a second broadcast application of metolachlor. If metolachlor was banded in the failed crop and the second crop is planted in the untreated row middles, a second banded treatment may be applied.

Rotational cropping restrictions Alfalfa may be planted after 4 months; barley, oats, rye, or wheat may be planted at 4.5 months; and tomato may be planted 6 months after metolachlor application. Clover may be planted 8 months after. Any metolachlor-labeled crop or root crops, tobacco, barley, buckwheat, milo (sorghum), oat, rye, wheat, cabbage, or peppers may be planted the spring after metolachlor applications the previous growing season. All other rotational crops may be planted 12 months after a layby application. Any metolachlor-labeled crop or tobacco, cabbage, or peppers may be planted the next spring

after layby or multiple applications of metolachlor.

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

Chemical family Chloroacetamide

metribuzin (TriCor DF 75% (product labeled for preplant timing))

Soil and foliar active. May be applied on dry bulk fertilizer in Idaho only

Rate for the preplant timing application 0.67 to 1.33 lb/A (0.5 to 1 lb ai/A Tricor DF 75%).

Note: Other metribuzin formulations may or may not have preplant-incorporated application timing on the label. Follow current label restrictions.

Time in Idaho Apply preplant-incorporated as a broadcast spray or impregnated on dry fertilizer.

Application methods Ground, aerial, or impregnated or coated on 500 to 1,200 lb/A dry bulk fertilizer.

Incorporation methods Preplant applications: incorporate evenly 4 to 6 inches deep by double-disking at right angles.

Remarks Metribuzin may not control triazine-resistant weed populations. Refer to the metribuzin label for proper rate for soil type, dry bulk fertilizer application information and all other recommendations, cautions, or special precautions that must be followed.

Caution Short-season, white-skinned varieties can be susceptible/moderately susceptible to metribuzin and may be injured. Other new varieties may be sensitive to metribuzin. When growing varieties for the first time, do not treat entire acreage until potato sensitivity is determined.

Tank-mixtures Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in preplant tank-mixtures. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions None on label.

Rotational cropping restrictions Do not plant onions, lettuce, cole crops, or cucurbits during the growing season following metribuzin applications. Do not plant sugar beets for 18 months after metribuzin application. Certain cereal varieties are sensitive to metribuzin (see cereal section of label) and should not be planted during the growing season after metribuzin use, unless moldboard plowing deeply enough to mix the upper 8 inches of soil and potato vines left in rows after harvest are uniformly distributed over the soil surface before plowing.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

paraquat (Gramoxone SL 2.0 or 3.0 lb paraquat cation/gal; or several trade names depending upon the formulation)

Foliar active, only

Rate for the preplant timing application 1 to 2 pints/A (0.25 to 0.5 lb ae/A) Gramoxone SL for preplant control of other volunteer grains, weeds, or grass cover crops. *For volunteer barley control in Idaho, Oregon, and Washington only:* use 0.5 to 1 pint/A (0.125 to 0.25 lb ae/A) Gramoxone SL to preformed beds before planting potatoes. Do not exceed three applications of Gramoxone per year. There are other trade names for these paraquat formulations.

Time Apply before planting potatoes. Grass or volunteer cereal grain control is best if applied before tillering or after boot stage.

Application methods Ground or aerial. Add nonionic surfactant with 75% or more surface-active agent at 0.125% v/v (1 pint/100 gal spray mix), or crop oil concentrate at 1% v/v (1 gal/100 gal spray mix) for ground applications, or 1 pint/A for aerial applications.

Remarks Nonselective, postemergence herbicide. Kills most green plant growth on contact, so good spray coverage is essential. Rainfast 30 minutes after application. Paraquat has no residual soil activity on crops planted later or weeds germinating later.

Caution Restricted use pesticide due to acute toxicity. For retail sale to and use only by certified applicators – not to be used by uncertified persons working under the supervision of a certified applicator. Follow all restrictions and precautions on label. Requires special safety equipment for handling, mixing, and spraying.

Tank-mixtures Must be applied alone for volunteer barley control, otherwise, see label for other allowable preplant tank-mix

combinations.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

S-metolachlor (Dual Magnum, or several trade names, 7.62 lb ai/gal)

Soil active

Rate for the preplant timing application 0.95 to 1.9 lb ai/A (1 to 2 pints/A), using lower rates on soils that are coarse or low in organic matter. Note: S-metolachlor also is formulated as Dual II Magnum or several trade names (7.64 lb ai/gal and includes a safener for corn) and as Dual IIG Magnum (16% G). Refer to the labels for those formulations to determine rates, timing, etc. for use in potatoes.

Time Apply preplant-incorporated or preplant-incorporated impregnated on dry bulk fertilizer.

Application methods Ground or aerial.

Incorporation methods Preplant-incorporated: incorporate before planting using a finishing disk, harrow, rolling cultivator, or similar implement that can uniformly incorporate herbicide into top 3 inches of soil.

Remarks During planting and later cultural practices, avoid bringing untreated soil to the surface.

Caution Do not apply preemergence after preplant incorporated application. Do not use on muck or peat soils. Crop may be injured after S-metolachlor if soil moisture is abnormally high during early crop development.

Tank-mixtures Read and follow the applicable "Restrictions and Limitations and Directions for Use" on all product labels in preplant tank-mixtures. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions If the potato crop fails, corn, soybeans, potatoes, safflower, or other S-metolachlor-registered crops may be replanted immediately. Do not make a second broadcast application.

Rotational cropping restrictions Do not plant barley, oats, rye, or wheat until 4.5 months after application. Alfalfa may be planted 4 months after application. Clover may be seeded 9 months after application. Any crop labeled for S-metolachlor use and pod and root crops, buckwheat, or milo (sorghum) may be planted the spring after treatment.

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

Chemical family Chloroacetamide

S-metolachlor + glyphosate (Sequence or several trade names, a formulated premix of 3 lb ai S-metolachlor + 2.25 lb ae/gal glyphosate)

S-metolachlor in this pre-mix only has soil activity; glyphosate in this pre-mix only has foliar activity

Rate for the preplant timing application Do not exceed 2.5 pints/A formulated product on coarse soils, 3.75 pints/A formulated product on medium soils with less than 3% organic matter, or 4 pints/A formulated product on fine textured soils with greater than 3% organic matter. Do not exceed 4 pints/A formulated product per season.

Time Apply before potatoes have been planted. This pre-mix may be applied up to 30 days before planting.

Application methods Ground in 15 to 40 gal/A or aerial in 3 to 15 gal/A water. Do not apply this product through any type of irrigation system. When foliage is dense, spray volume should be increased to ensure coverage of the target weeds. Flat-fan nozzles will result in the most effective application. Control of emerged weeds may be improved by adding dry ammonium sulfate at 8.5 to 17 pounds/100 gallons of water. Liquid formulations of AMS may be used at an equivalent rate.

Remarks This pre-mix is considered a foliar systemic herbicide which may be applied to control a broad spectrum of emerged weeds and can provide some residual control of certain weeds listed on the label. If rainfall or irrigation is not received within 7 days after application of Sequence, residual weed control may be reduced. Under these conditions, cultivate or use other weed control measures if weeds develop. If emerged at application time, weeds must be actively growing. For best possible annual weed control, apply to weeds 6 inches or less in height. If annual weeds have been mowed or grazed prior to application, wait for 3 to 4 inches of new growth to appear prior to application. When perennial weeds have been mowed or grazed, refer to the label for the recommended stage that new growth should reach prior to application.

Caution Do not harvest within 60 days after application.

Tank-mixtures This pre-mix can be tank mixed with metribuzin or pendimethalin (Prowl H2O/3.3EC or several trade names)

for control or suppression of annual and perennial weeds, provided that the tank-mix product label allows use of the product. Refer to the labels for weeds controlled and application rates for these tank-mixtures.

Re-cropping restrictions If crop treated with this pre-mix alone is lost, corn, legume vegetables (succulent or dried), potatoes, sorghum, soybeans, sunflowers, or transplanted tomatoes may be replanted immediately.

Rotational cropping restrictions Do not plant barley, oats, rye, or wheat before 4.5 months after application; alfalfa 4 months; tomato 6 months; or clover 9 months. Buckwheat, milo (sorghum) cabbage, stone fruits, or tree nuts may also be planted in the spring following treatment.

Site of action Group 15: inhibits very long chain fatty acid synthesis; Group 9: inhibits EPSP synthase

Chemical family Chloroacetamide; none generally accepted

trifluralin (Treflan HFP or several trade names, 4 lb ai/gal)

Soil active

Split application Preplant + postemergence may be made only in Idaho, Oregon and Washington and on soils with less than 2% OM: 0.75 pint/A (0.375 lb ai/A) before planting + 0.75 pint/A postemergence (0.375 lb ai/A), when potato plants have fully emerged. Incorporate the preplant application immediately. Refer to the Trifluralin + EPTC preplant section and in this Handbook and the labels for information on incorporation methods, remarks, cautions, and rotation crop restrictions.

trifluralin (Treflan HFP or several trade names, 4 lb ai/gal) + EPTC (Eptam 7E or several trade names, 7 lb ai/gal)

Trifluralin can be applied in a single preplant application only if tank mixed with EPTC and in Idaho, Oregon, Washington, only

Rate for the preplant timing application Trifluralin 0.75 pint/A (0.375 lb ai/A) + EPTC 3.5 to 9 pints/A (3 to 7.9 lb ai/A); use at least 4.5 pints/A EPTC for quackgrass control. For control of nightshade a minimum of 5 pints/A is recommended.

Time Single preplant application: only when tank mixed with Eptam.

Application methods Ground.

Incorporation methods Mechanically incorporate thoroughly into 2 to 3 inches of soil as soon as possible but no later than 24 hours after application.

Remarks Existing weeds must be destroyed by tillage before applying this herbicide tank mixture because trifluralin and EPTC do not control established weeds. Weed control may be erratic if cultivation exposes untreated soil between rows.

Caution Strictly adhere to label rates and precautions to prevent crop injury. If cultivation is required after application, avoid completely covering potato plants with treated soil. If treated soil is concentrated over the potato row/hill, emergence may be slowed and stems can become brittle. Do not apply to wet soils; weed control may be poor.

Tank-mixtures Preplant single application: only tank mixed with Eptam. Read and follow applicable "Restrictions and Limitations and Directions for Use" on the trifluralin and EPTC product labels in this preplant tank-mixture. The most restrictive labeling applies to use of tank-mixtures..

Rotational cropping restrictions In Idaho, Oregon, and Washington after a spring application of this preplant tank mixture, wait at least 12 months to plant sugar beets, red beets, spinach, corn, sorghum (milo), proso millet, oat, and annual or perennial grass crops or mixtures. Do not plant any of these crops for 18 months after application in fields that have not been irrigated, or that have been fallowed without irrigation or cultivation. Moldboard plowing 12 inches deep before planting these crops can reduce the possibility of crop injury. Do not plant vegetable crops, other than labeled for preplant application of this tank mixture, within 5 months after application.

Site of action Group 3: microtubule assembly inhibitor, Group 8: lipid synthesis inhibitor but not an ACCase inhibitor

Chemical family (trifluralin) Dinitroaniline; (EPTC) Thiocarbamate

Preemergence or Postemergence to Potato after Planting; Annual Grass and Broadleaf Weed Control

carfentrazone-ethyl (Aim EC or several trade names, 2 lb ai/gal)

Foliar active

Rate for the preemergence timing application Up to 0.031 lb ai/A (2 fl oz/A carfentrazone-ethyl)

Timing of the preemergence application Apply during planting or up to 24 hours after potatoes have been planted. Applications must be made before the crop emerges.

Application methods Ground in a minimum of 10 gal/A or aerial in a minimum of 3 gal/A. Use higher spray volumes when there is a dense weed population or crop canopy. Apply carfentrazone-ethyl with a crop oil concentrate at 1% v/v or a methylated seed oil (MSO) at a minimum of 1 quart/A or 1% v/v when applied in volumes of more than 20 gal/A.

Remarks Apply to actively growing weeds not more than 4 inches tall or rosettes 3 inches in diameter. Coverage is essential for good control. Tank-mixes with other herbicides may increase spectrum of control. Carfentrazone-ethyl is also formulated as a 40% WDG. Calculate rates with this product accordingly.

Caution Do not exceed 0.031 lb ai/A (2 fl oz carfentrazone-ethyl for preemergence (and/or preplant) burndown treatments. Do not exceed 0.181 lb ai/A (11.6 fl oz carfentrazone-ethyl) total per crop season. This total allowable usage applies to all applications made to the field per calendar year including harvest-aide.

Tank-mixtures Tank-mixes with other herbicides labeled for preemergence burndown applications in potato such as glyphosate or paraquat may increase spectrum of control. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in these and other tank-mixtures. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions Following an application of carfentrazone-ethyl, a registered crop may be planted at any time.

Rotational cropping restrictions A field may be rotated to a registered crop at any time after a carfentrazone-ethyl application. All other crops may be planted after 12 months.

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

Chemical family Triazolinone

dimethenamid-P (Outlook 6EC or several trade names, 6 lb ai/gal)

Preemergence, soil active

Rate 12 to 18 fl oz/A (0.56 to 0.84 lb ai/A) in coarse soils and 18 to 21 fl oz/A (0.84 to 1 lb ai/A) in medium- or fine-textured soils. One application only. Do not exceed 21 fl oz/A per season.

Time Apply preemergence after planting and after dragoff or hilling but before potato emergence. Tillage after application may result in reduced weed control. Dimethenamid-p applied preemergence is most effective when applied immediately after hilling to a weed-free surface because it is not effective on emerged weeds. Hilling is often combined with reservoir tillage (Dammer Diker).

Application methods Preemergence by ground, chemigation, aerial, or impregnated onto dry bulk fertilizer application. Will not control weeds emerged from soil. Application must be made to clean-tilled soil or with other herbicides that control emerged weeds.

Chemigate only through center pivot, lateral move, solid set, or hand move irrigation systems. Apply in at least 0.33 to 0.67 inch of water, using the lower volume on coarser soils and the higher volume on finer soils. Applying in more than 1 inch volume may reduce weed control. See labels for specific application methods and requirements.

Incorporation methods For effective control after ground or aerial preemergence application, rain or sprinkler irrigation is required to move the herbicide into the upper soil surface where weed seeds germinate. Performance is best if either rain or overhead irrigation is within 7 days after application. If not, then shallow mechanical incorporation may be needed.

Remarks In cold or wet growing conditions, dimethenamid-p may cause delayed emergence or early-season stunting of potatoes. Once growing conditions improve, then potato plants can metabolize Outlook after which normal growth will resume and tuber yield and quality will not be affected.

Caution To avoid adverse effects on endangered plant species, comply with the following mitigation measures where these species grow in the counties listed below. Aerial applications must leave a 150-ft untreated buffer between treatment area and endangered plant populations. Ground applications must use low-pressure nozzles that produce only medium to coarse or very coarse droplets and leave a 35-ft untreated buffer between treatment area and endangered plant populations. In Idaho, Kootenai County; in Oregon, Baker, Benton, Josephine, Klamath, Lane, Marion, and Union counties; in Washington, Lincoln County.

Tank-mixture examples Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in these preemergence tank-mixture. The most restrictive labeling applies to use of tank-mixtures. Dimethenamid-p may be applied before, in tank-mixtures with, or after the use of one or more of these registered herbicides or the other trade names for these products: flumioxazin (Chateau), EPTC (Eptam), rimsulfuron (Matrix), sethoxydim (Poast Plus), pendimethalin (Prowl H2O), clethodim (Select), metribuzin, trifluralin (Treflan HFP), glyphosate, or paraquat.

Re-cropping restrictions If dimethenamid-p has been applied to potatoes and the crop fails due to weather or other reasons, replanting potatoes is not recommended. Any other crop for which dimethenamid-p soil applications are registered may be planted (e.g., corn, dry bean, grain, horseradish, sorghum, soybean).

Rotational cropping restrictions Fall-seeded cereal crops may be planted 4 months after dimethenamid-p application. There are no rotational crop restrictions the spring after application in the previous year’s potato crop.

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

Chemical family Chloroacetamide

EPTC (Eptam 7E or several trade names, 7 lb ai/gal)

Preemergence or postemergence when applied after planting; only has soil activity

Rate 3.5 to 9 pints/A (3 to 7.9 lb ai/A) preemergence, 3.5 to 7 pints/A (3 to 6 lb ai/A) after drag-off/hilling or early postemergence. For nutsedge control, preemergence/dragoff: 7 pints/A. Do not exceed 14 pints/A (12.25 lb ai/A) per crop year.

Time Preemergence after drag-off or after hilling, or early postemergence. Hilling is often combined with reservoir tillage (Dammer Diker). Preharvest interval is 30 days.

Application and incorporation methods EPTC applied preemergence is most effective when applied immediately after hilling to a weed-free surface because it is not effective on emerged weeds. Soil surface must be free of dew and incidental moisture, and dry to at least 0.5 inch deep. EPTC is highly volatile. Incorporate into soil to prevent losing the herbicide.

EPTC can be applied preemergence via chemigation before weeds emerge or after a clean cultivation by metering into sufficient irrigation water to penetrate 3 to 4 inches deep.

In eastern Washington, eastern Oregon, and Idaho only, EPTC can be ground-applied preemergence, and although the label says to sprinkler-incorporate with 0.5 to 0.75 inch water within 36 hr after ground application, recommendation is to sprinkler-incorporate immediately. Application and incorporation must be within 5 days after the last tillage; results will be poor if weeds have germinated. Any cultivation after application should be shallow (i.e., half the depth that the herbicide was incorporated).

Remarks EPTC is not effective on emerged weeds. EPTC is highly volatile. It must be applied to soil that is free from dew and other moisture, and dry to at least 0.5 inch deep.

Caution Do not exceed 14 pints/A (12.25 lb ai/A) per crop year. Preharvest interval is 45 days. Tillage after applying EPTC brings untreated soil to the surface; weed control may be reduced.

Tank-mixture examples Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. EPTC may be applied in tank-mixtures with one or more of these registered herbicides or the other trade names for these products: *Preemergence*—flumioxazin (Chateau), rimsulfuron (Matrix), dimethenamid-p (Outlook), pendimethalin (Prowl H2O/3.3 EC), metribuzin, or in a three-way tank-mixture with S-metolachlor (Dual Magnum) + pendimethalin (Prowl H2O/3.3EC); *Postemergence*—with metribuzin (up to 6-inch potato height) or rimsulfuron. In the Pacific Northwest and northern regions defined on the labels, Eptam+ metribuzin tank-mixtures can be applied only by chemigation.

Re-cropping restrictions No re-cropping or rotational restrictions for EPTC on the labels.

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

Chemical family Thiocarbamate

ethalfluralin (Sonalan HFP or several trade names, 3 lb ai/gal)

Preemergence, soil active

Rate 1.33 to 2.67 pints/A (0.5 to 1 lb ai/A). Rate ranges for coarse-, medium-, and fine-textured soils: 1.33 to 2 pints/A, 2 to 2.67 pints/A, 2.67 pints/A.

Time After planting, and prior to potato emergence only. If incorporation by rainfall or sprinkler irrigation is planned, then

apply immediately after planting for best results. Sonalan is most effective when applied immediately after hilling to a weed-free surface because it is not effective on emerged weeds. Hilling is often combined with reservoir tillage (Dammer Diker®). Do not apply after potato emergence.

Application methods Preemergence-ground or chemigation (overhead sprinkler irrigation in 0.5 to 1 inch water).

Incorporation methods Preemergence: by rainfall or sprinkler incorporation 0.5 to 1 inch of water. If continuous rainfall or irrigation of 0.5 to 1 inch water occurs within 2 days of application, then no further incorporation is needed.

Ethalfuralin can be incorporated mechanically if rainfall or irrigation does not occur within 2 days after application. Mix thoroughly in the top 2 to 3 inches of soil. Set incorporation equipment so that the bed and furrow will be uniformly covered with a layer of treated soil. Avoid disturbing seed pieces and/or unemerged shoots. Do not expose untreated soil during the mechanical incorporation process. Do not incorporate using furrow irrigation.

Remarks Rainfall or sprinkler irrigation prior to application tends to seal the soil surface. When rain or sprinkler irrigation incorporation is intended, this herbicide moves more effectively into the weed germination zone if it is applied immediately after tillage and planting. Ethalfuralin may be shallowly cultivated after application and incorporation without reducing weed control, as long as no untreated soil is exposed.

Caution Do not exceed 2.67 pints/A per season. Do not apply after crop emergence.

Tank-mixtures Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions If replanting is required, then plant only crops listed on ethalfuralin labels.

Rotational cropping restrictions Sugar beets may be planted no earlier than 8 months after application and a moldboard plowing operation to a depth of at least 12 inches before planting. No other rotational cropping restrictions are listed on the label for Idaho, Oregon, or Washington; however, refer to the label for special rotation restrictions in other states.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

flumioxazin (Chateau 51% WDG or several trade names)

Preemergence, soil and foliar active

Rate 1.5 oz/A (0.047 lb ai/A) for preemergence suppression of weeds such as hairy nightshade, common lambsquarters, Palmer amaranth, redroot pigweed, and wild mustard. 1.5 oz/A suppresses weeds listed when applied to soils with up to 5% organic matter. Do not exceed 1.5 oz/A in a single application or growing season.

Time Apply after hilling but before potatoes emerge. At least 2 inches of soil must cover the vegetative part of the potato plant at application and incorporation. If applied to potatoes with less than 2 inches of soil cover, or during or after potatoes emerge, potato crop may be injured. Flumioxazin may not control weeds that germinate after application but before an activating rain or irrigation. It has some foliar activity on emerged weeds.

Application methods Ground, chemigation (center pivot only, end guns must be turned off), and aerial. Best timing is shortly after hilling, before potatoes emerge. Hilling is often combined with reservoir tillage (Dammer Diker). See labels for specific application methods and requirements. Use 10 to 30 gal/A spray solution to ensure adequate coverage. Apply via chemigation in 0.5 to 0.75 inches water during the first sprinkler set.

Incorporation methods Moisture is necessary to activate flumioxazin in soil for residual weed control. When moisture after application is not adequate, at least 0.25 inch sprinkler irrigation may improve weed control. Rain or irrigation should be as soon as possible and within 7 days after application, and before the most advanced potato sprouts are within 2 inches of the settled soil surface. Mechanically incorporating into soil or cultivating after applying reduces residual weed control is not recommended.

Remarks Flumioxazin has low solubility compared with most other herbicides used in potato production. Low herbicide solubility usually leads to low mobility in the soil profile. Thus, flumioxazin most likely will not move out of the weed-seed germination zone. Application to poorly drained soil and/or during cool, wet weather may injure crop. Once weather conditions improve, potato plants can metabolize flumioxazin, and tuber yield and quality are not affected. Treated soil splashed on newly emerged crops may temporarily injure crop. Potato varieties may vary in their response to flumioxazin.

Caution At least 2 inches of settled soil must cover the vegetative part of the potato plant at application or crop can be damaged.

After applying flumioxazin, properly clean spray equipment before applying other materials to any crop foliage; see “Sprayer Cleanup” on labels for specific information. No preharvest interval is listed on labels.

Tank-mixtures Tank mix flumioxazin with other preemergence-labeled herbicides for broad-spectrum weed control. Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in these tank-mixtures. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping and rotational restrictions Replanting potatoes is not recommended if the treated potato crop fails (e.g., due to hail or other bad weather). If potatoes are replanted do not reapply flumioxazin. Soybeans may be planted immediately after the application. Field corn, sorghum, sunflower, or wheat can be planted 30 days after a flumioxazin application if at least 1 inch of rain or irrigation has occurred between application and replanting. Barley, dry and snap beans, peas, rye, and sweet corn may be planted 3 months after application. Alfalfa, canola, clover, oats, and sugar beets may be planted 4 months after application if soil is tilled before planting, or 8 months after application if soil is not tilled before planting. All other crops not listed may be planted 4 months after application if soil is tilled prior to planting, or 8 months after application if soil is not tilled before planting if a successful soil bioassay was performed before planting. See labels for all other crops not listed.

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

Chemical family N-phenylphthalimide

fomesafen (Reflex 2 lb ai/gal)

Preemergence, soil active

For use in potatoes grown under overhead irrigation, only.

Idaho: only for distribution and use in potatoes within the counties of Ada, Bingham, Bonneville, Canyon, Cassia, Clark, Elmore, Gooding, Jefferson, Jerome, Minidoka, Owyhee, Payette, Power, and Twin Falls. (EPA Special Local Needs, 24c label ID-110004 expiring December 31, 2024).

Oregon: only for distribution and use in potatoes within the counties of Malheur, Morrow, and Umatilla. (EPA Special Local Needs, 24c label OR-140001 expiring December 31, 2023).

Washington: only for distribution and use in potatoes in the counties of Adams, Benton, Franklin, and Grant (EPA Special Local Needs, 24c label WA-130008 expiring December 31, 2022).

NOTE: all 24(c) labels expire on date stated or until otherwise amended, withdrawn, canceled, suspended, or ended. Check your state department of agriculture pesticide registration for current 24(c) in your state.

Rate 1 pint/A (0.25 lb ai/A)

Time Preemergence (only) after planting but before potato emergence.

Application methods Ground, chemigation (center pivot only), and aerial. Best timing is shortly after hilling, before potatoes and weeds emerge. Hilling is often combined with reservoir tillage (Dammer Diker). *Ground application:* use a minimum of 10 gal/A spray solution to ensure adequate coverage. Apply via center pivot chemigation only in 0.5 to 1 inches water. Use the lower volume (0.5 inch) on coarser soils and the higher volume (1 inch) on fine-textured soils. Application in more than 1 inch of water may reduce weed control by moving the herbicide below the effective zone in the soil profile. When sprinkler distribution patterns do not overlap sufficiently, unacceptable weed control may result and where sprinkler distribution patterns overlap excessively, crop injury may result. *Chemigation:* Read and follow all instructions on the Reflex label. *Aerial application:* should be made in a minimum of 5 gal/A spray solution and with a maximum of 40 PSI pressure.

Incorporation methods Because moisture is necessary to activate Reflex in soil for residual weed control, the herbicide may be more effective if rainfall or irrigation occurs shortly after ground or aerial application. If adequate rainfall is not received after a Reflex application, at least 0.25 inch overhead sprinkler irrigation before potatoes and weeds emerge may improve weed control. Mechanically incorporating into soil or cultivating after applying reduces residual weed control is not recommended.

Remarks Reflex effectiveness will be reduced if later cultural practices expose nontreated soil. Potato varieties may vary in their response to Reflex. Always determine tolerance before using Reflex on a variety for the first time. Some variety tolerance research results may be available through university research and extension personnel.

Caution Do not use Reflex in potatoes grown for seed. Do not exceed 1 pint /A of Reflex per season. Do not apply to a field more than once every two years. Do not harvest potatoes treated with Reflex within 70 days of application. Application to emerged potato plants will cause severe crop injury. Apply only to soils with less than 2% organic matter. Do not apply after June 1.

Tank-mixtures Reflex may be applied preemergence with other potato herbicides labeled for this timing and these application methods. Read and follow applicable restrictions and limitations and directions for Use on all product labels in tank-mixtures. The most restrictive labeling applies to use of tank-mixtures. If you have no previous experience mixing Reflex with these potato herbicides under your conditions, perform a compatibility test before attempting large-scale mixing (see tank-mix compatibility test sections on the labels).

Re-cropping and rotational restrictions If replanting is necessary, the field may be replanted to cotton, dry beans, potatoes, snap beans, or soybeans with no delay. During replanting, minimize soil disturbance to preserve the herbicide barrier for effective weed control. Do not make a second application of Reflex or other fomesafen-containing product as crop injury or illegal residues may occur in harvested crops.

The following rotational crops may be planted immediately after applying Reflex: cotton; dry bean; potato; snap bean; or soybean. Wheat can be planted 4 months after application if a successful field bioassay has been performed.

The minimum rotational interval after Reflex application for all other crops not listed on the label is 18 months after application, however, a successful field bioassay must be performed before planting these crops. Refer to the "Field Bioassay Instructions" section on the label for details.

To prevent injury to rotational crops, a minimum of 22 inches cumulative irrigation must occur during the period after Reflex application through potato harvest. Avoid overlapping spray or chemigation swaths or injury to rotational crops could occur. Do not graze rotated small grain crops or harvest forage or straw for livestock.

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

Chemical family Nitrophenyl ether

glyphosate (Glyphosate Original, Roundup PowerMAX, Roundup WeatherMAX, Roundup Custom, Roundup Original Max; or several trade names)

Preemergence, when applied after planting, foliar active

Rate 0.38 to 1.1 lb ae/A for most species

Time Delay herbicide application to allow maximum weed emergence but apply before potatoes emerge. Herbicide will not control weeds that emerge after application. In coarse or sandy soils, apply before potato sprouting to minimize crop damage.

Application methods See label for rates and gal/A of water recommended for specific species. Some glyphosate formulations require use of nonionic surfactant; see label for details on additive use. Adding 1% to 2% dry ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal spray-mix may increase performance. The equivalent rate of AMS in a liquid formulation also may be used.

Remarks Good growing conditions enhance glyphosate activity.

Caution Glyphosate applied after crop emergence will injure or kill potatoes. Follow all use restrictions and precautions on label.

Tank-mixtures are not stated or approved on most glyphosate labels. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Linuron (Linex 4L is the trade name west of the Rockies, 4 lb ai/gal; sold as Lorox and other trade names east of the Rockies)

Preemergence, soil and foliar active

Idaho: EPA Special Local Needs, 24(c) label ID -130001 expiring December 31, 2024. Only as a preemergence treatment for redroot pigweed, lambsquarters and certain other broadleaf weeds control.

Oregon: EPA Special Local Needs, 24(c) label OR-160005 (expiring December 31, 2021 or until otherwise amended, withdrawn, canceled, suspended, or ended). Limited to potatoes grown in eastern Oregon and the Klamath Basin in southern Oregon only. Do not apply this product to potatoes grown west of the Cascade Mountain Range in Oregon. Washington: EPA Special Local Needs, 24(c) label WA-130002 (expiring December 31, 2024). Use of Linex 4L herbicide is limited to use in eastern Washington, only. Do not apply

this product to potatoes grown in western Washington.

Statements on the Oregon and Washington 24(c) labels: "Broadcast application before emergence of potatoes for control of redroot pigweed, common lambsquarters, hairy nightshade, and black nightshade." "This Section 24(c) SLN label contains new or supplemental instructions for use of this product which do not appear on the main EPA-registered product label. Follow the instructions carefully."

NOTE: all 24(c) labels expire on date stated or until otherwise amended, withdrawn, canceled, suspended, or ended. Check your state department of agriculture pesticide registration for current 24(c) in your state.

Refer to the 24(c) label for weeds specified for your state.

Rate OREGON and WASHINGTON: preemergence for control of redroot pigweed, common lambsquarters, hairy and black nightshade 1 pint/A (0.5 lb ai/A) of Linex 4L on coarse sandy loam soils; 1.5 pints/A (0.75 lb ai/A) on medium: loam, silt loam, silt, sandy clay, sandy clay loam Use the lower end of the rate range for potatoes grown on calcareous or low organic matter (OM) soils. Do not apply to sand or loamy sand soil, as crop injury may result. Do not use linuron on potatoes grown in soils with > 70% sand and less than 15% clay. Do not use on soils with less than 1% organic matter.

IDAHO: 1 to 2 pints/A of Linex 4L only as a preemergence treatment for redroot pigweed, lambsquarters and certain other broadleaf weeds control. As a guide, potatoes grown on calcareous or low organic matter soils should adhere to the lower end of the rate range. See restrictions.

Time Preemergence (only) after planting and before the last drag-off/ hilling operation but before potato emergence. Do not apply once potatoes are "cracking" the surface. Hilling is often combined with reservoir tillage (Dammer Diker). Plant seed at least 2 inches deep. Best when applied before or as weeds emerge. If weeds have emerged, apply before grasses are 2 inches tall and before broadleaf weeds are 6 inches tall. Make only one application per year.

Application methods Ground or chemigation [linear (lateral) move, center pivot and solid set]. Do not apply by air.

Incorporation methods Best results are obtained when applied to moist soils. Irrigate powder dry soils before application.

For ground application, sprinkler-incorporate before potato emergence. The herbicide is not soil-active until it is incorporated.

Chemigation: apply in 0.33 to 1 inch water through a traveling system metering into the water the entire application period or in the last 30 minutes of solid-set or hand-moved irrigation systems. Use lower water volume on coarse soils and higher volume on fine-texture soils.

Remarks Effectiveness will be reduced if later cultivation exposes untreated soil. Always test this product and any tank-mix combinations first on a small scale for varietal tolerance. Soils high in clay or organic matter (OM) content require higher rates than soil low in clay or OM content to attain equivalent herbicide performance. Linex 4L has foliar activity and if emerged weeds are present, a light surfactant may be used. Results of weeds already emerged could vary by rate applied, species, and environmental conditions.

Caution Do not apply by air. Application and incorporation must occur before potatoes are cracking through the soil.

Tank mixtures No examples or restrictions are listed on the 24 (c) labels for Idaho, Oregon, or Washington.

Re-cropping restrictions If a crop treated with Linex 4L fails, any crop registered for the rate applied may be planted immediately. Thoroughly re-work the field. Do not make a second Linex 4L application.

Rotational cropping restrictions Any crop registered for the linuron rate applied may be planted immediately. Otherwise, West of the Rockies do not plant any other crop until 12 months after the last Linex application.

Site of action Group 7: Photosystem II inhibitor but different binding site than Groups 5 or 6.

Chemical family Urea

metolachlor (Me-Too-Lachlor, Stalwart, or several trade names, 8 lb ai/gal)

Can be applied preemergence or postemergence after planting. Soil active, only

Rate Preemergence: 1 to 2 pints/A (1 to 2 lb ai/A). After hilling/layby: 1.67 pints/A (1.67 lb ai/A). Use lower rate on coarse soils or soils low in organic matter (OM). Use higher rate on soils that are relatively fine or high in OM. Up to 2.75 pints/A can be used on soils with 6% to 20% OM.

Time Preemergence before weeds emerge, or postemergence after hilling/layby. Do not apply as both a preplant-incorporated and a preemergence treatment. The layby application can be made over a previous application of this product, but do not exceed 3.7 pints/A metolachlor per season. Do not harvest potatoes within 60 days of the preemergence application from planting to dragoff, or within 40 days after a layby application.

Application methods Ground, chemigation (center pivot only, preemergence only), or aerial. Metolachlor may be applied impregnated on dry fertilizer.

Incorporation methods Preemergence: apply after planting or after dragoff or hilling operations before potato or weeds emerge. Hilling is often combined with reservoir tillage (Dammer Diker). Postemergence after hilling/layby: application will not control emerged weeds. Sprinkler-incorporate preemergence or layby applications within 7 to 10 days.

Chemigation: apply preemergence only in 0.5 to 1 inch irrigation water. Meter into water during entire application period. Use lower water volume on coarse soils and higher volume on fine-texture soils. More than 1 inch chemigation water can reduce weed control if herbicide moves below effective zone in soil.

Remarks Effectiveness will be reduced if later cultivation exposes untreated soil. If conditions are cool and wet after application, metolachlor may delay maturity and/or reduce yield of "Superior" and other early-maturing varieties.

Caution Do not use on muck or peat soils.

Tank-mixture examples Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. Metolachlor may be applied with metribuzin preemergence. Apply this tank-mix postemergence only as a directed or semi-directed spray to avoid chlorosis, minor necrosis, or leaf discoloration. Metolachlor may be applied with pendimethalin (Prowl H2O/3.3EC or several trade names) and/or EPTC (Eptam or several trade names) preemergence, preemergence incorporated, or early postemergence, as the labels direct.

Re-cropping restrictions If a treated crop fails, any metolachlor-labeled crop may be planted immediately. Do not make a second broadcast application.

Rotational cropping restrictions Alfalfa may be planted after 4 months; barley, oats, rye, or wheat may be planted at 4.5 months; and tomato may be planted 6 months after a metolachlor application. Clover may be planted 8 months after application. Any metolachlor-labeled crop or root crops, tobacco, barley, buckwheat, milo (sorghum), oat, rye, wheat, cabbage, or peppers may be planted the spring after applications the previous growing season. All other rotational crops may be planted 12 months after a layby application. Any metolachlor-labeled crop or tobacco, cabbage, or peppers may be planted the next spring after layby or multiple applications.

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

Chemical family Chloroacetamide

metribuzin (Metribuzin 4L or several trade names, 4 lb ai/gal; or Metribuzin 75, TriCor DF or several trade names, 75%)

Preemergence or postemergence. Split preemergence + postemergence, and only in Idaho, Oregon, and Washington, can be applied in split postemergence applications after a preemergence application

Rate and Timing Metribuzin can be applied preemergence or postemergence to potatoes or split into a preemergence + postemergence application for weeds listed on the label and for suppression of hairy nightshade. Only in Idaho, Oregon, and Washington: two postemergence applications can be made if metribuzin has been applied preemergence.

Preemergence: use 0.5 to 2 pints/A metribuzin 4L or 0.33 to 1.3 lb/A of DF (0.25 to 1 lb ai/A) not exceeding 0.5 lb ai/A on coarse-textured (sandy) soils with low organic matter or sensitive varieties. For wild mustard control, only, use 0.25 to 0.5 lb ai/A.

Postemergence: For best control postemergence, applications should be made before weeds are 1-inch tall and before potato rows close. Apply metribuzin postemergence only on russet or white skinned varieties that are not early maturing. See the caution section for metribuzin varietal sensitivity information. Postemergence for weeds listed on label other than redroot pigweed or common lambsquarters: use 1 pint/A metribuzin 4L or 0.67 lb/A of 75 DF (0.5 lb ai/A). Postemergence for redroot pigweed and common lambsquarters: use 0.5 to 1 pint/A metribuzin 4L, or 0.33 to 0.67 lb/A of the DF (0.25 to 0.5 lb ai/A).

Split applications preemergence + postemergence: Do not exceed a total of 2 pints/A 4L or 1.3 lb/A 75 DF (1 lb ai/A) total per season. On medium- and heavy-textured soils, use 1 pint/A 4L or 0.67 lb/A 75 DF (0.5 lb ai/A) per application. On coarse (sandy) soils with low organic matter do not exceed 0.75 pints/A of 4L or 0.5 lb/A of 75 DF (0.33 lb ai/A) per application.

Two postemergence applications can be made if metribuzin has been applied preemergence (Idaho, Oregon, and Washington only). For redroot pigweed and common lambsquarters only: 0.5 to 1 pint/A metribuzin 4L or 0.33 to 0.67 lb/A of the DF (0.25 to 0.5 lb ai/A), not to exceed 0.375 lb ai/A per postemergence application on coarse (sandy) soils with low organic matter. For other weeds listed on label and for hairy nightshade suppression, on medium and heavy soils: use 1 pint/A 4L or 0.67 lb/A 75 DF (0.5 lb ai/A) per postemergence application. Make the first postemergence application early in the season while weeds are still less than 1-inch tall. Allow at least 14 days before the *second postemergence application*.

Note: For optimum control with postemergence metribuzin, apply before weeds are 1 inch tall.

Application methods Ground, chemigation, or aerial.

Incorporation methods Do not mechanically incorporate preemergence metribuzin treatments. Metribuzin may be applied preemergence and/or early postemergence through center pivot, solid set, and lateral roll system sprinklers. Apply proper rate in 0.25 to 0.75 inch of water (0.25 to 0.5 inch on sandy soil) as a continuous injection in center pivot and self-propelled wheel move systems, or in the last 15 to 30 min of set-in solid-set sprinkler irrigation systems.

Remarks Common cocklebur, most mustard species, shepherdspurse, or most grass species listed on label are controlled with *preemergence but not postemergence* applications. Russian thistle can be controlled *only with postemergence applications*. Other weeds listed on label may be controlled with preemergence or postemergence applications, *except for barnyardgrass and common sunflower, which require a preemergence + postemergence application for control*. See supplemental label for rates in seed potato fields. Metribuzin may not control triazine-resistant weeds populations. If applying postemergence with ground equipment, overhead moisture from rain or sprinkler irrigation within 24 hr after application may decrease control. Mechanical cultivation after treatment reduces weed control and may injure potato.

Do not apply within 24 hr of applying other pesticides. Do not apply after June 30 if treated land is to be planted to crops other than potatoes. Do not apply metribuzin within 60 days of harvest.

Caution Do not exceed 1 lb ai/A per year. Regardless of variety, if the crop is stressed or plant growth is slowed for reasons such as cloudy weather before application, herbicide metabolism within the plant also may be slowed resulting in injury. Symptoms could appear as chlorosis of the veins. If the variety is tolerant of metribuzin, then this injury will most likely be temporary since metribuzin metabolism usually speeds up once conditions improve. Do not apply postemergence within 3 days after cloudy, cool, or wet weather. Do not apply to potatoes under stress (moisture, disease, mechanical injury, nutrient deficiency, frost damage, or excessive heat), or crop may be injured.

Do not use a surfactant/adjuvant with metribuzin applied alone, and refer to the label for surfactant/adjuvant recommendations if metribuzin is tank mixed with another herbicide. otherwise, plant injury may result.

Potato Variety Sensitivity: Injury symptoms may include chlorosis of the veins, burning, or even death of the plant. Early-maturing, smooth-skinned, white-skinned, and all red-skinned potato varieties, especially Atlantic, Bellchip, CalWhite, Cascade, Centennial Russet, Cherry Red, Chieftan, Chipbelle, Dark Red Norland, Hi Plains, Hilite Russet, Jelly, Keystone Russet, Mazama, Modoc, Norchip, Nordonna, NorValley, Owyhee Russet, Red LaSoda, Red Norland, Shepody, Silverton Russet, Snowden, Superior, Wallowa Russet, Western Russet, White Pearl and White Rose, are moderately- to highly- susceptible and be injured by metribuzin applied preemergence. Preemergence applications on these varieties may cause even greater crop injury under adverse weather conditions, on coarse soils, under high soil pH, with higher rates per acre and with mechanical incorporation. Do not apply metribuzin postemergence to these varieties.

Some specialty and newly-released varieties may be sensitive to metribuzin applied preemergence or postemergence. When growing varieties for the first time, do not use metribuzin on a field scale until potato sensitivity is determined.

Tank-mixture examples Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. Metribuzin may be applied in two- or three-way tank-mixtures with the following registered herbicides or other trade names for the same active ingredient: flumioxazin (Chateau), S-metolachlor (Dual Magnum), EPTC (Eptam (chemigation only)), rimsulfuron (Matrix), dimethenamid-p (Outlook), or pendimethalin (Prowl H2O/3,3EC), and preemergence in three-way tank-mixtures only with rimsulfuron + either S-metolachlor EPTC, or pendimethalin, or in a three-way mixture with S-metolachlor + EPTC.

Re-cropping restrictions None on label.

Rotational cropping restrictions Do not plant onion, lettuce, cole and *Brassica* crops, or cucurbits during the growing season following metribuzin applications. Do not plant sugar beets for 18 months after metribuzin application. Certain cereal varieties are sensitive to metribuzin (see cereal section of label) and should not be planted during the growing season after metribuzin use unless moldboard plowing deeply enough to mix the upper 8 inches of soil and potato vines left in rows after harvest are uniformly distributed over the soil surface before plowing.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazinone

paraquat (Gramoxone SL 2.0 and 3.0; or several trade names depending upon the formulation)

Preemergence, only, when applied after planting. Foliar active

Rate 1 to 2 pints/A (0.25 to 0.5 lb ae/A) Gramoxone SL 2.0. Do not exceed three applications of Gramoxone per year.

Time Apply after weeds emerge but before potatoes emerge. Delay application to allow maximum weed emergence, but apply no later than ground cracking, before potatoes emerge. Paraquat will not control weeds that emerge after application. Do not exceed three applications per year.

Application methods Ground or aerial. Add a nonionic surfactant containing 75% or more surface-active agent at 0.125% v/v (1 pint/100 gal spray mix) or crop oil concentrate at 1% v/v (1 gal/100 gal spray mix) for ground applications or 1 pint/A for aerial applications. The herbicide kills most green plant growth on contact; thus good spray coverage is essential.

Remarks Nonselective, postemergence herbicide. Paraquat is rainfast 30 minutes after application.

Caution Restricted use pesticide due to acute toxicity. For retail sale to and use only by certified applicators – not to be used by uncertified persons working under the supervision of a certified applicator. Applications after crop emerges have reduced yields because of injury. Follow all use restrictions and precautions on label. Requires special safety equipment for handling, mixing, and spraying.

Tank-mixtures See label for allowed tank-mixtures. Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

pendimethalin (Prowl 3.3EC or several trade names, 3.3 lb ai/gal; or Prowl H2O or several trade names, 3.8 lb ai/gal)

Preemergence or postemergence. Soil active, only

Rate Prowl 3.3EC and other 3.3EC formulation: 1.2 to 1.8 pints/A (0.5 to 0.74 lb ai/A) in coarse soil; 1.8 to 2.4 pints/A (0.74 to 1 lb ai/A) in medium-texture soil with less than 3% organic matter; 2.4 to 3.6 pints/A (1 to 1.5 lb ai/A) in medium-texture soil with more than 3% organic matter or fine-texture soil with less than 3% organic matter; and 3.6 pints/A (1.5 lb ai/A) in fine-texture soil with more than 3% organic matter.

Prowl H2O and other trade names with the same formulation: 1.5 pints/A (0.7 lb ai/A) in coarse soil; 2 pints/A (0.95 lb ai/A) in medium-texture soil with less than 3% organic matter; and 3 pints/A (1.4 lb ai/A) in medium-texture soil with more than 3% organic matter or in fine-texture soil.

Time Preemergence after planting but before potatoes and weeds emerge, and early postemergence up to the 6-inch stage of potato growth. Pendimethalin applied preemergence is most effective when applied immediately after hilling to a weed-free surface because it is not effective on emerged weeds. Hilling is often combined with reservoir tillage (Dammer Diker®).

Mechanically-incorporated preemergence applications can be made before or at dragoff but before potatoes and weeds emerge,

Application methods Ground, chemigation, or aerial. Pendimethalin can be applied preemergence in liquid fertilizer or impregnated onto dry bulk fertilizer (see label for specific requirements/restrictions).

Incorporation methods Preemergence ground or aerial applications must have rain, irrigation, or shallow mechanical incorporation to move herbicide into the upper soil surface where weeds germinate. Pendimethalin is most effective with adequate rain or irrigation within 7 days of application. If mechanically incorporated, take care that equipment does not damage seed pieces or elongating sprouts. Preemergence-incorporated application can be made and incorporated before, at, or after dragoff but before potato and weeds emerge.

In furrow-irrigated fields, apply after final hilling and thoroughly incorporate 1 to 2 inches deep with equipment that will not damage potato seed pieces or elongating sprouts.

Chemigate with 0.5 to 0.75 inch irrigation water during the first sprinkler set. Apply only through center pivot, lateral move, end tow, side/wheel roll, traveler, big gun, solid set, or hand move irrigation systems.

Remarks Will not control established weeds. Pendimethalin is most effective with adequate rain or overhead irrigation after application.

Caution Do not exceed maximum rate allowed for any soil type. Do not apply postemergence if potatoes are stressed because the crop may be injured. Do not apply to peat or muck soils. Do not apply more than once per season.

Tank-mixture examples Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. Pendimethalin may be applied preemergence

with the following registered herbicides or other trade names for the same active ingredient: flumioxazin (Chateau), S-metolachlor (Dual Magnum), EPTC (Eptam), rimsulfuron (Matrix), dimethenamid-p (Outlook), and/or metribuzin. Pendimethalin + EPTC may be applied early postemergence by chemigation only (from potato crop emergence to 6 inch height). Pendimethalin + metribuzin may be applied early postemergence. Pendimethalin + EPTC + metribuzin may be applied by ground or chemigation preemergence in Idaho, Oregon, or Washington only. Pendimethalin + EPTC + metribuzin may be applied early postemergence by chemigation only.

Re-cropping restrictions If crop fails because of weather, any crop registered for preplant-incorporated applications of pendimethalin may be replanted without adverse effects the same year. If replanting is necessary, do not work the soil deeper than the treated zone.

Rotational cropping restrictions Wheat and barley may be planted 4 months after application. Do not plant sugar beets, red beets, or spinach for 12 months after application; plow soil 12 inches deep before planting these crops. All other crops can be planted the following year. If crop fails where irrigation is necessary to produce the crop treated with pendimethalin, and the treated land is fallowed in summer, do not plant winter wheat or winter barley as follow crops that fall.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pyroxasulfone (Zidua 4.17 lb ai/lb product formulated as a SC)

Preemergence, only; soil active

Rate 2.5 fl oz/A on coarse textured soil; 2.5 to 3.25 oz/A on medium- or fine-textured soils

Time Preemergence only. Can injure emerged potato plants. Zidua preemergence is most effective when applied immediately after hilling to a weed-free surface and then sprinkler incorporated. Hilling is often combined with reservoir tillage (Dammer Diker).

Application method May be applied by ground, chemigation, or aerial.

Incorporation method Must be incorporated/activated with at least 0.5 in rainfall and/or irrigation.

Rotational crop restrictions Alfalfa 10 months, sugar beet 12 months, wheat 1 month, small grains other than wheat 11 months.

Site of action Group 15. Inhibits very long chain fatty acid synthesis

Chemical family Isoxazoline

rimsulfuron (Matrix SG, Matrix FNV, Solida, or several trade names, 25%)

Single applications preemergence or postemergence; Split applications preemergence + postemergence, or postemergence + postemergence. Soil and foliar active.

Rate Preemergence or postemergence: use 1 to 1.5 oz/A (0.0156 to 0.023 lb ai/A); can split preemergence + postemergence or postemergence + postemergence. Do not exceed a total of 2.5 oz/A (0.039 lb ai/A).

Time May be applied preemergence after hilling or dragoff but before potatoes and weeds emerge; postemergence when weeds are small (less than 1 inch high or across for most species); as a split preemergence + postemergence application; or as a split postemergence + postemergence application.

For best results, apply rimsulfuron immediately after hilling, dragoff, or reservoir tillage (Dammer Diker) operation to a clean, newly prepared seedbed. Hilling is often combined with reservoir tillage (Dammer Diker).

Depending on rain or other environmental conditions and the top- growth density of some potato varieties, a second rimsulfuron application may be needed to control second flushes of germinating annual weeds and new growth of treated perennials from underground roots or stolons. Make the second application 14 to 28 days after the first, and apply to small weeds that are less than 1 inch high or diameter that are actively growing.

Quackgrass and crabgrass control may be better with postemergence than preemergence applications. For best Canada thistle control, apply rimsulfuron when weeds are small and actively growing. Quackgrass and Canada thistle not emerged at application require a second postemergence application for control.

Application methods Ground, chemigation, or aerial. Postemergence alone, always use a surfactant—a nonionic surfactant (NIS) at 0.125 to 0.25% v/v (1 to 2 pints/100 gal spray mix)—or a crop oil concentrate (COC) or methylated seed oil (MSO) at

1% v/v (1 gal/100 gal spray mix). Postemergence + metribuzin, use an NIS only; adding other adjuvant types such as MSO or COC may reduce crop tolerance. Do not apply aerially during a temperature inversion, when winds are gusty, or when conditions favor poor coverage and/or off-target spray movement.

Incorporation methods Chemigation: apply rimsulfuron in 0.33 to 1 inch/A water (0.33 to 0.5 inch on sandy soils) as a continuous injection in center pivot and self-propelled wheel move systems. For hand line and solid-set sprinkler irrigation systems, inject at the beginning of the set and apply 0.33 to 1 inch water.

Research in Idaho shows that chemigated rimsulfuron controls weeds more consistently if applied preemergence and at the full labeled rate of 0.023 lb ai/A (1.5 oz/A). If rimsulfuron is chemigated after weeds emerge, weeds must be very small (cotyledon to two-leaf stage) for acceptable control, and a nonionic surfactant must be added to the spray mix.

After preemergence ground or aerial applications, activate rimsulfuron in soil with 0.33 to 1 inch sprinkler irrigation (or a single rain) as soon as possible or within 5 days after application. Activating sprinkler irrigation is required regardless of soil moisture level at planting, and unless a single rain after application equals the activation moisture requirements.

Follow postemergence ground or aerial applications by 0.33 to 1 inch of rain or sprinkler irrigation no sooner than 4 hours or later than 5 days for soil activation and best weed control. After preemergence or postemergence applications, apply at least 0.33 inch sprinkler irrigation to sandy soil, 0.5 inch to sandy loam, 0.75 inch to silt, and 1 inch to clay.

Remarks Rimsulfuron is a sulfonylurea herbicide. Biotypes of kochia, prickly lettuce, and Russian thistle resistant to sulfonylurea herbicides are present in Idaho, Oregon, and Washington; rimsulfuron will not control them. Therefore, use resistance-management strategies with rimsulfuron. A key strategy is to tank mix rimsulfuron with a herbicide that has a different mechanism of action and is effective on the resistant species. Also, cultural practices such as tillage, preventing weed escapes from going to seed, and good sanitation can help delay development of herbicide-resistant weed populations.

Rimsulfuron is active on hairy nightshade *but does not control cutleaf nightshade*. When both hairy and cutleaf nightshade are present in a field, tank mix rimsulfuron with herbicide(s) that can control cutleaf nightshade such as EPTC (Eptam), flumioxazin (Chateau), S-metolachlor (Dual Magnum), dimethenamid-p (Outlook), or metolachlor to control both species. For information about rimsulfuron used in seed potatoes, see “Rimsulfuron—potatoes grown for seed” below.

Caution Applied postemergence, rimsulfuron may temporarily yellow potato foliage. Under environmental stress (cool, wet weather or hot or humid weather), rimsulfuron applied postemergence also may cause leaf malformations and stunt growth. Potatoes recover within 7 to 15 days. To reduce potential injury, apply only if the weather has been sunny at least 3 successive days. Avoid using COC or MSO adjuvants when potatoes are under heat stress.

Do not use on seed potatoes unless permitted by a supplemental label. Do not apply within 60 days of harvest. Do not cultivate later than 7 days before or for 7 days after a postemergence application. Optimum time for cultivation after postemergence application is 7 to 14 days. Avoid spray drift. Rimsulfuron can be very active even at low dosages, and many crops, including small grains, canola, sugar beet, peas, and onions, are very sensitive to rimsulfuron drift.

Tank-mixture examples Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. Preemergence tank-mixtures can be made with the following registered herbicides or other trade names for the same active ingredient: flumioxazin (Chateau), S-metolachlor (Dual Magnum), EPTC (Eptam), dimethenamid-p (Outlook), pendimethalin (Prowl 3.3EC or Prowl H2O), and/or metribuzin. Postemergence tank-mixtures can be made with metribuzin (use an NIS only) or EPTC (1 pint/A) and including 2 lb/A spray-grade ammonium sulfate (AMS) and methylated seed oil (MSO) or organo-silicon/modified seed oil blend; for best results, rain or sprinkler irrigation of 0.33 to 1 inch no sooner than 4 hr but not later than 1 day after application). Rimsulfuron may be tank mixed with suitable registered fungicides in postemergence applications; see label for specific combinations and instructions.

Re-cropping restrictions No specifics are stated on labels.

Rotational cropping restrictions Corn may be planted any time; winter wheat may be planted after 4 mo; barley, spring wheat, and spring oats after 9 months except in certain Idaho counties (Teton, Caribou, Madison east of Hwy. 20, and Fremont east of Hwy. 20) where barley may be planted after 18 months; beans (dry and succulent), sweet corn, sunflowers, and soybeans after 10 months; and sugar beets after 18 months. Alfalfa, mint, and grass/pasture/hay seed may be planted after 4 months, onions after 10 months, and peas after 8 months if potatoes were grown under sprinkler irrigation with a minimum of 18 inches water per season in sand, loamy sand, and sandy loam soils having not more than 1.5% organic matter. Rate restrictions apply to some counties in Washington and Oregon. Refer to supplemental labels. Rotation intervals may need to extend to 18 months if drought prevails after application and before planting the rotation crop unless supplemental sprinkler irrigation has been more than 15 inches during the potato growing season. Rotation interval may need to extend to 18 months after applying in seed

potato production if production practices decrease water amount/irrigation frequency and/or time for Matrix breakdown: that is, late planting. See supplemental label for details.

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

Chemical family Sulfonylurea

rimsulfuron (Matrix SG, Matrix FNV, Solida, or several trade names, 25%)

Potatoes grown for seed; Soil and foliar active.

Rate Preemergence: 1.5 oz/A. Postemergence: 1 to 1.5 oz/A. Split preemergence: 1 to 1.5 oz/A followed by postemergence at 1 oz/A. Postemergence: 1 oz/A followed by postemergence at 1 oz/A. Do not exceed 2.5 oz/A per year.

Time Preemergence or postemergence; Split applications preemergence + postemergence; Postemergence + postemergence.

Remarks May be used on potatoes grown for seed that use field-grown tubers as the planted seed piece, and are at least the progeny of the first field planting (first field planting uses laboratory-tested stocks that may be tissue-cultured plantlets, greenhouse-produced microtubers, minitubers, stem cuttings, or line selections). Do not use on potatoes grown for seed if grown from microtubers or transplants; these may be referred to as Generation 1, Nuclear, Elite 1, or Pre-Elite.

Incorporation methods To activate preemergence applications, moisture must be supplied by a single rain or sprinkler irrigation of 0.33 to 1 inch depending on soil texture (apply at least 0.33 inch to sandy soils, at least 0.5 inch to sandy loam soils, at least 0.75 inch to silt soils, and at least 1 inch to clay soils) within 5 days after application, to move herbicide 2 to 3 inches into the soil.

Caution Do not apply to plants stressed by cold, drought, herbicide injury, and/or insect or disease injury. Consider informing your state seed certification agency or inspector that this herbicide has been applied to your seed potatoes. Application to crop under stress (such as drought, frost, or extreme temperatures or temperature variations) may cause temporary chlorosis, leaf crinkling, pinching of terminal leaflet, and/or mottled leaf color. These may be similar to virus symptoms but usually disappear within 5 to 15 days of application.

Rotational cropping restrictions The rotational crop interval for spring barley is extended to 18 months due to the generally shorter growing seasons and different cultural practices in seed production in California, Idaho, Oregon, Montana, South Dakota, Washington, Colorado, and parts of North Dakota (all counties in North Dakota except Pembina, Towner, Walsh, Grand Forks, Trail, and Cass). The rotational planting interval for other crops on label may need to be extended to 18 months if seed potato production decreases water and/or time for herbicide breakdown. Practices that may shorten the breakdown are late planting or less frequent irrigations compared with commercial potato production practices. Potatoes can be planted any time after using this herbicide in potatoes grown for seed.

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

Chemical family Sulfonylurea

S-metolachlor (Dual Magnum or several trade names, 7.62 lb ai/gal)

Preemergence or postemergence when applied after planting, soil active, only.

Rate *Preemergence:* 1 to 2 pints/A (0.95 to 1.9 lb ai/A), using lower rates on soils that are coarse or low in organic matter. Up to 2.6 pints/A of S-metolachlor alone may be used where soil organic matter is between 6% and 20%. Do not apply preemergence after preplant incorporated application.

Postemergence (layby/After final hilling): 1.67 pints/A (1.6 lb ai/A). Postemergence application may be applied over a previous S-metolachlor application, but do not apply more than 3.6 pints/A of S-metolachlor in a single crop season. Postplant, mechanically incorporated application may be made any time after planting to drag-off but before potato emergence.

Note: S-metolachlor also is formulated as Dual II Magnum (7.64 lb ai/gal and includes a safener for corn) and as Dual IIG Magnum (16% G). Refer to labels of those herbicides to determine rates, timing, etc. for use in potatoes.

Time Apply post-plant mechanically incorporated, preemergence, or postemergence layby/after final hilling. Hilling is often combined with reservoir tillage (Dammer Diker). Postemergence application will not control emerged weeds. In furrow-irrigated fields, apply after final hilling and incorporate with equipment that will not damage potato seed pieces or elongating sprouts. For the preplant refer to the recommendations for S-metolachlor in the Before Planting section.

Application methods Ground, chemigation (center pivot irrigation systems only), aerial.

Incorporation methods *Postplant mechanically incorporated:* Use an implement that evenly distributes Dual Magnum in the top 2 inches of soil. Do not damage potato seed pieces or sprouts with incorporation equipment.

Preemergence (before potato and weeds emerge): If available, sprinkler irrigate with 0.5 to 1 inch of water within 2 days after application. Use lower water volume on coarse-textured soils and higher volume (1 inch) on fine-textured soils. If irrigation is not possible and rain does not occur within 2 days after planting and application, weed control may be decreased. Under these conditions, a uniform, shallow cultivation can be made as soon as weeds emerge, or incorporate with an implement that evenly distributes herbicide into top inches of soil. Do not damage seed pieces or sprouts with incorporation equipment.

Postemergence (layby/After final hilling): this application will not control emerged weeds. S-metolachlor may be applied postemergence over a previous application, but do not exceed 3.6 pints/A in a single growing season.

Preemergence or postemergence through chemigation: S-metolachlor may be applied preemergence or postemergence through center-pivot irrigation systems. Apply the proper rate, depending on soil type, in 0.5 to 1 inch of water before weeds emerge. Uniform water incorporation (first water after application) is important.

Caution If applied preplant incorporated, do not follow with a preemergence application. Do not use on muck or peat soils. Crop may be injured after S-metolachlor if soil moisture is abnormally high during early crop development. If cool, wet conditions occur after application, S-metolachlor may delay maturity and/or reduce yield of "Superior" or other early-maturing varieties. Do not harvest within 60 days after the at-planting to preemergence dragoff/After hilling application or within 40 days after a postemergence layby/After final hilling application.

Tank-mixture examples Read and follow the applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. S-metolachlor may be used in a two-way tank-mix with rimsulfuron, pendimethalin (Prowl H2O/3.3EC and several tradenames), or metribuzin and in a three-way tank-mix with EPTC + pendimethalin or with rimsulfuron + metribuzin (preemergence only).

Re-cropping restrictions If potato crop fails, corn, soybeans, potatoes, safflower, or other S-metolachlor-registered crops may be replanted immediately, provided that the rate of S-metolachlor applied to the lost potato crop was not greater than the labeled rate for the crop to be replanted. Do not make a second broadcast application.

Rotational cropping restrictions Do not plant barley, oats, rye, or wheat until 4.5 months after application. Alfalfa may be planted 4 months after application. Clover may be seeded 9 months after application. Any crop labeled for S-metolachlor use and pod and root crops, buckwheat, or milo (sorghum) may be planted the spring after treatment.

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

Chemical family Chloroacetamide

S-metolachlor + glyphosate (Sequence , a formulated premix of 3 lb ai S-metolachlor + 2.25 lb ae/gal glyphosate)

When applied after planting, preemergence, only. S-metolachlor only has soil activity. Glyphosate only has foliar activity.

Rate Do not exceed 2.5 pints/A formulated product on coarse soils, 3.75 pints/A formulated product on medium soils with less than 3% organic matter, or 4 pints/A formulated product on fine textured soils with greater than 3% organic matter. Do not exceed 4 pints of Sequence per acre per season.

Time This pre-mix may be applied during or after planting but before crop emergence.

Application methods Ground in 15 to 40 gal/A or aerial in 3 to 15 gal/A water. Do not apply this formulated product through any type of irrigation system. When foliage is dense, spray volume should be increased to ensure coverage of the target weeds. Flat-fan nozzles will result in the most effective application. Control of emerged weeds may be improved by adding dry ammonium sulfate at 8.5 to 17 lb/100 gallons of water. Liquid formulations of ammonium sulfate AMS may be used at an equivalent rate.

Remarks This pre-mix is considered a foliar systemic herbicide that may be applied to control a broad spectrum of emerged weeds and can provide some residual control of certain weeds listed on the label.

If rainfall or irrigation is not received within 7 days after application, residual weed control may be reduced. Under these conditions, cultivate or use other weed control measures if weeds develop.

If emerged at application time, weeds must be actively growing. For best possible annual weed control, apply to weeds 6 inches or less in height. If annual weeds have been mowed or grazed prior to application, wait for 3 to 4 inches of new growth to appear prior to application. When perennial weeds have been mowed or grazed, refer to the label for the recommended stage that new

growth should reach prior to application.

Caution *Application must be made before crop emergence.* Contact with potato foliage will result in crop injury. If cool, wet conditions occur after application, the pre-mix may delay maturity and/or reduce yield of “Superior” or other early-maturing varieties. Do not harvest within 60 days after application.

Tank-mixture examples The pre-mix can be tank-mixed with metribuzin or pendimethalin (Prowl H2O/3.3EC and several trade names) for control or suppression of annual and perennial weeds provided that the tank-mix product label allows use of the product. Refer to the labels for weeds controlled and application rates for these tank-mixtures.

Re-cropping restrictions If crop treated with the pre-mix alone is lost, corn, legume vegetables (succulent or dried), potatoes, sorghum, soybeans, sunflowers, or transplanted tomatoes may be replanted immediately.

Rotational cropping restrictions Do not plant barley, oats, rye, or wheat before 4.5 months after application; alfalfa 4 months; tomato 6 months; or clover 9 months. Buckwheat, milo (sorghum) cabbage, stone fruits, or tree nuts may also be planted in the spring following treatment.

Site of action (S-metolachlor) Group 15: inhibits very long chain fatty acid synthesis; (glyphosate) Group 9: inhibits EPSP synthase

Chemical family (S-metolachlor) Chloroacetamide; (glyphosate) none generally accepted

S-metolachlor + metribuzin (Boundary 6.5 EC or several trade names, a formulated premix of 5.25 lb ai S-metolachlor + 1.25 lb ai/gal metribuzin)

Preemergence or postemergence. S-metolachlor only has soil activity, metribuzin has soil and foliar activity.

Rate *Preemergence:* 1.5 to 2.9 pints/A (1 lb ai/A S-metolachlor + 0.23 lb ai/A metribuzin to 1.9 lb ai/A S-metolachlor + 0.45 lb ai/A metribuzin). *Postemergence* (for application in center pivot irrigation water only): 1.5 to 2.2 pints/A (1 lb ai/A S-metolachlor + 0.23 lb ai/A metribuzin to 1.3 lb ai/A S-metolachlor + 0.34 lb ai/A metribuzin).

Refer to label for rate ranges according to soil texture. Two applications permitted per year. In soils with 3 to 10% OM, do not exceed 5.1 pints/A per year (3.35 lb ai/A S-metolachlor + 0.8 lb ai/A metribuzin). In soils with 0.5 to 3% OM, do not exceed 4.95 pints/A per year (3.25 lb ai/A S-metolachlor + 0.77 lb ai/A metribuzin). Do not exceed 1 lb ai/A of metribuzin per year.

Time *Preemergence:* after planting, after a hilling operation, but before crop emergence. Hilling is often combined with reservoir tillage (Dammer Diker). *Postemergence:* after drag-off if that is usual practice, but at least 60 days before harvest.

Application methods *Preemergence:* ground, irrigation (center pivot irrigation equipment), or aerial.

Postemergence: center pivot irrigation equipment only. Meter into the irrigation water during the entire period of water application. Apply in 0.5 to 1 inch of water. More than 1 inch of water at application may reduce weed control by moving the herbicide below the effective zone in the soil. Refer to the “Center Pivot Irrigation Application” section of the label for more chemigation application information.

Incorporation methods Rain or irrigation is required to activate this pre-mix. In areas of low rainfall, follow a preemergence application with irrigation of 0.25 to 0.5 inch of water. Do not irrigate heavily immediately after application.

Remarks This pre-mix is recommended for preemergence weed control prior to or after potatoes emerge. It has some postemergence activity on weeds, but the consistency and spectrum of weed control is much better preemergence for weeds. As with many surface-applied herbicides, weed control and crop tolerance may vary with rainfall and/or soil texture.

Caution Preplant-incorporated applications are not recommended due to an increased risk of crop injury. The pre-mix is not recommended for muck or peat soils. Do not apply it postemergence if the weather in the next 3 days is predicted to be cool, wet, or cloudy, as crop injury may occur.

Do not harvest within 60 days of the last application. Do not apply after June 30 in Idaho, Oregon, or Washington if the treated land will be planted to a crop other than potatoes in the fall. See previous entries in this section for potato variety sensitivity to metribuzin.

In general, do not apply postemergence to early-maturing, smooth-skinned, white-skinned, or red-skinned varieties of potato. Preemergence applications may cause crop injury under adverse weather conditions, on coarse soils, under high soil pH, and with higher use rates. Potato varieties may vary in their response to a given herbicide application. When using the pre-mix for the first time on a particular variety, always determine crop tolerance before using on a field-scale.

Tank-mixture examples Read and follow the applicable “Restrictions and Limitations and Directions for Use” on all product

labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures. For preemergence applications in potatoes, Boundary 6.5EC may be tank mixed with other pesticide products registered for use in this way and timing in potatoes. For postemergence applications (center pivot irrigation applications only), i.e., where potato vines are exposed, there may be increased risk of crop injury from certain product mixtures. At this application timing, tank mix Boundary 6.5EC only with pesticide products that allow tank mixing and postemergence chemigation on their product label.

Re-cropping restrictions If replanting is necessary in fields previously treated with Boundary 6.5EC, the field may be replanted to soybeans or potatoes. Before replanting, refer to the specific crop use sections for recommendations, precautions, and restrictions.

Rotational cropping restrictions Do not plant winter barley, winter wheat, or alfalfa until 4.5 months after application. Corn, peas, spring barley, or spring wheat may be planted 8 months after application. Do not plant asparagus, forage grasses, lentils, tomatoes, or other crops not listed (except root crops) until 12 months after application. Onions, sugar beets, and other root crops may not be planted until 18 months after application.

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

Chemical family (S-metolachlor) Chloroacetamide; (metribuzin) Triazinone

sulfentrazone (Helm Sulfentrazone 4F, Sulfentrazone 4SC Prime Sulfentrazone 39.6 SC or several trade names, 4 lb ai/gal)

Preemergence, only; soil and foliar active

Note: See the labels for expiration date before using this product.

Rate 3 to 8 fl oz/A (0.094 to 0.25 lb ai/A) depending on soil texture, percentage of organic matter (OM), and pH. Do not apply more than 8.0 fl oz/A (0.25 lb ai/A) in the 12 months after the first application. Use sulfentrazone rates in the lower range when soil pH is above 7 (e.g. 3 fl oz/A on loam soil, pH 8.0. 1.1% O.M). This herbicide is usually more available in the soil solution for uptake when soil pH is above 7 than in soils with lower pH. Availability influences weed control effectiveness and crop response.

On coarse soils with less than or equal to 3% OM, apply 3.0 to 4.5 fl oz/A; on coarse soils with 3% or more OM, apply 4.5 to 6.0 fl oz/A. Do not apply to soils classified as sand and with less than 1% OM.

Medium-texture soils with less than 1.5% OM, apply 3 to 4.5 fl oz/A; medium-texture soils with 1.5 to 3% OM, apply 3.75 to 6 fl oz/A; medium-texture soils with more than 3% OM, apply 5.25 to 6.75 fl oz/A.

Refer to the EPA-approved labels for a soil categories chart and for information on fine-texture soil rates.

Time Apply after planting and dragoff but before potato crop emerges. Sulfentrazone is most effective when applied immediately after hilling and incorporated. Hilling is often combined with reservoir tillage (Dammer Diker).

Do not apply to emerged potatoes. If applied during or after potato emergence, crop response may be undesirable.

Application methods Ground, aerial, and chemigation. Make chemigation application only with center pivot, lateral move, end tow, solid set, or hand move irrigation systems. Apply in 0.25 to 0.5 inch water/A. Refer to the EPA-approved labels for specific application methods/requirements.

Application incorporation Performance is best with incorporation by either rain or overhead irrigation within 7 days after application. If dry conditions exist for 7 days post-application, incorporate sulfentrazone into the soil to a depth no more than 2 inches.

Remarks Potato varieties may vary in their response to sulfentrazone. Factors such as heavy rain after application; cool and moist conditions before row closure; stress from heat; and soil conditions such as coarse texture, low organic matter, or high pH may affect crop response to the herbicide and herbicide availability, increasing risk of adverse crop response.

Caution *Sulfentrazone can be highly mobile and readily available for uptake in soils with pH 7.5 or greater.* Irrigation with highly alkaline water (high pH) after applying sulfentrazone may increase the amount of herbicide available in the soil solution for uptake by the potato crop. Crop injury can occur from irrigation with water having pH above 7.5.

Tank-mixtures Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures including directions for re-cropping. Sulfentrazone may be applied with other soil-applied herbicides labeled for use in potatoes. *Use a herbicide providing grass control with sulfentrazone.*

Re-cropping restrictions If initial planting of labeled crops fails to produce a stand, only crops labeled for sulfentrazone or any

tank-mix partner used, whichever is more restrictive, may be planted.

Rotational crop restrictions (Minimum rotational intervals) Cabbage, dry shell peas and beans, lima beans, mint, potato, soybean, and sunflower, and spring wheat (Pacific Northwest states ID, OR, WA only) may be planted any time after sulfentrazone use in potatoes. Other intervals include 4 months: barley, rye, triticale, and wheat (other than spring wheat in ID, OR, WA); 10 months: field corn, sorghum; 12 months: sweet potato, other cereal grains such as buckwheat, oat, pearl or proso millet, and teosinte; 18 months: sweet or popcorn; and 24 months: canola. Sugar beet may not be planted for 36 months after application in potato. See the EPA-approved labels for all other crops not listed. When sulfentrazone is tank mixed with another product(s), read and follow the directions for all tank mix partners.

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

Chemical family Triazolinone

sulfentrazone + metribuzin (Sulfentrazone MTZ, a formulated premix of 0.27 lb ai metribuzin + 0.18 lb ai sulfentrazone per pound of product (total of 0.45 lb active ingredient per pound of product))

Preemergence, only; soil and foliar active.

NOTE: Sulfentrazone MTZ may be labeled for use in Idaho and Washington. Refer to the label for allowed use in Oregon and other states.

Rate 8.3 to 22.2 oz/A (0.14 lb ai/A metribuzin + 0.09 lb ai/A sulfentrazone to 0.37 lb ai/A metribuzin + 0.25 lb ai/A sulfentrazone) depending on soil texture, percentage of organic matter (OM), and pH.

Do not apply more than 22.2 oz/A Sulfentrazone MTZ DF (0.37 lb ai/A metribuzin + 0.25 lb ai/A sulfentrazone) or more than 0.25 lb ai/A sulfentrazone from any source in the 12 months after the first application.

Use rates in the lower range when soil pH is above 7. This herbicide is usually more available in the soil solution for uptake when soil pH is above 7 than in soils with lower pH. Availability influences weed control effectiveness and crop response.

Coarse soils with less than or equal to 3% OM—8.3 to 12.5 oz/A; coarse soils with greater than 3% OM—12.5 to 16.7 oz/A. Do not apply to soils classified as sand and with less than 1% OM.

Medium-texture soils with less than 1.5% OM—8.3 to 12.5 oz/A; medium-texture soils with 1.5 to 3% OM—10.4 to 16.7 oz/A; medium-texture soils with more than 3% OM—14.6 to 18.8 oz/A.

Refer to the EPA-approved labels for a soil categories chart and for information on fine-texture soil rates.

Time Apply after planting and dragoff but before potato crop emerges. Do not apply to emerged potatoes. If applied during or after potato emergence, crop response may be undesirable.

Application methods Ground, aerial, and chemigation. Make chemigation application only with center pivot, lateral move, end tow, solid set, or hand move irrigation systems. Apply in 0.25 to 0.5 inch water/A. Refer to the EPA-approved labels for specific application methods/requirements.

Application incorporation Performance is best with either rain or overhead irrigation within 7 days after application. If dry conditions exist for 7 days post-application, incorporate Sulfentrazone MTZ DF into the soil to a depth no more than 2 inches.

Remarks Potato varieties may vary in their response to Sulfentrazone MTZ because of the metribuzin in the pre-mix. When making an application of an untested variety, always determine the crop tolerance prior to planting or spraying with this product. Varieties sensitive to applications of metribuzin will more than likely be sensitive to Sulfentrazone MTZ. See previous entries in this section for potato variety sensitivity to metribuzin. In general, do not apply postemergence to early-maturing, smooth-skinned, white-skinned, or red-skinned varieties of potato. *Caution should especially be used if planting these varieties on marginal coarse soils.* Factors such as heavy rain after application; cool and moist conditions before row closure; stress from heat; and soil conditions such as coarse texture, low organic matter, or high pH may affect crop response to the herbicide and herbicide availability, increasing risk of adverse crop response.

Caution Sulfentrazone can be highly mobile and readily available for uptake in soils with pH 7.5 or greater. Metribuzin can be soluble regardless of soil pH. Irrigation with highly alkaline water (high pH) after applying Sulfentrazone MTZ may increase the amount of herbicide available in the soil solution for uptake by the potato crop. Crop injury can occur from irrigation with water having pH above 7.5.

Tank-mixtures Read and follow applicable “Restrictions and Limitations and Directions for Use” on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures including directions for re-cropping. Sulfentrazone MTZ DF

may be applied with other soil-applied herbicides labeled for use in potatoes.

Re-cropping restrictions If initial planting of labeled crops fails to produce a stand, only crops labeled for Sulfentrazone MTZ DF or any tank-mix partner used, whichever is more restrictive, may be planted.

Rotational crop restrictions (Minimum rotational intervals) Field corn, popcorn, and soybeans may be planted any time after Sulfentrazone MTZ use in potatoes. Other intervals include 4 months: barley, wheat; 12 months: alfalfa, dry beans, potatoes, sunflower; 18 months: sorghum, sweet corn; and 24 months: canola. Sugar beet may be planted 24 months after application and a successful bioassay. Crops with rotational intervals that are greater than 12 months after a Sulfentrazone MTZ application are the result of crop injury concerns. These crops should only be planted following a successful bioassay. Sorghum may be planted after 12 months where Sulfentrazone MTZ DF was applied at rates 20 oz/Acre or less in the previous cropping season.

See the EPA-approved labels for all other crops not listed. When Sulfentrazone MTZ is tank mixed with another product(s), read and follow the directions for all tank mix partners.

Site of action (sulfentrazone) Group 14: protoporphyrinogen oxidase (Protox) inhibitor; (metribuzin) Group 5: photosystem II inhibitor.

Chemical family (sulfentrazone) Triazolinone; (metribuzin) Triazinone

trifluralin (Treflan HFP or several trade names, 4 lb ai/gal)

Soil active, only

After planting: trifluralin can be applied before emergence, immediately following dragoff, or after potato plants have fully emerged.

Rate Coarse textured soil – 1 pint/A; medium textured soils – 1 to 1.5 pints/A; fine textured soils – 1.5 to 2 pint/A. Coarse and medium soils with 2 to 5% organic matter – 1.5 pints/A. Fine soils with 2 to 5% organic matter – 2 pints/A. Soils with 5 to 10% organic matter – 2 pints/A. Use lower rate in rate range in areas receiving less than 20 inches total annual rainfall and irrigation.

In Idaho, Oregon, and Washington, trifluralin can be applied in a split application before potatoes are planted + postemergence once plants have fully emerged and on soils with less than 2% OM: Rate is 0.75 pint/A (0.375 lb ai/A) before planting + 0.75 pint/A postemergence (0.375 lb ai/A), when potato plants have fully emerged. Incorporate the preplant application immediately.

Application method By ground, chemigation, or aerial.

Chemigation: trifluralin may be applied through properly equipped chemigation systems. Apply in 0.5 to 1 acre inch of overhead sprinkler irrigation after planting, before emergence, or immediately following dragoff or after the potato plants have fully emerged. Existing weeds must be destroyed by tillage or cultivation prior to application because trifluralin does not control established weeds. Refer to Chemigation section in the trifluralin labels for further information.

Incorporation Trifluralin must be incorporated within 24 hr after application.

Sprinkler incorporation: information for sprinkler incorporating trifluralin is not listed on the labels in the Potato section. For other crops on the labels, trifluralin can be incorporated and activated with rainfall or a single overhead sprinkler irrigation of 0.5 acre inch or more.

Mechanical: Set incorporation equipment so that the bed and furrow will be uniformly covered with a layer of treated soil. If the layer of treated soil is not uniform and the herbicide is concentrated over the bed, potato emergence may be retarded and stem brittleness can occur. When applying and incorporating trifluralin after potato plants have fully emerged, do not completely cover the foliage with treated soil. Likewise, do not completely cover foliage at subsequent cultivations. Be careful that incorporation machinery does not damage potato seed pieces or elongating sprouts

Caution If cultivation is required after application, avoid completely covering potato plants with treated soil. If treated soil is concentrated over the potato row/hill, emergence may be slowed and stems can become brittle. Do not apply to wet soils; weed control may be poor.

Tank-mixtures Read and follow applicable “Restrictions and Limitations and Directions for Use” on the trifluralin product labels. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions No information regarding re-cropping restrictions is provided on the trifluralin labels.

Rotational cropping restrictions Wait at least 12 months to plant sugar beets, red beets, spinach, corn, sorghum (milo), proso millet, oat, and annual or perennial grass crops or mixtures. Do not plant any of these crops for 18 months after application in fields that have not been irrigated, or that have been fallowed without irrigation or cultivation. Moldboard plowing 12 inches

deep before planting these crops can reduce the possibility of crop injury. For all other crops not listed, do not plant within 5 months after application.

Site of action Group 3: microtubule assembly inhibitor.

Chemical family Dinitroaniline, Thiocarbamate

Postemergence - Grass Control Only

clethodim (Select 2EC, Volunteer 2SC or several trade names, 2 lb ai/gal)

Foliar active, only

Rate 6 to 16 fl oz/A (0.094 to 0.25 lb ai/A). See label for recommended rates on specific grass species and growth stages. Use the high rate under heavy grass pressure and/or when grasses have reached maximum height. Do not exceed a total of 32 fl oz/A per season. Does not control broadleaves.

Time Apply to actively growing grasses with recommended weed heights. Apply when the first grass species in a mixed-grass-weed population reaches the recommended growth stage for treatment. Where irrigation supplements limited rain, apply clethodim as soon as possible within 7 days after irrigation. In arid regions, a second application generally controls perennial grasses more effectively than a single application. Make the second application 2 to 3 weeks after the first. Do not apply a postemergence broadleaf herbicide within 1 day after a clethodim application; grass control may be reduced. Do not cultivate less than 7 days before or after applying Select. Do not apply if rain is expected within 1 hour after application. Preharvest interval is 30 days.

Application methods Ground or aerial. Always use a crop oil concentrate (COC), 1 quart/A COC for ground applications and 1% v/v (but not less than 1 pint/A) COC for aerial applications. One to 2 quarts/A liquid fertilizer or 2.5 to 4 lb/A spray-grade ammonium sulfate (AMS) may be added to the spray mix in addition to COC. Adding AMS improves control for difficult species such as quackgrass, wild oat, volunteer cereals, or volunteer corn. Do not apply by chemigation.

Remarks Clethodim controls annual and perennial grasses but does not control sedges or broadleaves. Do not apply to stressed grass plants; control may be reduced. Perennial grass control is best if rhizomes or stolons are cut up before planting crop, to stimulate maximum emergence of grass shoots. Minor leaf spotting on treated potato plants may occur under certain environmental conditions, but new foliage will be unaffected.

Caution Grass crops such as corn, sorghum, rice, small grains, and turf are highly sensitive to Selector Volunteer. The Select and Volunteer 2EC labels do not specify uses in potato grown for seed.

Tank-mixtures Mixtures of clethodim and broadleaf herbicides may reduce grass control and an additional clethodim application may be necessary. Do not apply if any broadleaf weeds present are tall or dense enough to prevent proper coverage. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Re-cropping restrictions None on the label.

Rotational cropping restrictions None on the label.

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

Chemical family Cyclohexanedione

sethoxydim (Poast or several trade names, 1.5 lb ai/gal; Poast Plus or several trade names, 1.0 lb ai/gal)

Foliar active, only

Rate Most annual grasses: 1.5 pints/A Poast (or other trade names) with 1.5 lb ai/gal; or 2.25 pints/A Poast Plus (or other trade names) with 1.0 lb ai/gal formulation (0.28 lb ai/A). Volunteer cereals: 2 pints/A of the 1.5 lb ai or 3 pints/A of the 1.0 lb ai/gal formulation (0.375 lb ai/A). See the quackgrass and wild oat sections for specific rates and directions for control of these grasses. Does not control broadleaves.

Time Apply to actively growing annual grasses at stage of grass growth indicated on label. To control volunteer cereals, apply before tillering up to 4 inches tall. Do not cultivate within 5 days before or 7 days after application. Cultivating 7 days or later after application may help provide season-long control. Do not apply within 30 days of harvest.

Application methods Ground or aerial. In irrigated areas, it may be necessary to irrigate before treatment to ensure active

weed growth. Always add a nonphytotoxic oil concentrate to the spray tank at 32 oz/A or methylated seed oil (MSO) at 20 oz/A or Dash HC at 16 oz/A.

Remarks See labels for specific rates for weed species and weed size. Sethoxydim is most effective on actively growing grasses before they reach the maximum size listed on label. Larger, more mature grasses can often be controlled but may require two applications. Sethoxydim will not control annual bluegrass or any of the fine fescues and is relatively weak on downy brome.

Caution Control may be erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, or other factors. Do not apply if rain is expected within 1 hour after application. Do not apply through any type of irrigation equipment.

Tank-mixtures Sethoxydim can only be tank mixed with metribuzin in potatoes. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of **Tank-mixtures**. Do not apply this tank-mix if grasses to be controlled include rhizome Johnsongrass, quackgrass, Bermudagrass, wirestem muhly, volunteer corn or cereal, shattercane, red rice, or itchgrass.

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

Chemical family Cyclohexanedione

Hard-to-Control Weeds in Potato

Quackgrass

EPTC (Eptam 7E or several trade names, 7 lb ai/A)

Soil active, only

Apply and incorporate just before planting potatoes for quackgrass control.

Rate 4.5 pints/A (4 lb ai/A)

Remarks Thoroughly till quackgrass before application; chop rhizomes into pieces 2 to 3 inches or smaller. EPTC must be incorporated immediately and thoroughly after application, either with a rotovator or by cross-disking. Use on mineral soils containing less than 10% organic matter. See previous entries in this section for application and incorporation methods, remarks, cautions, re-cropping and rotational cropping restrictions, and site of action and chemical family information for this herbicide.

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

Chemical family Thiocarbamate

rimsulfuron (Matrix SG; Matrix FNV; Solida; or several trade names, 25%)

Soil and foliar active

Rate 1 to 1.5 oz/A of the 25% DF (0.0156 to 0.023 lb ai/A) + nonionic surfactant (NIS) at 0.125 to 0.25% v/v (1 to 2 pints/100 gal spray solution) or crop oil concentrate or methylated seed oil (MSO) at 1% v/v (1 gal/100 gal spray solution)

Time Apply postemergence to 4- to 6-inch quackgrass.

Remarks Also may use as a split postemergence + postemergence application. Use 1 to 1.5 oz/A rimsulfuron + 0.125 to 0.25% nonionic surfactant (NIS) (1 to 2 pints/100 gal spray solution) at each application; do not exceed a total of 2.5 oz/A rimsulfuron. In split applications, make the second 14 to 28 days after the first. See previous entries in this section for application and incorporation methods, remarks, cautions, re-cropping and rotational cropping restrictions, and site of action and chemical family information for this herbicide. Applied postemergence, rimsulfuron may temporarily yellow potato foliage.

Under environmental stress (cool, wet or hot or humid weather), rimsulfuron applied postemergence also may stunt growth and cause leaf malformations. Potatoes recover within 7 to 15 days. To reduce injury, apply only if it has been sunny at least 3 successive days. Do not use on seed potatoes unless permitted by a supplemental label.

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

Chemical family Sulfonyleurea

sethoxydim (Poast, 1.5 lb ai/gal or several trade names; Poast Plus or several trade names, 1 lb ai/gal)

Foliar active, only

Rate 2.5 pints/A the 1.5 lb ai/gal formulation or 3.75 pints/A of the 1.0 lb ai/gal formulation (0.47 lb ai/A)

Time Apply when quackgrass shoots are 6 to 8 inches tall. A second application at 0.28 lb ai/A (1.5 pints/A of the 1.5 lb ai/gal or 2.25 pints/A of the 1.0 lb ai/gal formulations) may be needed if quackgrass re-grows. Best results usually require repeated applications.

Remarks Always add a nonphytotoxic oil concentrate to spray tank at 2 pints/A. Add nitrogen to improve control. Cultivate 7 to 14 days after an initial or sequential application to aid control. May not eradicate quackgrass. Do not tank mix sethoxydim with other herbicides for control of quackgrass.

See previous entries in this section for application methods, remarks, cautions, re-cropping and rotational cropping restrictions, and site of action and chemical family information for this herbicide.

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

Chemical family Cyclohexanedione

Wild Oat

EPTC (Eptam 7E or several trade names, 7 lb ai/gal)

Soil active, only

Rate 3.5 to 7 pints/A (3 to 6 lb ai/A)

Time Preplant: preplant incorporated or preemergence. When applied after planting apply and immediately incorporate into soil before planting potatoes. Preemergence: after a clean cultivation (hilling).

Remarks If applied preplant, thoroughly incorporate into soil immediately after applying 2 to 3 inches deep by cross-disking 4 to 6 inches deep or by tilling with a power-driven rotary tiller cutting 2 to 3 inches deep.

If applied after planting, incorporate either mechanically into the top 2 to 3 inches of soil or by sprinkler irrigation. See previous entries in this section for application and incorporation methods, remarks, cautions, re-cropping and rotational cropping restrictions, and site of action and chemical family information for this herbicide.

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

Chemical family Thiocarbamate

Paraquat +glyphosate (Gramoxone 2.0 or 3.0; or several trade names or glyphosate)

Foliar active, only

Rate Apply to fallow ground before planting potatoes: 1.5 to 4 pints/A Gramoxone SL (0.75 to 1 lb ae/A).

After planting and before potatoes emerge: 1 to 2 pints Gramoxone SL (0.5 to 1 lb ae/A) + a nonionic surfactant with 75% or more surface-active agent at 0.125% v/v (1 pint/100 gal spray mix) or crop oil concentrate at 1% v/v (1 gal/100 gal spray mix) for ground applications or 1 pint/A for aerial applications.

Timing After planting and before potatoes emerge - glyphosate at 0.38 lb ae/A.

Remarks These herbicides control only wild oat emerged at the time of application. Wild oat emerging later will not be controlled. Some glyphosate formulations require nonionic surfactant (NIS) ; see label for details. Adding 1 to 2% dry ammonium sulfate (AMS) by weight or 8.5 to 17 lb/100 gal spray-mix may increase performance. The equivalent rate of AMS in a liquid formulation also may be used.

Caution **Restricted use pesticide due to acute toxicity.** For retail sale to and use only by certified applicators – not to be used by uncertified persons working under the supervision of a certified applicator. Do not apply either paraquat or glyphosate if potatoes have emerged, because crop may be injured. See previous entries in this section for application and incorporation methods, remarks, cautions, re-cropping and rotational cropping restrictions, and site of action and chemical family information for this herbicide.

Site of action paraquat - Group 22: photosystem 1 electron diversion; glyphosate - Group 9: inhibits EPSP synthase

Chemical family (paraquat) bipyridilium; (glyphosate) none generally accepted

rimsulfuron (Matrix SG; Matrix FNV; Solida; or several trade names, 25%)

Soil and foliar active

Rate 1 to 1.5 oz/A (0.0156 to 0.023 lb ai/A rimsulfuron + nonionic surfactant (NIS) at 0.125% to 0.25% v/v (1 to 2 pints/100 gal spray solution) or 1% v/v (1 gal/100 gal spray solution) crop oil concentrate or methylated seed oil (MSO) if wild oat are emerged.

Time Preemergence after hilling or dragoff but before potatoes and wild oat emerge or postemergence to wild oat in the two- to four-leaf stage (3 to 5 inches tall).

Remarks See previous entries in this section for application and incorporation methods, tank mixtures, remarks, cautions, re-cropping and rotational cropping restrictions information for this herbicide.

Caution Applied postemergence, rimsulfuron may temporarily yellow potato foliage. Under environmental stress (cool, wet, or hot or humid weather), rimsulfuron applied postemergence also may stunt growth and cause leaf malformations. Potatoes recover within 7 to 15 days. To reduce potential injury, apply only if the weather has been sunny for at least 3 successive days. Do not use on seed potatoes unless permitted by a supplemental label.

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

Chemical family Sulfonylurea

sethoxydim (Poast or several trade names 1.5 lb ai/gal; Poast Plus or several trade names, 1 lb ai/gal)

Foliar active, only

Rate 1.5 pints/A of the 1.5 lb ai/gal; or 2.25 pints/A of the 1.0 lb ai/gal formulation (0.28 lb ai/A)

Time Apply to actively growing wild oat up to 4 inches tall.

Remarks Always add a nonphytotoxic oil concentrate to the spray tank at 2 pints/A or methylated seed oil at 20 oz/A or Dash HC at 16 oz/A. Depending on the crop, the addition of ammonium nitrate or ammonium sulfate is recommended. Sethoxydim can only be tank mixed with metribuzin in potatoes.

Caution Control may be erratic on grasses stressed by drought, temperature extremes, insect damage, herbicide injury, and other factors. Do not apply if rain is expected within 1 hour after applying. Do not cultivate within 5 days before or 7 days after applying. Preharvest interval is 30 days. See previous entries in this section for application and incorporation methods, remarks, cautions, re-cropping and rotational cropping restrictions specific to this herbicide.

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

Chemical family Cyclohexanedione

Tank-Mixtures and Herbicide Resistance

Not all tank-mixtures labeled for use in potatoes are listed for each herbicide in this section. See the potato herbicide labels for allowed tank-mixtures. Read and follow applicable "Restrictions and Limitations and Directions for Use" on all product labels in a tank-mixture. The most restrictive labeling applies to use of tank-mixtures.

Target weed species in a given field with the most appropriate herbicide tank mixtures for those species (i.e., the same mixture may not be the best across all fields in an operation).

Herbicide resistant weed management: Prevent or delay the development of a herbicide resistant weed population. Do not include herbicides with the same site of action in the tank mixture. Use herbicides in the tank mixtures that have overlapping control /activity of weed species present in a field (i.e., two or more herbicides have activity on the same weed species).

Chemical Potato Vine Kill (Desiccation)

carfentrazone-ethyl (Aim EC, 2 lb ai/gal, 40% WDG or several trade names)

Rate 3.2 to 5.8 fl oz/A of the EC, 2 to 3.6 oz/A of the WDG (0.05 to 0.09 lb ai/A). Do not exceed 7.2 oz/A EC or 11.6 oz/A WDG (0.018 lb ai/A) per crop season as a desiccant.

Time For best results, apply when potato crop is in early stages of natural senescence. Desiccation generally is adequate within 14 days after initial treatment. If potato crop vegetation is actively growing when desiccation begins, two applications may be required to desiccate leaf and stem tissue. If a second application is necessary, wait 7 to 14 days after the first application.

Application methods Ground or aerial. It is essential to thoroughly cover the potato plant. Use enough water to thoroughly cover potato leaves and vines. Do not apply this product through any type of irrigation system.

Ground: Apply in at least 20 gal/A of water using 80 or 110 flat-fan nozzles. Vary spray volume and spray pressure according to density of potato canopy and vines to assure thorough spray coverage. Increase spray volume and pressure if potato canopy is dense or if weather is cool, cloudy, or dry. Increased spray volumes enhance performance. Apply with a crop oil concentrate (COC) at 1% v/v or with a methylated seed oil (MSO) at a minimum of 1 quart/A or 1% v/v when applied in volumes of more than 20 gal/A.

Aerial: Apply with aerial equipment 5 to 10 gal/A of water using higher volumes on dense potato canopies and vines. Apply 10 ft or less above potato canopy and use low drift nozzles.

Remarks Dense potato canopy, large plant size, and environmental conditions not conducive to product absorption or activity will reduce initial application efficacy and increase the need for a second application. Use higher rate during cool or cloudy weather or when vine growth is heavy. Do not use high rate if soil moisture is low or temperatures are high, or stem ends may discolor. When carfentrazone-ethyl is applied alone, grazing and hay operations may proceed with no restrictions.

Caution Do not exceed 0.181 lb ai/A total product per crop season. This total allowable usage applies to all applications made to the field per calendar year including burndown treatments and vine kill. Do not exceed 0.018 lb ai/A per crop season as a desiccant. Preharvest interval is 7 days. Personal protective equipment must be worn for handling and application; see label.

Tank-mixtures Carfentrazone-ethyl may be applied in a tank-mix or as a sequential application with other potato desiccants. Refer to the other product's label for restrictions on tank-mixtures, and observe all label precautions, instructions, and rotational cropping restrictions.

Rotational cropping restrictions Following an application of carfentrazone-ethyl, a treated field may be rotated only to a registered crop (registered crop may be planted at any time). All other crops may be planted after 12 months.

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

Chemical family Triazolinone

diquat (Reglone Desiccant or several trade names, 2 lb diquat cation/gal)

Rate 1 to 2 pints/A (0.25 lb ai/A to 0.5 lb ai/A) in a single application. May be applied in two applications, but do not exceed a total of 4 pints/A (1 lb ai/A) per season before harvest.

Time Preharvest interval is 7 days. Do not exceed 0.5 lb ai/A (2 pints/A) in a single application. A 5-day interval between sequential applications is recommended.

Application methods Ground or aerial. Apply with a nonionic surfactant at 0.5 to 4 pints/100 gal spray mix. Do not apply through any type of irrigation system.

Remarks Do not apply in full sunlight; early-morning or later afternoon/early evening time is best. Do not apply to drought-stressed potatoes. Diquat is rainfast 30 minutes after application. Cool, cloudy weather slows activity but will not affect performance.

Caution A moderately toxic herbicide that requires protective gear for handling and application. Follow all use restrictions and precautions on label. Make last application at least 7 days before harvest. Do not feed forage from treated potatoes to livestock. Avoid applications in extremely dusty conditions because dust coating the plant surface can reduce desiccant activity.

Tank-mixtures Diquat can be applied in a tank-mixture at time of potato desiccation with fungicides listed on the supplemental (2ee) label and a nonionic surfactant (NIS) to facilitate harvest. Otherwise, no tank-mixtures (or tank-mixture restrictions) are listed on label.

Rotational cropping restrictions None listed on label.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

glufosinate-ammonium (Rely 280 or several trade names, 2.34 lb ai/gal)

Rate 21 fl oz/A (0.38 lb ai/A) in a single application only; do not split application.

Time Beginning of natural senescence of potato vines.

Application methods Apply in 20 to 100 gal/A of water by ground or 5 to 10 gal/A by air. Use enough water to thoroughly cover potato vines. Spray coverage on dense crop canopy will be better with higher water volumes.

Remarks Potato varieties with heavy or dense vines may require an application of another desiccation product to complete desiccation.

Caution Do not apply to potatoes grown for seed. Preharvest interval is 9 days.

Tank-mixtures No tank-mixtures or tank-mix restrictions on label.

Rotational cropping restrictions Wait at least 30 days (formerly, 70 days) after application to plant wheat, barley, buckwheat, millet, oats, rye, sorghum, and triticale. Wait at least 120 days after the last application to plant rotation crops other than those listed. Corn and soybeans may be planted any time after application.

Site of action Group 10: glutamine synthase inhibitor

Chemical family Phosphinic acid

paraquat (Parazone 3.0, 3 lb paraquat cation/gal)

Rate 0.7 to 1.3 pints/A (0.26 to 0.49 lb ai/A). Use two applications of 0.6 pint/A if vine growth is dense. Use 1.3 pints/A where quick vine kill is desired.

Time Begin application when leaves turn yellow. Immature potato foliage tolerates Gramoxone Max. Make split applications at least 5 days apart.

Application methods Ground application only, plus a nonionic surfactant with 75% or more surface-active agent at 0.125% v/v (1 pint/100 gal spray mix) or crop oil concentrate at 1% v/v (1 gal/100 gal spray mix).

Remarks For fresh-market potatoes only. Do not use in potatoes that will be stored or used for seed.

Caution Do not apply to drought-stressed potato vines. Potatoes must be harvested promptly after desiccation, and consumed or processed immediately. Do not pasture livestock in treated potato fields. Do not exceed 2.7 pints/A per season. Do not use on muck or peat soils.

Tank-mixtures No tank-mixtures or tank-mix restrictions are listed on the label.

Rotational cropping restrictions All rotational crops may be planted immediately after the last paraquat application.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

pyraflufen-ethyl (Vida or several trade names, 0.208 lb ai/gal)

Rate 2.0 to 5.5 fl oz/A (0.00325 to 0.00894 lb ai/A) in a single application. May be applied sequentially, but do not exceed two applications or a total of 11 fl oz/A (0.0179 lb ai/A) per season before harvest.

Time For best results, apply when potato crop is in early stages of natural senescence. A second application of this or another desiccation product may be needed under certain climatic conditions to ensure complete desiccation. Make one to two applications using ground equipment at a minimum 7-day interval.

Application methods Ground or aerial. Apply in at least 5 gal/A spray mix by air or 20 to 50 gal/A using ground equipment. Use an approved agricultural buffering agent buffering to less than pH 5 or less if using Vida in a water source of \geq pH 5. Always buffer the water source before adding pyraflufen-ethyl. High temperatures and sunlight following application generally will enhance performance and speed desiccation. Do not apply through any type of irrigation system

Remarks A repeat application of pyraflufen-ethyl or another desiccant may be needed under certain climatic conditions to ensure complete desiccation. Pyraflufen-ethyl is rainfast within 1 hour after application. Do not apply within 7 days of harvest.

Caution A corrosive product that can cause irreversible eye damage; requires goggles or a face shield and other protective gear for handling and application. Follow all use restrictions and precautions on label. Do not exceed 2 applications or a total of 11 fl oz per acre per season for potato desiccation.

Tank-mixtures Pyraflufen-ethyl may be applied in tank-mixtures or sequentially with other desiccant/harvest aides such as

diquat for improved desiccation. Weather, crop conditions, or the presence of certain weeds, crop damaging insects, or diseases will indicate the inclusion of other products in desiccation Tank-mixtures. Read and follow label directions and restrictions for each tank-mix product.

Rotational cropping restrictions Do not plant any rotational crops except corn, soybean, or wheat for 30 days after the last pyraflufen application.

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

Chemical family Phenylpyrazole

sulfuric acid (93%)

Rate 17 to 28 gal/A

Time Repeat application after 5 days if vines are not completely desiccated. Preharvest interval is 5 days.

Application methods For retail sale and use only by certified applicators or appropriately licensed persons directly under their direct supervision. Apply undiluted sulfuric acid product.

Remarks This material is not as dependent on temperature or other environmental conditions as most other desiccants.

Caution A restricted-use herbicide. Sulfuric acid is very caustic. Requires protective clothing, including dust/mist filtering respirator, chemical-resistant headgear, protective eyewear, chemical-resistant boots, and waterproof gloves. Applicators must use a closed system/enclosed cab meeting Worker Protection Standards for agricultural pesticides. Adequate supply of water should be immediately available for drenching.

Tank-mixtures None on label.

Rotational cropping restrictions None on label.