

SECTION H.

CORN

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Field, Silage, and Seed Corn

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Herbicide-resistant Corn

Herbicide-resistant field corn is now commonly grown in the Pacific Northwest. There are four major types of herbicide resistant corn: including some that are genetically engineered; and some that are developed by genetic selection of tolerant corn individuals and/or varieties. Failure to apply the correct herbicide to the correct crop will result in serious injury to the corn. Refer to the appropriate herbicide label for guidelines on how to use each product on herbicide-resistant corn.

IMI (IR/IT¹) or Clearfield (CL) Corn was developed by genetic selection to tolerate imidazolinone herbicides. Lightning (imazethapyr + imazapyr) controls nearly all annual grass and broadleaf weeds (except ALS-resistant weeds) and suppresses quackgrass and Canada thistle. Optill (imazethapyr + saflufenacil), Pursuit (imazethapyr), and Pursuit Plus (imazethapyr + pendimethalin) also can be applied to Clearfield corn. Some IMI varieties (IR) are tolerant to several sulfonylurea (e.g., Accent, Exceed) and sulfonamide (Broadstrike products, Python) herbicides and are sometimes used to reduce the injury potential of these products when applied alone or in combination with organophosphate (OP) insecticides.

LibertyLink Corn is tolerant to over-the-top applications of products containing glufosinate including Liberty, Ignite, and Rely 280 herbicides. These products provide broad-spectrum control of annual broadleaf and grass weeds at low to moderate weed densities. Apply to LibertyLink corn up to 24 inches with seven or fewer collars. Apply when weeds are small because translocation is limited. Glufosinate does not control large or well-tillered grasses such as yellow foxtail, wild oat, or volunteer cereals. Glufosinate is non-residual; controlling multiple weed flushes may require multiple applications or applying with a residual herbicide. Apply with AMS fertilizer. Refer to label for weeds controlled, application information and timing, tank-mix options, and restrictions. Ignite can be used to control weeds resistant to other herbicides.

Roundup Ready Corn is tolerant to glyphosate at labeled rates up to 30 inches tall with eight or fewer collars, and will control most annual and perennial weeds. Roundup Ready Corn II has elevated tolerance to glyphosate. Apply glyphosate to corn only if it is confirmed to be tolerant to glyphosate, or the corn crop may be killed. Certain formulations do not require additional nonionic surfactant, while others require either partial or full nonionic surfactant rates. Add ammonium sulfate to all glyphosate formulations at 2 to 6 lb/100 gal water or at 1 lb/a if applied at less than 12 gal/a.

¹ IR/IT; imidazolinone resistant or tolerant varieties

In-crop application timing may not be appropriate for effective perennial weed control. Glyphosate is a nonselective, non-residual, translocated herbicide that controls grasses and broadleaf weeds. However, glyphosate may not control some broadleaved weeds such as kochia, nightshade, wild buckwheat, horseweed (marestail), dandelion, and lambsquarters if applied alone or after only one application.

Poast Protected Corn hybrids were developed with traditional breeding and selection techniques and are tolerant to broadcast over-the-top applications of sethoxydim containing products such as Poast, Poast Plus, Rezult, and Sethoxydim SPC herbicides. These herbicides will control annual grasses when applied with other postemergence herbicides or help to manage escaped grasses.

Preplant, Preplant Incorporated, or Preemergence

acetochlor (Surpass or Cadence)

Consult label for corn uses or types

Rate 0.8 to 3 lb ai/a. Consult appropriate label for rates.

Time Apply preplant or preemergence.

Remarks Labels for the products differ. Follow the label for the product being used. Use lower rates on coarse soils with low organic matter. May be surface applied or incorporated into top 1 to 2 inches of soil. If rain or 0.25 to 0.75 inch of overhead irrigation does not occur within 7 days of a surface application, shallowly incorporate herbicide with a rotary hoe or similar device. May be tank mixed with several other herbicides to broaden activity.

Caution Improper incorporation methods or poor soil preparation may reduce weed control. Consult label for crop rotation restrictions.

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

Chemical family Chloroacetamide

Acetochlor + Mesotrione (Harness Max)

Rate 1.12 - 1.92 lb ai/a Acetochlor + 0.096 - 0.18 lb ai/a Mesotrione (40-75 fl oz/a Harness Max)

Time Apply preplant, preemergence, or postemergence to field corn, seed corn, and yellow popcorn.

Remarks Harness Max is a premixture of acetochlor (HG 15) and mesotrione (HG 27). Postemergence applications can be made to corn up to 11 inches in height. Harness Max will

provide excellent control of annual small-seeded broadleaf and grass weeds as well as postemergence control of some large-seeded broadleaf weeds. Use lower rate on coarse soils and lower organic matter (sand, sandy loams), higher rate on fine soils (silt loam, clays, silts) and soils high in organic matter. Consult label for compatible herbicide tankmix partners and adjuvants. Precipitation or overhead sprinkler irrigation is required after application to move the herbicide treatment into the weed germination zone in order to control weeds that have not emerged. The amount of moisture required for maximum activity depends on existing soil moisture, soil type, and organic matter content, but 0.5 to 0.75 inch is normally adequate.

Caution Do not apply to within 50 ft of any well where the depth of ground water is 30 ft or less. Field corn, seed corn, yellow popcorn, or grain sorghum can be planted immediately after application; wheat (4 months); alfalfa, peanuts, soybean, cotton (10 months); barley, rye, oats, millet (the spring following application); cucurbits, dry beans, peas, sugar beets and all other rotational crops (18 months). Refer to the label for all rotational restrictions. Do not apply to white popcorn, sweet corn, or ornamental (Indian) corn. Do not exceed a maximum of 3 lb ai/a of acetochlor from any product or combination of products containing acetochlor per year. Do not exceed a maximum of 0.24 ai/a of mesotrione from any product or combination of products containing mesotrione per year. Do not exceed a maximum of 0.19 lb ai/a of mesotrione applied postemergence from any product or combination of products containing mesotrione per year. Do not make more than 2 applications of this product per year (preemergence followed by postemergence or two postemergence applications are allowed). Only one postemergence application may be made if Harness Max has been used pre-emergence. Applications must be at least 14 days apart. Mixing Harness Max with organophosphate or carbamate insecticide will result in severe corn injury.

Allow a minimum of 60 days before harvesting forage, grain, or stover or feeding corn forage to livestock

Site of action Groups 15 and 27: inhibiting very long chain fatty acid synthesis and 4-hydroxyphenylpyruvate dioxygenase (4-HPPD)

Chemical family Chloroacetamide + Triketone

atrazine (Aatrex 4L and several other trade names)

Rate 1.6 to 2 lb ai/a (2.5 lb ai/a maximum rate of product per season)

Time Apply preplant, preemergence, or postemergence when weeds are less than 1.5 inches tall.

Remarks Use lower rate on coarse soils (sand, sandy loams), higher rate on fine soils (silt loam, clays, silts) and soils high in organic matter. Overhead moisture required for maximum activity. East of the Cascades, postemergence applications may be made under sprinkler irrigation. Emerged annual grasses, such as barnyardgrass and green foxtail, are not adequately controlled when soil surface is dry at application and/or grasses are past the two-leaf stage. East of the Cascades, where rill irrigated, incorporate 2 inches deep before planting. If applying postemergence, control is enhanced by adding a nonionic adjuvant or a crop oil concentrate to the mix.

Caution A restricted-use herbicide. Plant only corn during the season of treatment. West of the Cascades, crops other than corn can be planted the year after treatment at 2 lb ai/a or less.

East of the Cascades, do not plant any crop other than corn the year after treatment. Some populations of redroot pigweed, groundsel, kochia, and lambsquarters have evolved resistance to atrazine. Combine other herbicides with atrazine if these species are present. Do not graze treated area or feed treated forage to livestock for 21 days after application. After harvesting a treated crop, plow and thoroughly till the soil in the fall or spring to minimize possible injury to rotational spring-seeded crops.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

dimethenamid-P (Outlook, Commit, Sortie)

Rate 0.47 to 0.98 lb ai/a (10 to 21 fl oz/a product)

Time Apply preplant or preemergence. May be applied at layby when corn is more than 12 inches tall but before it is more than 36 inches tall.

Remarks Consult label for application rate in relation to soil type. Use lower rates on coarse soils with low organic matter or low cation exchange capacity (CEC). Control is best when applied and incorporated into soil by overhead moisture or a light mechanical tillage before weed seedlings emerge. Till 1 to 2 inches deep to incorporate. May be tank mixed with atrazine or pendimethalin to improve broadleaf weed control. Consult the label for more options for tank-mixes to broaden weed control spectrum. May be applied through certain types of irrigation systems.

Caution Poor soil preparation or improper herbicide incorporation reduces weed control.

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

Chemical family Chloroacetamide

flumioxazin (Chateau WDG)

Supplemental label for preplant residual in field corn only

Rate 0.188 to 0.38 lb ai/a (2 oz/a Chateau SW)

Time Apply 14 to 30 days before planting field corn at 2 oz/a.

Remarks Apply with preplant burndown herbicides such as glyphosate, glufosinate, or paraquat in no till or minimum tillage fields.

Caution Do not irrigate between emergence and 2-leaf stage.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Diphenylether

flufenacet + metribuzin (Axiom DF)

Rate 0.78 lb ai/a flufenacet + 0.19 lb ai/a metribuzin (23 oz Axiom DF)

Time Apply pre-emergence and activate with moisture prior to weed emergence.

Remarks Do not exceed 0.78 lb ai/a flufenacet, 0.19 lb ai/a metribuzin (23 oz Axiom DF) per season. If any crop treated with Axiom DF is lost, field corn may be planted immediately. DO NOT make a second application of Axiom DF.

Caution Do not apply flufenacet + metribuzin through any type of irrigation system, do not apply aerially, do not use flood irrigation to apply, activate, or incorporate flufenacet + metribuzin herbicide in the soil. Do not apply flufenacet + metribuzin in tank mixture when environmental conditions may favor drift to non-target sites.

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

Chemical family oxyacetamide + triazinone

halosulfuron + thifensulfuron (PermitPLUS)

For preplant and postemergence residual in field corn

Rate 0.031 lb ai/a halosulfuron + 0.0036 lb ai/a thifensulfuron (0.75 oz/a)

Time When used alone, PermitPLUS can be applied over the top or with drop nozzles to 2- to 6-leaf corn (1 to 5 collars). PermitPLUS can be applied only once per season at a rate of 0.75 oz/a (0.031 lb/a halosulfuron + 0.0036 lb/a thifensulfuron). PermitPLUS can also be applied postemergence.

Remarks Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage. Apply PermitPLUS to field corn hybrids with Relative Maturity (RM) of 88 days or more, including "food grade" (yellow dent, hard endosperm), waxy, and high-oil corn.

Caution Do not irrigate between emergence and 2-leaf stage.

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

Chemical family Sulfonylurea

mesotrione (Callisto)

Do not use on white popcorn

Rate 0.078 to 0.094 lb ai/a (2.5 to 3 fl oz/a)

Time Apply preemergence.

Remarks Controls several annual broadleaf weeds. If overhead moisture (0.25 inch) is not received within 7 to 10 days after application, rotary hoe to activate the herbicide. Will not control most grass weeds. May be tank mixed with preemergence grass herbicides to broaden activity. Do not mix with organophosphate (i.e. Lorsban) or carbamate insecticides due to crop injury concerns.

Caution Do not exceed 0.24 lb ai/a (7.7 oz/a product) per season. See label for crop rotation restrictions.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

pendimethalin (Prowl H₂O)

Rate 0.95 to 1.9 lb ai/a (2 to 4 pints/a Prowl H₂O)

Time Apply after planting but before crop or weeds emerge.

Remarks Rate depends on soil type and organic matter content. Plant in a seedbed that is firm and free of clods and trash. Plant at least 1.5 inches deep to ensure good seed coverage. See label for tank-mix combinations. Weed control is best when adequate rain or overhead irrigation is received within 7 days after application.

Caution Do not incorporate; serious corn injury can result. Make sure corn is planted 1.5 inches deep. Do not use on peat or muck soil.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pyroxasulfone (Zidua SC)

For corn grown for grain, processing, or silage, popcorn, and sweet-corn (grown for fresh, processing or seed)

Rate 1.3 to 3.4 oz ai/a (2.5 to 6.5 fl oz /a Zidua SC)

Time May be applied in a single application or in sequential applications. Apply as a single preplant surface application, preplant incorporated, or preemergence at 1.3 to 3.4 fl oz/a depending on soil texture (consult label for details). When applied as a residual component of a planned sequential (two pass program) use 0.91 to 3.4 oz ai/a depending on soil texture (consult label for details).

Remarks Zidua SC may be broadcast surface applied in the fall or winter to control winter annual weeds germinating in fall. Sequential preemergence or postemergence application can be made, but do not exceed the maximum cumulative rate allowed by soil type per season. Consult the label for preplant surface application (15 to 45 days before planting) and for preplant surface or preplant incorporated application (up to 14 days before planting). Sequential application program of Zidua SC (e.g. fall application followed by spring application or sequential applications in the spring), the maximum combined rate is 2.35 oz ai/a on coarse soils or 4.43 oz ai/a on all medium-to-fine soils per year.

Caution Corn seed must be planted a minimum 1 inch deep. Consult the label for tank mix partners. If a labeled crop treated with Zidua SC is lost to crop failure (because of environmental factors including drought, frost, hail, etc.), the crop may be replanted. However, do not repeat application of Zidua SC after crop failure. Consult the label for the interval between Zidua SC application and the planting of rotation crops. There is no preharvest interval for soybean grain, sunflower, or cotton. Consult label for detailed information and other crop rotation restrictions.

Site of action Group 15: Very long chain fatty acid synthesis inhibitor

Chemical family Chloroacetamide

pyroxasulfone + fluthiacet methyl (Anthem)

Rate 0.084 to 0.218 lb ai/a (5 to 13 oz/a)

Time Apply 15 to 45 days preplant through preemergence. See label for application timing, soil type, organic matter, and rate information.

Remarks Preplant, preplant incorporated, and early preemergence applications may be made up to 45 days prior to planting and up to crop emergence. Apply alone or in tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Do not exceed a total of 16.3 oz/a of Anthem per season. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 30 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 40 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl); Group 14 protoporphyrinogen oxidase inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine

pyroxasulfone + fluthiacet methyl + atrazine (Anthem ATZ)

Rate 1.126 to 2.253 lb ai/a (32 to 64 oz/a)

Time Apply 15 to 45 days preplant through preemergence. See label for application timing, soil type, organic matter, and rate information.

Remarks Preplant, preplant incorporated, and early preemergence applications may be made up to 45 days prior to planting up to crop emergence. Apply alone or in tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Restricted-use herbicide. Do not exceed a total of 39 oz/a of Anthem ATZ per season on coarse-textured soils or 70 oz/a on fine-textured soils. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 60 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 45 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14 protoporphyrinogen oxidase inhibitor; (atrazine) Group 5: photosystem II inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine; (atrazine) Triazine

rimsulfuron (Resolve DF, Resolve SG, Pruvion, Bestow)

Field corn only

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

Time Apply preplant or preemergence.

Remarks Check label for rates for each application timing. Apply to field corn hybrids with a relative maturity date of 77 days or more. If weeds are present at time of application, use an appropriate surfactant. Allow at least 4 weeks between preemergence and postemergence applications. Rain or sprinkler irrigation enhances control.

Caution Not all corn hybrids or Hi-Lysine hybrids have been tested for crop safety. Do not exceed 0.031 lb ai/a (2 oz/a product) per year. Consult label for re-cropping restrictions. Rimsulfuron may interact with some soil-applied organophosphate insecticides resulting in corn injury

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

Chemical family Sulfonylurea

saflufenacil (Sharpen)

Grain, silage, popcorn

Rate 0.044 to 0.067 lb ai/a (2 to 3.5 fl oz/a product depending on soil texture)

Time Apply early preplant surface (15 to 30 days before planting), preplant surface or incorporated (0 to 14 days before planting), and post-plant surface (before corn emergence).

Remarks Burndown broadleaf weed control with residual control dependent on rate. An adjuvant system is required for optimum broadleaf burndown activity such as methylated seed oil

plus ammonium sulfate. PHI is 80 days. Tank mix with Outlook or other soil active herbicides to improve residual control.

Caution Do not apply after corn has emerged because corn will be severely injured.

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

Chemical family Pyrimidinedione

S-metolachlor (Dual II Magnum or Dual Magnum)

Rate 0.95 to 1.9 lb ai/a (1 to 2 pints/a Dual II Magnum (contains crop safener) or Dual Magnum or Moccasin 960 (contains no safener))

Time Apply either preplant incorporated or preemergence.

Remarks Use preplant incorporated if furrow irrigated and incorporate into the top 2 inches of soil before planting. Use lower rate on coarse soils, higher rate on fine soils. Preemergence treatment may be used when overhead moisture is expected and should be applied before weeds and corn emerge. May be combined with atrazine to better control broadleaf weeds. Dual II Magnum contains a safener to reduce injury potential to the crop.

Caution If crop treated only with S-metolachlor is lost, corn, soybeans, potatoes, safflower, and labeled pod crops can be replanted immediately. Small grains can be planted 4.5 months after application. Consult label for other crop rotation restrictions.

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

Chemical family Chloroacetamide

S-metolachlor (Medal II EC)

Rate 1.27 to 1.9 lb ai/a (1.33 to 2 pints/a)

Time Apply either preplant surface, preplant incorporated, preemergence, post-emergence, or lay-by, using the appropriate rate specified on the label.

Remarks Rate is dependent on soil organic matter and application timing (see the label). A tillage operation may precede the application. A fall and/or a spring tillage may follow application, but do not exceed an incorporation depth greater than 2 to 3 inches. Minimize furrow and ridge formation in the tillage operations. If a spring application is made, the total rate of the fall plus spring applications must not exceed the maximum total rate for corn, or illegal residues may result.

Fall application for control or suppression of yellow nutsedge: For preemergent control or suppression of yellow nutsedge the following spring, apply 1.33 pints/a of Medal II EC in the fall after the harvest of the previous crop but before freeze-up.

Caution Apply no more than 1.33 pints/a in a single fall preplant application. Do not apply to frozen ground. If a fall application is made, the combined total amount applied in the fall plus spring must not exceed the maximum season S-metolachlor rate for corn (3.9 pints/a, depending on soil texture) or illegal residues may result. Do not graze or feed for age from treated areas for 30 days following application. If crop treated only with S-metolachlor is lost, consult the label for replant crops. Consult label for other crop rotation restrictions.

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

Chemical family Chloroacetamide

S-metolachlor + atrazine (Bicep II Magnum FC)

Rate 2.9 to 3.55 lb ai/a (2.1 to 2.6 quarts/a Bicep II Magnum FC)

Time Apply either preplant, preemergence, or postemergence.

Remarks Use preplant, preemergence, or postemergence control of most annual grasses and broadleaf weeds in corn. May be tankmixed with other herbicides for weed control in conventional, minimum-till, and no-till corn. Tank mixtures are permitted only in those states where the tank mix partner is registered (see full label for details). When tank mixing or sequentially applying atrazine or products containing atrazine to corn, do not exceed an application rate of 2 lb ai/a of atrazine for any single application and the total pounds of atrazine applied must not exceed 2.5 lb ai/acre per year.

Caution Restricted use pesticide (ground and surface water concerns). For retail sale to and use only by certified applicators or persons under their direct supervision, and only for those uses covered by the certified applicator's certification. Consult label for atrazine use restrictions. Bicep II Magnum contains atrazine and S-metolachlor as active ingredients. Check the label for restrictions on use on soils considered "highly erodible land" (as defined by the Natural Resource Conservation Service). Do not rotate to food or feed crops other than those listed on the label. In case of crop failure, corn or sorghum (milo) may be planted immediately. Do not apply a second application of Bicep II Magnum. Do not rotate to sugar beet, vegetables (including beans), and small grains the year after application.

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

Chemical family (S-metolachlor) Chloroacetamide; (atrazine) Triazine

S-metolachlor + atrazine + bicyclopyrone + mesotrione (Acuron)

Rate 2.15 to 2.58 lb ai/a (2.5 to 3 quarts/a Acuron)

Time Apply either preemergence or post emergence.

Remarks Acuron is a combination of the herbicides atrazine, bicyclopyrone, mesotrione and S-metolachlor plus the safener benoxacor. Rate is dependent on soil organic matter. When tank mixing or sequentially applying atrazine or products containing atrazine with Acuron to corn, do not exceed an application rate of 2.0 lb active ingredient of atrazine per acre for any single application and the total pounds of atrazine applied (lb ai/a) must not exceed 2.5 lb active ingredient per acre per year. When applied according to directions and under normal growing conditions, Acuron will not harm the treated crop. During germination and early stages of growth, extended periods of unusually cold and wet or hot and dry weather, insect or plant disease attack, carryover pesticide residues, the use of certain soil applied systemic insecticides, or improperly placed fertilizers or soil insecticides, may weaken crop seedlings. Acuron used under these conditions could result in crop injury. Where reference is made to weeds partially controlled, partial control can either mean erratic control from good to poor or consistent control at a level below that generally considered acceptable for commercial weed control. Dry weather following preemergence application of Acuron or an Acuron tank mixture may reduce effectiveness. If possible, cultivate if weeds develop. Applying Acuron post-emergence to corn that has received an at-plant application of Counter insecticide can result in severe corn injury. Temporary corn injury may occur if Acuron is applied to emerged corn where organophosphate insecticides other than Counter were

applied at planting. Postemergence (emerged corn) applications of any organophosphate or carbamate insecticide within 7 days before or 7 days after a Acuron application may result in severe corn injury.

Caution Grazing Restriction: To avoid possible illegal residues, do not graze or feed forage from treated areas for 45 days following application. Pre-Harvest Interval (PHI): Corn (for grain, seed, or silage) may be treated up to 12 inches tall. Do not harvest forage within 60 days after application. Do not apply more than 3.0 quarts of Acuron per acre per growing year. Do not use aerial application to apply Acuron. Do not apply Acuron to sweet corn or yellow popcorn after the crop has emerged or severe crop injury may occur. Do not use Acuron on any crop other than corn (for grain, seed, or silage), sweet corn (preemergence applications only) or yellow popcorn (preemergence applications only). Do not use Acuron in the culture of white popcorn or ornamental (Indian) corn or injury may occur. Do not contaminate irrigation water used for crops or water used for domestic purposes. Thoroughly clean sprayer or other application device before using. Dispose of cleaning solution in a responsible manner. Do not use a sprayer or applicator contaminated with other materials, or crop damage or sprayer clogging of the application device may occur. If crop treated only with Acuron is lost, corn (field, seed, silage), sweetcorn, yellow popcorn, can be replanted immediately. Small grain cereals including wheat, barley and rye can be planted 4 months after application. Dry bean and potato can be planted 10 months and all other crops after 18 months. Consult label for complete crop rotation list.

Site of action (S-metolachlor) Group 15: inhibits very long chain fatty acid synthesis; (S-metolachlor) Group 5: photosystem II inhibitor; bicyclopyrone and mesotrione: Group 27: inhibits 4-hydroxyphenylpyruvatedioxygenase (4-HPPD).

Chemical family (S-metolachlor) Chloroacetamide; (atrazine) Triazine; (bicyclopyrone and mesotrione) Triketone

simazine (Princep 4L)

Rate 2.0 lb ai/a (2 quarts/a Simazine 4L)

Time Apply as a single preemergence application on soils that are not highly erodible (consult label for details). Total simazine applied may not exceed 2.5 lb ai/a per calendar year.

Remarks If the soil is highly erodible and covered with <30% plant residues, apply a maximum of 1.6 lb ai/a as a single application. Pre-grazing/pre-harvest interval for corn is 60 days. For preemergence application must be made before weeds and corn emergence as specified on the label. Preplant application should be broadcast in the spring after plowing at the specified rate on the label depending on plant residue cover. Apply before, during, or after final seedbed preparation. If soil is tilled or worked after application, avoid deep incorporation. Best results will be obtained when simazine is applied within 2 weeks before planting. Under dry weather conditions, preplant applications may give better weed control than preemergence. If weeds develop, particularly under relatively dry conditions, a shallow cultivation will generally result in better weed control. Simazine may be tank mixed with other herbicides as specified on the label.

Caution Do not plant any crop except corn until the following year, or injury may occur. Following harvest, plow and thoroughly till the soil in fall or spring to minimize possible injury to spring-seeded rotational crops, regardless of the rate used. Do not plant sugar beets, tobacco, vegetable (including dry beans), spring seeded small grain, or small-seeded legumes and grasses

the year following application, or injury may occur. Consult label for detailed information and other crop rotation restrictions.

Site of action Group 5: inhibits photosystem II

Chemical family Triazine

Postemergence

2,4-D (several trade names)

Rate 0.5 to 1.0 lb ae/a. Consult label, as 2,4-D labels vary in rates.

Time Apply when corn is actively growing.

Remarks Applying without drop nozzles to corn over 8 inches tall may increase lodging and interfere with normal tassel emergence. Use drop nozzles to avoid applying to corn leaves.

Caution Do not spray corn from tasseling to dough stage. In western Washington, some common annual broadleaf weeds are tolerant to 2,4-D: chickweed, smartweed, black bindweed, knotweed, and redroot pigweed. Note feeding restrictions.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

bentazon (Basagran 5L)

Rate 0.75 to 1 lb ai/a (1.2 to 1.6 pints/a product)

Time For small, annual broadleaf weeds. Apply postemergence to corn when weeds are small and actively growing. Basagran 5L may be tank mixed with one or more of, but not limited to, the following herbicide products: Outlook, Status, Atrazine, and glyphosate.

Remarks Adding oil concentrate generally increases weed control but also may increase corn injury. Use adjuvants as indicated on the label. Irrigate before application to ensure vigorous weed growth. Control is poor if days and nights are below 80°F and 60°F, respectively. Use at least 5 gal/a water and at least 40 psi to ensure thorough coverage of weed foliage. Leaves may speckle temporarily, but plants generally outgrow it within 10 days. Use higher rate with oil concentrate applied twice, 7 to 10 days apart for Canada thistle and yellow nutsedge control.

Caution Do not apply to corn growing under stress, or mix with other pesticides. Do not exceed 2 lb ai/a per season. Seed corn producers should consult the contracting company regarding tolerance of seed production lines. Do not cultivate 5 days before or after application. Do not graze treated corn fields for at least 12 days after the last treatment with Basagran 5L.

Site of action Group 6: photosystem II inhibitor

Chemical family Benzothiadiazole

bromoxynil (Buctril)

Field corn and popcorn only

Rate 0.25 to 0.5 lb ai/a (1 to 2 pints/a)

Time Apply after corn reaches the three-leaf (0.25 lb ai/a) or four-leaf (0.50 lb ai/a) stage. Effectiveness dependent on weed size.

Remarks Label rates for each product differ; see appropriate label for maximum rate. Use drop nozzles when corn is more than 8 inches tall. Spray when corn foliage is dry to decrease chance of temporary leaf burn. Warm temperatures also increase chance of some foliage burn. Thorough coverage of weed foliage required for adequate control. Buctril is registered for use for

application through sprinkler systems; consult labels for use restrictions.

Caution Do not cut for feed or graze within 30 days after treatment. Do not plant rotation crop until the following season. Do not add any spray additive or mix with liquid fertilizers.

Site of action Group 6: photosystem II inhibitor

Chemical family Nitrile

carfentrazone (Aim)

Rate 0.032 lb ai/a (2 fl oz/a Aim EC)

Time Apply to small weeds and when corn is up to the 14-collar growth stage; use directed applications if more than 8-collar growth stage.

Remarks See label for maximum weed size. Add 0.25% v/v nonionic surfactant. If corn grows in very dry soil, a sprayable liquid nitrogen fertilizer may be used in addition to the nonionic surfactant. Any crop may be planted 30 days after application except barley, oats, and rye, which can be planted 12 months after application. Good spray coverage is essential. Adjust sprayer to avoid excess herbicide application over the row and/or into the whorl of the corn plant.

Caution Tank-mixtures of carfentrazone with emulsifiable concentrate (EC) formulations of other herbicides, fungicides, or insecticides, or with crop oil concentrate, methylated seed oil, or silicone-based adjuvants may increase crop injury. Adding nitrogen or ammonium sulfate with nonionic surfactant may increase leaf injury.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Triazinone

clopyralid (Stinger or Spur)

Rate 0.063 to 0.165 lb ae/a (0.25 to 0.66 pints/a)

Time Apply to actively growing broadleaf weeds after corn emerges up to 24 inches tall. For Canada thistle, apply after most basal leaves emerge but before bud stage.

Remarks For best results on Canada thistle, use at least 0.5 pint/a product. Do not cultivate before treatment, and wait two weeks after treatment before cultivation. Re-treat as necessary but do not exceed 0.66 pint/a product per calendar year.

Caution Do not graze treated areas or harvest corn for feed within 40 days of treatment. Wheat, barley, oats, grasses, field corn, or sugar beets may be planted any time after treatment. Do not plant alfalfa, asparagus, canola (rapeseed), *Brassica* species grown for seed, cole crops, dry beans, soybeans, grain sorghum, mint, onions, popcorn, safflower, sunflower, sweet corn, or strawberries during the first 12 months after applying product. If annual precipitation (not including irrigation) is 18 inches or more—alfalfa, asparagus, dry beans, canola (rapeseed), *Brassica* species grown for seed, grain sorghum, mint, onions, popcorn, sweet corn, soybeans, strawberries, and sunflowers may be planted 12 months after applying product. Cole crops, lentils, peas, potatoes (including potatoes grown for seed), safflower, or broadleaf crops grown for seed (excluding *Brassica* species) may also be planted 12 months after treatment; however, unless risk of injury is acceptable, these crops should not be planted until 18 months after treatment. If average annual precipitation (not including irrigation) is less than 18 inches—alfalfa, dry beans, soybeans, sunflowers, lentils, peas, potatoes (including potatoes grown for seed), or broadleaf crops grown for seed (excluding *Brassica* species) should not be planted until 18 months after

applying product. However, crop injury and/or yield loss may occur up to 4 years after application for extremely sensitive species such as tomatoes and legumes.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

dicamba (Banvel or Clarity)

Field, seed and popcorn

Rate 0.25 lb ae/a (1 pint/a)

Time Apply when corn is actively growing and seedling weeds are in the four- to six-true-leaf stage of growth.

Remarks Controls atrazine-resistant pigweed and lambsquarters. Does not control grass weeds. If grass weeds are present, combine with a grass-killing herbicide or glyphosate if applied over glyphosate tolerant corn. Apply before corn is 24 inches tall, especially if it is growing near sensitive crops. Two applications per year are allowed, but do not exceed 1.5 pints/a.

Caution Verify seed and popcorn tolerance before using dicamba. Do not apply after corn is 3 ft tall, or 15 days before tassels emerge, whichever is first. Some varieties of field corn may show temporary injury after application. Do not graze or harvest for dairy or beef feed before ensilage stage (milk stage). Do not apply when temperature is expected to exceed 85°F. Use spray drift reduction nozzles.

Site of action Group 4: synthetic auxin

Chemical family Benzoic acid

diflufenzopyr + dicamba (Status)

Rate 0.0063 to 0.0125 lb ai/a diflufenzopyr + 0.156 to 0.3125 lb ai/a dicamba (5 to 10 oz/a product)

Time Apply to corn 4 to 36 inches tall (V10).

Remarks Controls broadleaves and suppresses some annual grasses. Add a nonionic surfactant at 1 quart/100 gal spray mix plus 5 quarts of urea ammonium nitrate (UAN) per 100 gal spray mix. Spray-grade ammonium sulfate may be substituted for UAN at 17 lb/100 gal spray mix. Applications can be split; allow at least 15 days between applications. Verify selectivity on the popcorn hybrid with your local seed corn company before using. Crop may be temporarily injured if crop is stressed or rapidly growing. Can be applied with glyphosate to glyphosate tolerant corn, or glufosinate to glufosinate tolerant corn.

Caution Do not exceed 12.5 oz/a product per year. Do not use penetrants such as petroleum-based oils or methylated seed oils; crop may be injured. It is not recommended for use in tank-mixes with plant-growth-regulating herbicides such as 2,4-D, dicamba, or clopyralid unless applications are at least 15 days apart. Preharvest interval is 32 days for silage and 72 days for grain and stover. Do not plant any crop other than corn for 120 days after application.

Site of action (diflufenzopyr) Group 4: synthetic auxin; (dicamba) Group 19: inhibits indole acetic acid transport

Chemical family (diflufenzopyr) Semicarbazone; (dicamba) Benzoic acid

flumiclorac (Resource)

Field corn

Rate 0.027 to 0.054 lb ai/a (4 to 8 fl oz/a)

Time Apply to corn from V2 (2 collars) to V10 stage. Determine the leaf stage of corn by counting only those leaves with visible leaf collars.

Remarks Controls only actively growing, susceptible broadleaf weeds. Rate is determined by weed species and weed growth stage. Flumiclorac must be applied with a crop oil concentrate or methylated seed oil; the amount of additive is determined by the rates and timing. Adding spray-grade ammonium sulfate at 2 to 2.5 lb/a may enhance weed control.

Caution Do not use on sweet corn or popcorn. Verify crop safety before applying to seed corn. Corn leaves open at time of application may show some spotting and burning. Do not apply when corn and weeds are under stress. Do not apply if rain is expected within 1 hour of application. Preharvest interval is 28 days for grazing animals on green foliage or using as feed.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family N-phenylphthalimide

fluroxypyr (Starane Ultra)

Rate 0.14 lb ae/a (0.4 pint/a product)

Time Apply broadcast to actively growing broadleaf weeds before they are 8 inches tall. Field corn can be treated broadcast up to and including five fully exposed leaf collars (V5 growth stage).

Remarks In field corn, a high-quality adjuvant labeled for use on growing crops is recommended to improve weed control. May be applied preplant to control emerged volunteer potatoes. To control heavy populations of volunteer potatoes, a second application may be made postemergence. Only weeds emerged at the time of application will be controlled.

Caution Do not exceed 0.25 lb ae/a (0.7 pints/a) per growing season. Preharvest interval is 47 days for grazing and forage, 90 days for field corn grain and stover.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

fluthiacet-methyl (Cadet)

Field corn, sweet corn for processing, and popcorn

Rate 0.0042 to 0.006 lb ai/a (0.6 to 0.9 fl oz/a)

Time Apply to corn from the two leaf (two leaf collars) to when corn is 48 inches tall or prior to tasseling, whichever comes first. See label for maximum growth stage and weeds controlled.

Remarks For use by individuals or firms certified as licensed pesticide applicators. See label for maximum weed size, usually 3 inches or less tall with the exception of velvetleaf (36 inches tall). Spray adjuvants are required for optimum weed control. Thorough coverage is essential for control of susceptible broadleaf weeds. Lower rate can be used if tank mixing with glyphosate for preplant burndown.

Caution Do not exceed 0.009 lb ai (1.25 fl oz Cadet) per season.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Imine

glufosinate (Liberty)

Apply only to LibertyLink corn varieties

Several field corn varieties have been developed with resistance to glufosinate. Apply only to LibertyLink corn varieties. Refer to the product label for specific use directions.

glyphosate (several trade names)

Apply only to Roundup Ready corn varieties

Several field corn varieties have been developed with resistance to glyphosate. Only apply glyphosate to Roundup Ready corn varieties. Refer to the product label for specific use directions, and to the comments at the beginning of this section.

halosulfuron (Sanda)

Rate 0.5 to 1 oz ai/a (0.66 to 1.33 oz/a product)

Time Apply postemergence from spike through layby (V10-V12) stage

Remarks Do not exceed 0.75 oz ai/a per application on popcorn. Controls only susceptible broadleaf weeds and nutsedge. Always add a nonionic surfactant or crop oil concentrate if not tank mixed with other herbicides. Apply only with ground equipment. May apply up to twice per growing season.

Caution Before using, consider crop rotation plans.

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

Chemical family Sulfonylurea

halosulfuron + dicamba (Yukon)

Rate 0.75 to 1 oz ai/a halosulfuron + 3.3 to 4.4 oz ai/a dicamba (6 to 8 oz/a product)

Time Apply postemergence from spike through layby (V10-V12) stage.

Remarks Do not exceed 0.75 oz ai/a per application on popcorn. Controls only susceptible broadleaf weeds and yellow nutsedge. Always add a nonionic surfactant or crop oil concentrate if not tank mixed with other herbicides. Apply only with ground equipment. May apply up to twice per growing season.

Caution Before using, consider crop rotation plans (see the label for details).

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

Chemical family Sulfonylurea

halosulfuron + thifensulfuron (Permit PLUS)

For preplant and postemergence residual in field corn

Rate 0.031 lb ai/a halosulfuron + 0.0036 lb ai/a thifensulfuron (0.75 oz/a product)

Time When used alone, Permit PLUS can be applied over the top of corn plants or with drop nozzles to 2- to 6-leaf corn (1 to 5 collars). Apply only once per season. Permit PLUS can also be applied postemergence.

Remarks Following application to foliage, allow 30 days before grazing domestic livestock, harvesting forage, or harvesting silage. Apply Permit PLUS to field corn hybrids with Relative Maturity (RM) of 88 days or more, including "food grade" (yellow dent, hard endosperm), waxy, and high-oil corn.

Caution Do not irrigate between emergence and 2-leaf stage.

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

Chemical family Sulfonylurea

mesotrione (Callisto)

Do not use on white popcorn or ornamental corn

Rate 0.094 lb ai/a (3 oz/a product)

Time Apply postemergence to actively growing weeds less than 5 inches tall and when corn is in eight-leaf stage of growth or less.

Remarks Controls several annual broadleaf weeds. For field corn, always add crop oil concentrate to spray solution at 1 gal/100 gal water and 2.5% v/v of a 28% or 32% nitrogen solution or 8.5 lb/a of ammonium sulfate to 100 gal spray solution. In yellow popcorn, do not use ammonium sulfate or urea ammonium nitrate, and use nonionic surfactant instead of crop oil concentrate. Does not adequately control grasses. If corn is stressed it may be bleached temporarily. Wait at least 14 days to reapply.

Caution Do not use methylated seed oil (MSO or MSO blend adjuvants). Do not exceed 0.24 lb ai/a (7 oz/a product) per season. Do not apply mesotrione to corn treated with the insecticides Counter or Lorsban; crop injury may be severe. Do not apply within 7 days before or after applying an organophosphate or carbamate insecticide; injury may occur. See label for crop rotation restrictions. Do not apply aerially in Idaho, Oregon, and Washington.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

mesotrione + fluthiacet methyl (Solstice)

Rate 0.0739 to 0.0931 lb ai/a mesotrione + 0.0042 to 0.0053 lb ai/a fluthiacet methyl (2.5 to 3.15 oz/a Solstice).

Time Recommended stage is spike to V5-V6 stage.

Remarks Apply with a minimum of 10 gal/a water; 15 gal/a is recommended. Use medium droplets and good pressure to penetrate weed canopy and get good coverage from top to bottom of weeds. Avoid XC (extremely coarse) type spray nozzles as coverage is not adequate for contact-type herbicides. Adjuvants (crop oil concentrate at 1% v/v + ammonium sulfate at 8.5 lb/100 gal, or nonionic surfactant at 0.25% + ammonium sulfate at 8.5 lb/100 gal) can be used, but COC provides stronger weed control. May be mixed with other labeled postemergence herbicides.

Caution Do not harvest for forage within 45 days of application. Do not harvest for grain within 70 days of application. Do not harvest sweet corn within 40 days of application. Do not apply Solstice to white popcorn or ornamental (Indian) corn. Do not apply in tank-mix with an emulsified concentrate grass herbicide unless specifically addressed on the label. Do not apply this product with fertilizer as the carrier. Do not use with methylated seed oil, as increased crop response may be seen.

Site of action (mesotrione) Group 27: 4-HPPD inhibitor; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor

Chemical family (mesotrione) Triazinone; (fluthiacet methyl) Imine

nicosulfuron (Accent Q)

Rate 0.03 to 0.06 lb ai/a (0.9 to 1.8 oz/a Accent Q).

Time Apply to corn before the 10-collar growth stage or before field corn is taller than 36 inches, or before seed corn or popcorn is 20 inches tall, and while weeds are actively growing and in the height range on label.

Remarks When not tank mixed with other herbicides, always add a nonionic surfactant or crop oil concentrate to the spray

mixture. Consult the label for surfactant or crop oil specification and rates to be used alone or in tank-mixes. Apply only with ground equipment to corn that is not stressed or damaged. Use drop nozzles when field corn is over 24 inches tall. Check with seed supplier to determine crop tolerance before using on popcorn or corn grown for seed.

Caution Before using, consider crop rotation plans. Rotation crops other than corn may be very sensitive to low concentrations of nicosulfuron in soil. To avoid injury, do not apply to corn previously treated with Counter or organophosphate soil-applied insecticides such as Thimet or Lorsban. Do not apply to corn treated within 7 days with foliar-applied organophosphate insecticides such as Lorsban, malathion, or parathion, or with Basagran or 2,4-D, and do not apply any of these materials within 3 days after applying nicosulfuron, or crop may be injured. See label for further precautions and restrictions. In furrow-irrigated fields, if at least 0.5 inch of rain falls after application, do not use tail water from the first irrigation to irrigate any crop other than field corn, popcorn, or field corn grown for seed.

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

Chemical family Sulfonylurea

pendimethalin (Prowl H₂O)

Rate 0.75 to 2 lb ai/a, depending on soil type, and percentage of organic matter

Time Apply when corn has two to four leaves (depending on the tank-mix partner) and when weeds are no more than 2 inches tall.

Remarks Do not apply Prowl alone postemergence. Consult the label for tank-mix combinations and restrictions. Weed control is best when adequate rain or overhead irrigation is received within 7 days after application. For maximum effectiveness, wait to cultivate for least 7 to 10 days after an early postemergence application.

Caution Do not use on peat or muck soils or apply in liquid fertilizer. Do not incorporate.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

primisulfuron (Beacon)

Field corn only

Rate 0.57 oz ai/a (0.76 oz/a product)

Time When corn is 4 to 20 inches tall and weeds are in height range specified on label.

Remarks May make a split application. Complete all applications before corn tassels. Overhead irrigation or rain within 4 hours after applying may reduce weed control. If not tank mixed with other herbicides, always add a nonionic surfactant or crop oil concentrate to spray mixture. See label for surfactant or crop oil specification and rates when used alone or in tank-mixes.

Caution Before using, consider crop rotation plans. Rotation crops other than corn may be sensitive to low concentrations of primisulfuron remaining in the soil. To avoid crop injury, do not apply to corn previously treated with organophosphate insecticides. Do not apply primisulfuron to corn treated within 10 days with organophosphate insecticides such as Thimet, Dyfonate, Counter, or Lorsban. Do not apply any of these insecticides within 10 days before or after the herbicide treatment, or crop injury may result.

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

Chemical family Sulfonylurea

pyraflufen-ethyl (Vida)

Field corn, glyphosate-tolerant corn, LibertyLink-tolerant corn, popcorn, seed corn, corn silage, corn stover

Rate 0.0016 to 0.0032 lb ai/a (1 to 2.0 fl oz/a) + tank-mix partner or non-selective herbicide

Time VE to V4 stage of growth (approximately 12 inches tall)

Remarks Applied in-crop as an early postemergence treatment for control of broadleaf weeds in tank-mixtures with other labeled herbicides for broad spectrum weed control.

Caution Some temporary herbicidal symptoms such as leaf speckling or small discolored or necrotic spotting may appear on the crop, depending on environmental conditions, or if the crop is under stress. Do not apply postemergence to sweet corn. PHI is 50 days for silage, 90 days for grain or stover.

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

Chemical family Triazinone

pyroxasulfone + fluthiacet methyl (Anthem)

Rate 0.084 to 0.218 lb ai/a (5.0 to 13.0 oz/a)

Time Apply from 1-leaf through V4 stage.

Remarks Postemergence applications may be made up to V4 stage. Apply alone or in a tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate. Soils with higher CEC require greater rates of herbicide.

Caution Do not exceed a total of 16.3 oz/a of Anthem per season. See label for rotational restrictions. Do not harvest field corn for forage for 30 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 40 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14 protoporphyrinogen oxidase inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine

pyroxasulfone + fluthiacet methyl + atrazine (Anthem ATZ)

Rate 1.126 to 2.253 lb ai/a (32.0 to 64.0 oz/a)

Time Apply from 1-leaf through V4 stage. See label for soil type, organic matter, and rate information.

Remarks Postemergence applications may be made up to V4 stage. Apply alone or in a tank-mixture to broaden weed spectrum. For early preplant applications in reduced-tillage systems, use the higher rate specified for each soil type. Requires rainfall or irrigation to activate.

Caution Restricted-use herbicide. Do not exceed a total of 39 oz/a of Anthem ATZ per season on coarse-textured soils or 70 oz/a on fine-textured soils. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 60 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn

forage or ears until 45 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor; (atrazine) Group 5: photosystem II inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine; (atrazine) Triazine

rimsulfuron (Resolve DF or SG)

Field corn only

Rate 0.125 to 0.5 oz ai/a (0.5 to 2 oz/a product)

Time Apply postemergence to corn up to 12 inches tall or six leaf collars but before susceptible weeds reach sizes listed on label.

Remarks Apply to field corn hybrids with a relative maturity date of 77 days or more. If weeds are present at application, use an appropriate surfactant. Allow at least 3 weeks between preemergence and postemergence applications. Rain or sprinkler irrigation will enhance control.

Caution Do not apply to field corn taller than 12 inches or six collars, whichever is more restrictive. Do not exceed 0.5 oz ai/a (2 oz/a product) per year. Consult label for re-cropping restrictions. Resolve may interact with some soil-applied insecticides.

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

Chemical family Sulfonylurea

sethoxydim (Poast)

Poast-protected corn varieties only

Rate Maximum rate is 0.28 lb ai/a (1.5 pints/a) with a maximum of 0.56 lb ai/a (3 pints/a) per year.

Time Maximum height for quackgrass and wild proso millet control is 8 and 10 inches, respectively.

Remarks Use in Poast-protected corn varieties only. May be applied over the top. A second application is allowed 10 days after the first. Identify susceptible grasses and add 2 pints/a nonphytotoxic crop oil concentrate to improve leaf absorption. Control often is erratic on grasses stunted or stressed from drought, high temperatures, or low fertility. Resistant grasses include annual bluegrass and all fine fescues; quackgrass can be suppressed. Grass control may be reduced if applied with bentazon. Inhibits fatty acid production, cell membranes, and new growth.

Caution Do not apply to corn hybrids that are not tolerant to Poast. Do not exceed 3 pints/a per year. Preharvest interval is 60 days.

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

Chemical family Cyclohexanedione

tembotrione (Laudis)

Rate 0.082 lb ai/a (3 oz/a product)

Time Apply to actively growing weeds to field corn or popcorn from emergence to the V8 stage of growth.

Remarks Consult label for maximum weed size. Use a methylated seed oil (MSO) when tembotrione is used alone, or when a specific adjuvant is not listed on the label. A second application may be made to field or popcorn 14 days after the first application.

Caution Do not exceed a total of 6 fl oz/a of product per growing season. Not all hybrids of corn have been tested for herbicide tolerance. Weed control may be reduced if applied to stressed weeds or weeds that are dust covered or in the presence of heavy dew. Do not graze livestock or harvest for forage within 45 days after application. Rotation restrictions include cucurbits and dry beans (18 mo) and brassica and peas (10 mo).

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

tembotrione + thiencazzone (Capreno)

Field corn, silage

Rate 3 oz/a product

Time Apply to actively growing weeds from V1 to the V6 stage of growth.

Remarks Broadens control spectrum of Laudis herbicide and adds soil residual. Consult label for maximum weed size. Use COC plus ammonium nitrogen spray additives.

Caution Do not use Lorsban, Counter, or other OP insecticides in the same season as Capreno. Not all hybrids of corn have been tested for herbicide tolerance. Weed control may be reduced if applied to stressed weeds or weeds that are dust-covered, or in the presence of heavy dew. Do not graze livestock or harvest for forage within 45 days after application. Note crop rotation restrictions on the label.

Site of action (tembotrione) Group 27: inhibits 4-hydroxyphenylpyruvatedioxygenase (4-HPPD), (thiencazzone) Group 2: ALS inhibitor.

Chemical family (tembotrione) Triketone; (thiencazzone) Sulfonyl-amino-carbonyl-triazolinone

thifensulfuron (Harmony GT XP)

Field corn only

Rate 0.083 oz/a product

Time Apply postemergence to two- to six-leaf field corn (one to five collars, up to 16 inches tall) and after weeds emerge but before susceptible weeds reach the sizes listed on the label.

Remarks Controls broadleaf weeds. Apply to field corn hybrids with a relative maturity date of 88 days or more. Include an appropriate spray additive and either ammonium nitrate or ammonium sulfate to spray mix.

Caution Do not apply to field corn taller than 16 inches or five collars, whichever is more restrictive. Do not apply with other corn herbicides unless specified on Harmony GT XP labels or technical bulletins. Preharvest interval is 30 days for grazing or feeding forage or grain from treated crop to livestock. Not all corn hybrids or Hi-Lysine hybrids have been tested for crop safety. Do not apply more than once per season. Harmony GT may interact with some soil-applied insecticides.

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

Chemical family Sulfonylurea

tolpyralate (Shieldex 400SC)

Rate 0.026 to 0.035 lb ai/a (1 to 1.35 fl oz/a)

Time Apply broadcast postemergence to actively growing weeds up to 5 inches tall and to corn up to 20 inches tall.

Remarks Controls wild proso millet, several other annual grasses, and many annual broadleaf weeds. Does not control purslane. Rate is dependent on weed size. Best results are obtained when applications are made early postemergence when corn and weeds are small. Apply to corn that is less than 12 inches tall for improved coverage and best overall performance. Tankmixing tolpyralate with 0.25 to 1 lb ai/a of atrazine greatly improves control of most species, particularly common purslane. Spray additives are essential for maximum control. Methylated seed oil (MSO) is recommended (0.5 to 1 % v/v) but NIS (0.25 to 0.5% v/v) and COC (1% v/v) also can be used. UAN at 2.5% v/v will enhance performance. Spray-grade ammonium sulfate at 8.5 lb/100 gal of water may be substituted for the UAN. Tolpyralate may be used sequentially or in combination with all soil- or foliar-applied insecticides registered for use in corn.

Caution Preharvest interval is 35 days. Has not been tested on all sweet corn lines for tolerance. Rotational interval is 9 months for most vegetable crops but 18 months for sugar beets. Do not make more than 2 applications per year and more than 2.7 oz/a/year.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

topramezone (Armezon, Impact)

Rate 0.0165 to 0.022 lb ai/a (0.75 to 1.0 oz/a product)

Time Apply postemergence to actively growing weeds 3 to 8 inches tall.

Remarks Controls many annual broadleaf weeds and several annual grasses. See label for optimum treatment time for weeds of different sizes. Add methylated seed oil or crop oil concentrate at 1 to 1.5% v/v and urea ammonium nitrate or ammonium phosphate at 1.2 to 1.5% v/v to the spray solution. Spray-grade ammonium sulfate at 8.5 lb/100 gal of water may be substituted for the nitrogen fertilizers. For best performance, tank mix topramezone with 0.25 to 1 lb ai/a atrazine. Topramezone may be used sequentially or in combination with all soil- or foliar-applied insecticides registered for use in corn.

Caution Do not exceed 0.022 lb ai/a (1 fl oz/a product) per growing season. Preharvest interval is 45 days. Crop rotation restrictions for snap beans and sugarbeet are determined by location, whether east or west of the Cascade mountains. Has not been tested on all popcorn and seed corn inbred lines for tolerance.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

topramezone + atrazine (ImpactZ)

For postemergence residual in field corn, seed corn, popcorn and sweet corn, and weed management between crops

Rate 0.016 lb ai/a topramezone + 0.333 lb ai/a atrazine (10.7 fl oz/a product) depending on soil texture

Time ImpactZ herbicide can be selectively applied to emerged weeds in all corn types including conventional and

herbicide-resistant/tolerant corn hybrids. Can be broadcast over-the-top spray to small weeds in corn up to 12 inches in height. Use of adjuvants is recommended. Apply with MSO at 1.5 gal/100 gal of water plus UAN at 1.25 gal/100 gal or AMS at 8.5 to 17 lbs/100 gal or liquid AMS equivalent. Reduce oil adjuvant rate when mixing oil-base residual corn herbicides to reduce risk of temporary foliar injury in corn. Use of NIS at 0.25% may be substituted for MSO or HSOC under conditions of tender corn foliage in early season applications. Consult label for details on complete weed control and partial weed control. Rainfast after 4 hours. Consult label for tank mixture or sequential applications with other herbicides registered for use in corn.

Remarks Do not apply ImpactZ within 45 days of corn harvest. Do not apply ImpactZ to corn that exceeds 12 inches in height. Consult label for rotation restrictions. Do not apply more than 1 lb atrazine per acre with any application combinations. Do not graze or feed treated corn for age, silage, fodder, or grain for at least 60 days after an application of ImpactZ. Do not apply this product through any type of Irrigation system. It may be applied aerially. Following application to foliage, allow 45 days before harvesting. Do not graze or feed treated corn for age, silage, fodder, or grain for at least 60 days after application.

Caution Do not irrigate between emergence and 2-leaf stage.

Site of action Group 27 and 5: Triketone + Photosystem II inhibitor

Chemical family Sulfonylurea

topramezone + dimethenamid-P (Armezon PRO)

Rate 0.5 to 0.857 lb ai/a (14 to 24 fl oz/a product)

Time Apply postemergence to actively growing weeds 3 to 8 inches tall.

Remarks Consult label for application rate in relation to soil type. Use lower rates on coarse soils with low organic matter or low cation exchange capacity. Controls many annual broadleaf weeds and several annual grasses. See label for optimum treatment time for weeds of different sizes. Apply to corn from emergence up to 45 days prior to harvest or V8 growth stage, whichever comes first. Tank mix with atrazine (up to 12 inches tall corn) where possible to improve weed control speed and spectrum. Refer to label for crop rotation restrictions. Add 0.25 to 0.5 lb ai/a atrazine for best performance. When tank mixing with atrazine, use COC or NIS (not MSO).

Caution Do not exceed 1.147 lb ai/a (28 fl oz/a product) per growing season. Preharvest interval is 45 days. Crop rotation restrictions for snap beans and sugarbeet are determined by location, whether east or west of the Cascade mountains. Has not been tested on all popcorn and seed corn inbred lines for tolerance.

Site of action (topramezone) Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD); (dimethenamid-P) Group 15: inhibits very long chain fatty acid synthesis

Chemical family (topramezone) Triketone; (dimethenamid-P) Chloroacetamide

pyroxasulfone (Zidua SC)

For corn grown for grain, processing, or silage, popcorn, and sweet-corn (grown for fresh, processing or seed).

Rate 0.91 to 3.4 oz ai/a (1.75 to 6.5 fl oz /a Zidua SC)

Time May be applied early postemergence to corn for residual preemergence control of susceptible weeds. Consult the label for details.

Remarks Zidua SC may be broadcast surface applied in the fall or winter to control winter annual weeds germinating in fall. Sequential preemergence or postemergence application can be made, but do not exceed the maximum cumulative rate allowed by soil type per season. Consult the label for preplant surface application (15 to 45 days before planting) and for preplant surface or preplant incorporated application (up to 14 days before planting). Sequential application program of Zidua SC (e.g. fall application followed by spring application or sequential applications in the spring), the maximum combined rate is 2.35 oz ai/a on coarse soils or 4.43 oz ai/a on all medium-to-fine soils per year. For full-season weed control, apply a labeled postemergence treatment of Status herbicide plus glyphosate (in glyphosate tolerant field corn) as sequential component.

Caution Corn seed must be planted a minimum 1-inch deep. Before applying to seed corn, sweet corn, or popcorn, verify with your local seed company (supplier) the selectivity of Zidua SC on your chosen inbred line or hybrid in order to avoid potential injury. Do not exceed the maximum cumulative rate allowed by soil type per season. Consult the label for tank mix partners. If a labeled crop treated with Zidua SC is lost to crop failure (because of environmental factors including drought, frost, hail, etc.), the crop may be replanted. However, do not repeat application of Zidua SC after crop failure. Consult the label for the interval between Zidua SC application and the planting of rotation crops. There is no preharvest interval for soybean grain, sunflower, or cotton. Consult label for detailed information and other crop rotation restrictions.

Site of action Group 15: Very long chain fatty acid synthesis inhibitor

Chemical family Chloroacetamide

Postemergence Directed Spray

paraquat (Gramoxone Inteon, Parazone 3SL)

Rate 0.5 lb cation/a (1 to 2 pints/a)

Time Apply when corn is at least 10 inches tall with nozzles arranged to spray no higher than the lower 3 inches of corn stalks.

Remarks Apply by ground in at least 20 gal/a water, and add a nonionic surfactant or crop oil concentrate.

Caution A restricted-use herbicide. Corn plants shorter than 10 inches (measured from soil surface to top of whorl) may be injured and may not recover.

Site of action Group 22: photosystem I electron diversion

Chemical family Bipyridilium

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

clopyralid (Stinger)

See "Corn—Postemergence" in this section of this handbook.

Rate Apply 0.124 to 0.25 lb ae/a (0.33 to 0.66 pint/a of Stinger)

Time Any time after sweet corn emerges until it is no more than 18 inches tall.

Remarks To control Canada thistle, apply when most thistle plants have emerged and thistles are at least 6 to 8 inches wide or tall, but before bud stage. For best results on Canada thistle, use at least 0.5 pint/a product.

glyphosate

Rate 2.25 to 3.75 lb ae/a

Time Apply to weeds before crop emergence or post emergence in glyphosate tolerant corn.

Remarks Rate depends on species and growth stage as specified on label. Use highest rate on field bindweed. Treat perennial weeds when there is a maximum leaf surface and the weed is growing vigorously. Consult label for interval between application and tillage. Add water conditioning agents, such as AMS, prior to adding glyphosate if spray water has a low pH.

Caution Do not apply to weeds stressed by drought, weather, or maturity. Rain within 6 hours after applying may reduce effectiveness. Be sure to control weed escapes in following years. Do not use glyphosate in galvanized or mild steel tanks. Do not feed or forage treated vegetation within 8 weeks of application. Do not apply glyphosate with aerial equipment. Do not mix with other pesticides or herbicidal oils unless specified on label. For best results, spray coverage should be uniform and complete. If repeat treatments are needed, apply before crop emerges; the total of both treatments must not exceed 6 lb ae/a of glyphosate per crop. Glyphosate is tightly adsorbed or inactivated in the soil.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Spot Treatment of Annual and Perennial Weeds

glyphosate (several trade names)

Rate 0.75 to 3.75 lb ae/a

Time Apply to actively growing weeds before silking of corn.

Remarks Rates depend on weed species and growth stage as specified on label.

Caution Do not treat more than 10% of the area to be harvested. Sprayed crop will be killed. Avoid drift or spray outside target area for the same reason. Do not apply if weeds are stressed from drought, disease, or insect damage; weed control may be reduced. Rain within 8 hr after application may reduce effectiveness.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Yellow Nutsedge Control

bentazon (Basagran, Bentazon 4)

Rate 0.75 to 1 lb ai/a

Time Apply when yellow nutsedge is 6 to 8 inches tall and, if needed, again at the same rate 7 to 10 days later.

Remarks Results are best with two applications. Add oil concentrate to spray mix as label instructs. Refer to this product in *Postemergence* section above for additional remarks and cautions.

Site of action Group 6: photosystem II inhibitor

Chemical family Benzothiadiazole

halosulfuron (Sanda)

Rate 0.0314 to 0.0623 oz ai/a (0.67 to 1.33 oz/a product)

Time Apply to yellow nutsedge that is at three- to five-leaf stage.

Remarks Add 1 to 2 quarts nonionic surfactant or crop oil concentrate per 100 gal spray solution for broadcast applications. A second application may be required 6 to 10 weeks after the first.

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

Chemical family Sulfonylurea

halosulfuron + dicamba (Yukon)

Rate 0.75 to 1 oz/a halosulfuron + 3.3 to 4.4 oz/a dicamba (6 to 8 oz product/a)

Time Apply when corn is 1 to 12 inches tall and yellow nutsedge is at the 3- to 5-leaf stage.

Remarks Add 1 to 2 quarts nonionic surfactant or crop oil concentrate per 100 gal spray solution for broadcast applications. A second application may be required 6 to 10 weeks after the first.

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

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

mesotrione (Callisto)

Rate 0.078 to 0.094 lb ai/a (2.5 to 3 fl oz/a product)

Time Apply postemergence to corn less than 5 inches tall.

Remarks Suppresses nutsedge growth.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

Special Uses

clethodim (Clethodim 2E)

Burndown of volunteer RR corn before re-planting corn

Rate 3 fl oz/a

Time Up to 6 days before planting corn.

Remarks Apply with or without glyphosate. Apply to weeds up to 12 inches.

Caution Will not kill sethoxydim resistant corn. Preharvest interval is 90 days. Avoid boom overlaps. Do not use COC or MSO adjuvants.

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

Chemical family Cyclohexanedione

Combining Herbicides

The purpose of combining herbicides is to exploit the strong properties of each herbicide while minimizing any weaknesses or undesirable properties. By combining herbicides at reduced rates, the grower can increase the spectrum of annual weeds controlled while reducing herbicide carryover. See label concerning the herbicides in use.

Under furrow irrigation, combinations are best applied preplant and incorporated. Some combinations (refer to labels), however, have been registered for application through sprinkler irrigation systems that incorporate them. This method of application is acceptable, provided the herbicides are applied before weeds emerge.

Refer to each label for actual rates and further details concerning herbicide combinations. Component products may have slightly different labels; thus, rates and use directions may vary slightly.

TANK-MIXES

Unless specifically prohibited on the label, herbicides registered for use on the same crop may be tank mixed. Unless a tank-mix is recommended on an herbicide label, the grower, applicator, or person making the tank-mix recommendation will be responsible and liable for injury, nonperformance, or other problems associated with the application.

PREMIXES

There are an abundance of premixes available; listed on the next page are just a few of the many labeled for corn.

A Few Examples of Convenient Premixes Labeled for Corn

Trade Name	Ingredients
Affinity	40% thifensulfuron + 10% tribenuron
Acuron Flexi	0.87% bicyclopyrone + 3.47% mesotrione + 31.24% s-metolachlor
Axiom	54.4% flufenacet + 13.6% metribuzin/lb
Basis	50% rimsulfuron + 25% thifensulfuron/lb
Bicep Lite II Magnum	3.33 lb S-metolachlor + 2.67 lb atrazine/gal
Bicep II Magnum	2.4 lb S-metolachlor + 3.1 lb atrazine/gal gal
Brawl II ATZ	3.1 lb atrazine + 2.4 lb S-metolachlor/gal
Breakfree ATZ	2.25 lb atrazine + 3 lb acetochlor/gal
Breakfree ATZ Lite	1.5 lb atrazine + 4 lb acetochlor/gal
Buctril + Atrazine (Idaho only)	1 lb bromoxynil + 2 lb atrazine/gal
Cadence ATZ	3 lb acetochlor + 2.25 lb atrazine/gal
Cadence Lite ATZ	4 lb acetochlor + 1.5 lb atrazine/gal
Cinch ATZ	3.33 lb S-metolachlor + 2.67 lb atrazine/gal
Cinch ATZ Lite	2.4 lb S-metolachlor + 3.1 lb atrazine/gal
Curtail	0.38 lb clocyralid + 2 lb 2,4-D amine/gal
Guardsman Max	1.7 lb dimethenamid-P + 3.3 lb atrazine/gal
Halex GT	20.50% S-metolachlor + 20.50% glyphosate + 2.05% mesotrione (glyphosate tolerant corn only)
Harness Xtra (ID only)	1.7 lb dimethenamid-P + 3.3 lb atrazine/gal
Harness Xtra 5.6L (ID only)	3.1 lb acetochlor + 2.5 lb atrazine/gal
Keystone (ID, WA only)	3 lb acetochlor + 2.25 lb atrazine/gal
Keystone LA (ID, WA only)	4 lb acetochlor + 1.5 lb atrazine/gal
Lexar	1.74 lb S-metolachlor + 0.224 lb mesotrione + 1.74 lb atrazine/gal
Lumax	2.68 lb S-metolachlor + 1 lb atrazine + 0.268 lb mesotrione/gal
Lumax EZ	2.49 lb S-metolachlor + 0.935 lb atrazine + 0.21% atrazine related compounds + 0.249 mesotrione lb ai/gal
Medal II AT	3.1 lb atrazine + 0.7% atrazine related compounds + 2.4 lb S-metolachlor/gal
NorthStar	7.5% primisulfuron + 43.9% dicamba/lb
Permit PLUS	66.2% halosulfuron + 7.78% thifensulfuron
Realm Q	7.5% rimsulfuron + 31.25% mesotrione
Require Q (mp)	52.94% dicamba + 6.25% rimsulfuron/lb
Resolve Q	18.4 % rimsulfuron + 4% thifensulfuron-methyl/lb
Rifle Plus	1.1 lb dicamba + 2.1 lb atrazine/gal
Sequence	2.25 lb glyphosate + 3 lb S-metolachlor/gal (glyphosate tolerant corn only)
Spirit	14.2% prosulfuron + 42.8% primisulfuron/lb
Stalwart	3.1 lb atrazine + 2.4 lb S-metolachlor /gal
Status	16% diflufenzopyr + 40% dicamba/lb
Steadfast	50% nicosulfuron + 25% rimsulfuron/lb
Stout	67.5% nicosulfuron + 5% thifensulfuron/lb
Tripzin	2.9 lb pendimethalin + 1.1 lb metribuzin/gal
SureStart (ID and OR only)	3.75 lb acetochlor + 0.38 lb clocyralid + 0.12 lb flumetsulam/gal
WideMatch	0.75 lb fluroxypyr + 0.75 lb clocyralid/gal
Yukon	12.5% halosulfuron + 55% dicamba/lb

Sweet Corn (Fresh, Processing, and Seed)

Ed Peachey

Revised March 2020

Preplant Incorporated and Preemergence Surface

acetochlor (Surpass or Cadence)

Rate 0.8 to 3 lb ai/a. Consult appropriate label for rates.

Time Apply preplant or preemergence.

Remarks Use lower rates on coarse soils with low organic matter. May be surface-applied or incorporated into top 1 to 2 inches of soil. If rain or 0.25 to 0.75 inch of overhead irrigation does not occur within 7 days of a surface application, shallowly incorporate herbicide with a rotary hoe or similar device. May tank mix with several other herbicides to broaden activity.

Caution Improper incorporation methods or poor soil preparation may reduce weed control. Consult label for crop rotation restrictions.

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

Chemical family Chloroacetamide

atrazine (several trade names)

Rate Consult label for yearly changes.

Time Apply preplant or preemergence by selecting rates depending on soil type listed on label.

Remarks Activate with overhead irrigation in 7 days or incorporate mechanically in top 2 inches of soil for rill-irrigated fields east of the Cascades. Control of barnyardgrass and yellow foxtail is poor if the soil surface remains dry or if these grasses grow beyond the two-leaf stage. Do not plant crops other than corn during the season of treatment. Other crops can be planted the next year west of the Cascades, if treated before June 10 with 2 lb/a or less; east of the Cascades, use other herbicides when planting corn the next year.

Caution A restricted-use herbicide. Also, any product or premix containing more than 4% atrazine is restricted use (Atrazine 4L is 42% atrazine). Some populations of redroot pigweed, groundsel, kochia, and lambsquarters have evolved resistance to atrazine. Combine other herbicides with atrazine if these species are present. Do not exceed 2 lb ai/a for any single application. Do not exceed 2.5 lb ai/a per year. Do not graze treated area or feed treated forage to livestock for 45 days after application. After harvest, plow and thoroughly mix the soil to reduce possible injury. Do not apply through any type of irrigation system.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

dimethenamid-P (Outlook)

Rate 0.56 to 0.98 lb ai/a (12 to 21 fl oz/a Outlook)

Time Apply preplant incorporated, preplant surface, or pre-emergence surface.

Remarks Consult label for application rate in relation to soil type. Use lower rates on coarse soils with low organic matter or low cation exchange capacity. Control is best if incorporated into soil by overhead moisture or a light mechanical tillage (1 to

2 inches deep) before weed seedlings emerge. May be tank mixed with other herbicides to improve weed control. Control of wild proso millet can be enhanced if Outlook is applied postplant surface after preplant-incorporating Dual Magnum.

Caution Apply through irrigation systems as described on the label. Delayed and erratic emergence or leaf wrapping of sweet corn may occur if conditions are extreme (heavy rain and extended periods of water-saturated soil and/or cool weather) during germination and emergence, particularly for preplant-incorporated applications followed by cool, wet weather. Do not apply on sweet corn grown for seed.

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

Chemical family Chloroacetamide

mesotrione (Callisto)

Rate 0.078 to 0.094 lb ai/a (2.5 to 3 fl oz/a Callisto)

Time Apply preemergence surface after planting.

Remarks Good control of some broadleaf weeds. Tank mix with atrazine to improve weed control.

Caution Some sweet corn varieties are more sensitive than others. Rotational interval is 18 months for peas, snap beans, cucurbits, beets, and many other crops. Crop yield may be reduced if applied to corn treated with the insecticides Counter or Lorsban. Do not apply more than 0.24 lb ai/a per year (7.7 fl oz).

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

S-metolachlor + atrazine + bicyclopyrone + mesotrione (Acuron)

Rate 2.15 to 2.58 lb ai/a (2.5 to 3 quarts/a Acuron)

Time Preemergence only in sweet corn

Remarks Acuron is a premix of atrazine, bicyclopyrone, mesotrione and S-metolachlor plus the safener benoxacor. Bicyclopyrone is an HPPD inhibitor herbicide with soil residual that will control pigweed and nightshade. Acuron Flexi does not contain atrazine. Rate is dependent on soil organic matter.

Caution A restricted use herbicide. Application to emerged corn seedlings will typically cause unacceptable injury. Grazing Restriction: To avoid possible illegal residues, do not graze or feed forage from treated areas for 45 days following application. If crop is lost that has been treated with Acuron (field, seed, silage), sweetcorn, yellow popcorn, can be replanted immediately. Small grain cereals including wheat, barley and rye can be planted 4 months after application. Dry bean and potato can be planted 10 months and all other crops after 18 months.

Site of action (S-metolachlor) Group 15: inhibits very long chain fatty acid synthesis; (S-metolachlor) Group 5: photosystem II inhibitor; bicyclopyrone and mesotrione: Group 27: inhibits 4-hydroxyphenylpyruvatedioxygenase (4-HPPD).

Chemical family (S-metolachlor) Chloroacetamide; (*atrazine*) Triazine; (bicyclopyrone and mesotrione) Triketone

pendimethalin (Prowl H₂O)

Rate 0.95 to 1.90 lb ai/a (2 to 4 pints/a Prowl H₂O) depending on soil texture and organic matter content.

Time Apply preemergence only; do not preplant-incorporate. Apply over a uniform seedbed with corn seed planted 1.5 inches deep to ensure selectivity.

Remarks Note rates listed on label for different soil types and organic-matter contents.

Caution May cause lodging of sweet corn. Planting deeply and hilling during cultivation may help to reduce lodging. Do not incorporate. Use only shallow cultivation to reduce soil mixing at or near seed. Do not apply to reduced-till or no-till sweet corn.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pyroxasulfone (Zidua)

Rate 0.080 to 0.21 lb ai/a (1.5 to 4.0 oz /a Zidua WDG) depending on soil texture

Time Apply preplant incorporated up to 14 days before planting or preemergence surface. May be applied in a single application or in sequential applications.

Remarks Residual control of annual ryegrass and rattail fescue and many broadleaved weeds. Preplant-surface applications are not recommended in sweet corn. Sequential preemergence or postemergence application can be made, but do not exceed the maximum cumulative rate allowed by soil type per season. Zidua may be broadcast surface applied in the fall or winter to control winter annual weeds germinating in fall.

Caution Corn seed must be planted a minimum of 1 inch deep. If a labeled crop treated with Zidua is lost to crop failure because of environmental factors, corn may be replanted, but do not repeat application of Zidua after crop failure. Crop rotation intervals are 18 months for grasses grown for seed, and 11 months for small grains, snap beans, and peas. May injure corn on gravelly loams at 3 oz/a.

Site of action Group 15: Very long chain fatty acid synthesis inhibitor

Chemical family Chloroacetamide

pyroxasulfone + fluthiacet methyl (Anthem)

Rate 0.084 to 0.218 lb ai/a (5 to 13 oz/a Anthem)

Time Preemergence. See label for application timing, soil type, organic matter, and rate information.

Remarks Preplant applications are not recommended for sweet corn. Apply alone or in a tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Do not exceed a total of 16.3 oz/a of Anthem per season. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 30 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 40 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14 protoporphyrinogen oxidase inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine

pyroxasulfone + fluthiacet methyl + atrazine (Anthem ATZ)

Rate 1.126 to 2.253 lb ai/a (32 to 64 oz/a Anthem ATZ)

Time Preemergence. See label for application timing, soil type, organic matter, and rate information.

Remarks Preplant applications are not recommended for sweet corn. Apply alone or in a tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Restricted-use herbicide with atrazine. Do not exceed a total of 39 oz/a of Anthem ATZ per season on coarse-textured soils or 70 oz/a on fine-textured soils. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 60 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 45 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor; (atrazine) Group 5: photosystem II inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine; (atrazine) Triazine

saflufenacil (Sharpen)

Processing varieties only, not including sweet corn grown for seed or fresh market varieties.

Rate 0.044 lb ai/a (2 fl oz/a)

Time Apply early preplant surface (15 to 30 days before planting), preplant surface or incorporated (0 to 14 days before planting), and post-plant surface (before corn emergence).

Remarks Burndown broadleaf weed control with residual control dependent on rate. Does not control grasses. An adjuvant system is required such as methylated seed oil plus ammonium sulfate for optimum broadleaf burndown activity. If only residual broadleaf weed control is desired, Sharpen can be applied at 1.0 fl oz/a (all soil types) with an adjuvant system any time before corn emergence for. PHI is 80 days. Tank mix with Outlook or other soil active herbicides to improve residual control.

Caution Do not apply after corn has emerged because corn will be severely injured.

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

Chemical family Pyrimidinedione

saflufenacil + dimethenamid-P (Verdict)

Processing sweet corn only

Rate 0.044 lb ai/a saflufenacil + 0.39 lb ai/a dimethenamid-P (10 fl oz/a)

Time Apply preplant surface or preplant incorporated (0 to 14 days before planting), and post-plant surface (before corn emergence).

Remarks Burndown broadleaf weed control with residual broadleaf and grass control. An adjuvant system is required for optimum broadleaf burndown activity such as methylated seed oil plus ammonium sulfate. PHI is 80 days. Plant corn >1/2 inch deep to avoid injury, and make sure the corn row has closed before applying Verdict.

Caution Do not apply after corn has emerged because corn will be severely injured. Do not apply where an at-planting application of an organophosphate or carbamate insecticide was applied because severe injury may result. Do not apply to soils with less than 3% OM. Some hybrids may be less tolerant to Verdict than others.

Site of action (saflufenacil) Group 14: Protoporphyrinogen IX oxidase (PPO) inhibitor; (dimethenamid-P) Group 15: inhibits very long chain fatty acid synthesis

Chemical family (saflufenacil) Pyrimidinedione; (dimethenamid-P) Chloroacetamide

simazine (Princep 4L, Simazine 4L, and others)

Rate 1.6 to 4 lb ai/a (1.6 to 4 quarts/a, depending on product)

Time Preemergence, apply before weeds and corn emerge.

Remarks Maximum rate on highly erodible soils is 1.6 quarts/a if less than 30% of the soil is covered with plant residues. Preharvest and pregrazing interval is 45 days. Can be preplant-incorporated.

Caution A restricted-use herbicide in Washington. Do not plant crops other than corn for 1 year. Do not graze treated areas. Do not exceed 2.5 quarts/a per year. After harvest, plow and thoroughly mix the soil to reduce possible injury.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

S-metolachlor (Dual Magnum or Dual II Magnum with corn safener) or metolachlor (Parallel)

Rate Consult labels to adjust rates for soil types and organic matter content.

Time Apply preplant incorporated, preemergence, or early post-emergence, before weeds germinate or yellow nutsedge emerges.

Remarks Activate with shallow incorporation or overhead moisture. Dual II has corn safener.

Caution Consult label for specific rates, depending on soil texture and especially organic matter, or for restrictions on planting sensitive crops within 4 to 5 months. Inhibits root and shoot growth.

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

Chemical family Chloroacetamide

Postemergence for Soil Residual

dimethenamid-P (Outlook)

Rate 0.56 to 0.98 lb ai/a (12 to 21 fl oz /a Outlook)

Time Early postemergence on corn up to 12 inches tall.

Remarks Consult label for application rate in relation to soil type. Use lower rates on coarse soils with low organic matter or low cation exchange capacity. May be tank mixed with other herbicides to provide burndown with residual control. PHI 50 days.

Caution Consult label for instructions on applications made through some irrigation systems. Regional experience indicates that corn may be injured by postemergence applications made during very hot weather. Do not apply on sweet corn grown for seed.

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

Chemical family Chloroacetamide

pendimethalin (Prowl 3.3 EC or Prowl H₂O)

Rate 0.74 to 1.98 lb ai/a (1.8 to 4.8 pints/a Prowl 3.3) or 0.95 to 1.9 lb ai/a (2 to 4 pints/a Prowl H₂O), depending on soil texture and organic matter content

Time Apply to emerged corn until 20 to 24 inches tall or at V8 growth stage, whichever is more restrictive.

Remarks Does not control emerged weeds. Note rates listed on label for different soil types and organic-matter content. Tank mix with other postemergent herbicides to control emerged weeds. Use drop nozzles if the corn canopy intercepts the spray and prevents it from uniformly reaching the soil.

Caution Do not incorporate. Use only shallow cultivation to reduce soil mixing at or near seed.

Site of action Group 3: microtubule assembly inhibitor

Chemical family Dinitroaniline

pyroxasulfone (Zidua SC or WDG)

Rate 0.057 to 0.21 lb ai/a (1.75 to 6.5 fl oz /a Zidua SC) depending on soil texture.

Time May be applied early postemergence to corn from spiking to V4 for residual preemergence control of susceptible weeds.

Remarks PHI is 37 days. Residual control of annual ryegrass and rattail fescue and many broadleaved weeds.

Caution Crop rotation intervals are 18 months for grasses grown for seed, and 11 months for small grains, snap beans, and peas. May injure corn on gravelly loams at 3 oz/a, especially if tankmixed with another preemergence herbicide.

Site of action Group 15: Very long chain fatty acid synthesis inhibitor

Chemical family Chloroacetamide

S-metolachlor (Dual Magnum or Dual II Magnum with corn safener) or metolachlor (Parallel)

Rate Consult labels to adjust rates for soil types and organic matter content.

Time Apply early postemergence before weeds germinate or yellow nutsedge emerges.

Remarks Activate with shallow incorporation or overhead moisture. Dual II has a safener to reduce potential injury. Suppresses yellow nutsedge.

Caution Consult label for specific rates, depending on soil texture and especially organic matter, or for restrictions on planting sensitive crops within 4 to 5 months. Inhibits roots and shoots.

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

Chemical family Chloroacetamide

Postemergence

2,4-D amine

Rate 0.24 to 0.71 lb ae/a (0.5 to 1.5 pints/a product)

Time Apply after corn is tall enough to use drop nozzles between rows.

Remarks To avoid drift injury, use the same precautions in spraying 2,4-D as for winter cereals. Avoid contact with corn foliage to reduce brittle stalks and whorl distortion that prevents tassel emergence. Mimics natural plant hormones.

Caution Do not apply from tasseling to dough stage of corn. Crop injury is more likely if corn is growing rapidly under high temperature and high soil moisture.

Site of action Group 4: synthetic auxin

Chemical family Phenoxy acetic acid

atrazine + crop oil

Rate Consult labels.

Time Apply postemergence before grass weeds exceed 1.5 inches and broadleaf weeds 4 to 6 inches but before corn is 12 inches tall.

Remarks Use lower water carrier volumes to improve activity. Do not exceed 1 to 1.5 lb ai/a when wheat is expected to follow in the rotation. Consult label for replanting sensitive crops within 12 to 24 months.

Caution A restricted-use herbicide. Also, any product or premix containing more than 4% atrazine is restricted use (Atrazine 4L is 42% atrazine). Do not exceed 2 lb ai/a for any single application. Do not exceed 2.5 lb ai/a per year. Reduce potential soil residue by keeping applications under 2 lb/a, or select other herbicides.

Site of action Group 5: photosystem II inhibitor

Chemical family s-triazine

bentazon (Basagran 5L)

Rate 0.75 to 1 lb ai/a (1.2 to 1.6 pints/a Basagran 5L)

Time Apply to small, annual broadleaf weeds; see label for maximum weed size.

Remarks Add nonionic surfactant/crop oil concentrate/methylated seed oil and urea ammonium nitrate/ammonium sulfate. Apply postemergence to corn when weeds are small and actively growing. Rainfast in 4 hours. Use higher rate with crop oil concentrate applied twice, 7 to 10 days apart, for Canada thistle and yellow nutsedge control. Irrigate before application to ensure vigorous weed growth. Control is poor if day and night temperatures are below 75°F and 55°F, respectively. Use at least 5 gal/a water and at least 40 psi to ensure thorough coverage of weed foliage. Corn leaves may be speckled temporarily, but plants continue growth without further symptoms within 10 days.

Caution Do not apply to corn growing under stress conditions. Do not mix with insecticides. Do not exceed 2 lb ai/a (3.2 pints/a 5L) per season.

Site of action Group 6: photosystem II inhibitor

Chemical family Benzothiadiazole

carfentrazone (Aim EC)

Rate 0.008 to 0.032 lb ai/a (0.5 to 2 fl oz/a Aim EC). Up to 2 fl oz/a for preemergence burndown or postemergence-directed applications.

Time Apply to actively growing broadleaf weeds up to 4 inches tall or 3 inches across. Apply to corn from before planting up to the 14th collar growth stage, and when weeds are small. Use directed applications if corn is larger than the V-8 stage.

Remarks Adjust nozzles to minimize herbicide application directly over row that might concentrate spray in whorl of corn plant. Acts on contact. Fields can be planted to labeled crops at any time and rotated to any other crop 12 months after application (see label). Good spray coverage is essential.

Caution Avoid applying to corn with collars filled with water. Use only a nonionic surfactant on sweet corn. Avoid any chance of spray drift to non-target sites. User assumes all responsibility for crop loss or damage of sweet corn varieties and inbred lines for seed production. Overlapping applications can injure crop. Tank-mixtures of carfentrazone with emulsifiable concentrate (EC) formulations of other herbicides, fungicides, or insecticides, or with crop oil concentrate, methylated seed oil, or silicone-based adjuvants may increase crop injury. Adding nitrogen or ammonium sulfate with nonionic surfactant may increase leaf injury. Do not exceed 0.031 lb ai/a (2 fl oz/a Aim EC) per season.

Site of action Group 14: inhibits protoporphyrinogen oxidase

Chemical family Triazinone

clopyralid (Stinger)

Rate Apply 0.124 to 0.25 lb ae/a (0.33 to 0.66 pint/a of Stinger) uniformly with ground equipment as a broadcast or directed spray in 10 to 20 gal/a total spray volume.

Time Any time after sweet corn emerges until 18 inches tall.

Remarks To control Canada thistle, apply when most thistle plants have emerged and thistles are at least 6 to 8 inches wide or tall, but before bud stage. For best results on Canada thistle, use at least 0.5 pint/a product. Do not cultivate before treatment; wait 2 weeks after treatment before cultivation. Re-treat as necessary but do not exceed 0.66 pint/a product per calendar year. Preharvest interval is 30 days for ears and forage, 60 days for stover. Make one to two broadcast applications per crop per year, not to exceed a total of 0.66 pint/a. Re-treatment interval is 21 days. To control Jerusalem artichoke, common cocklebur, jimsonweed, ragweed (common and giant), annual sowthistle, and sunflower, apply Stinger from weed emergence up to the five-leaf growth stage. Use a higher rate listed for heavy infestations, or when greater residual control is desired.

Caution Preharvest interval is 30 days for ears and forage, 60 days for stover. Make one to two broadcast applications per crop per year, not to exceed a total of 0.66 pint/a. Re-treatment interval is 21 days. Do not graze treated areas or harvest corn for feed within 40 days of treatment. Wheat, barley, canola, *Brassica* crops (including those grown for seed), garden beets, sugar beets, oats, grasses, field corn, spinach, or turnips may be planted any time after treatment. Asparagus, grain sorghum, mint, onion, and strawberries can be planted 12 months after application. Alfalfa, dry bean, soybeans, and sunflowers can be planted 1 month after application if rain (not including irrigation) is greater than 18 inches, or after 18 months if rainfall is less than 18 inches. Do not plant broadleaf crops grown for seed (excluding *Brassica* seed

crops), carrot, celery, lentils, lettuce, melons, peas, potatoes, safflower, or tomato for 18 months after applying clopyralid.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

fluroxypyr (Starane)

Rate 0.125 lb ae/a (0.66 pint/a Starane)

Time Apply broadcast to actively growing broadleaf weeds before they are 8 inches tall, and up to and including four fully exposed leaf collars (V4 growth stage). After the V5 or V4 stages, apply as a directed spray with drop nozzles.

Remarks Primarily to control volunteer potatoes in sweet corn, but acts on a number of broadleaf weeds.

Caution Not all sweet corn varieties have been screened for tolerance to fluroxypyr, and varieties may differ in their tolerance. Do not allow grazing. Preharvest interval is 47 days for foraging treated field corn, 31 days for sweet corn ears. Do not add a spray adjuvant when applying fluroxypyr alone on sweet corn.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

fluthiacet-methyl (Cadet)

Sweet corn for processing only

Rate 0.004 to 0.006 lb ai/a (0.6 to 0.9 fl oz/a Cadet)

Time Apply to corn from 2-leaf (two leaf collars) to when corn is 48 inches tall or before tasseling, whichever comes first. See label for maximum growth stage and weeds controlled.

Remarks See label for maximum weed size, usually 3 inches or less tall with the exception of velvetleaf (36 in tall). Spray adjuvants are required for optimum weed control. See label for adjuvant recommendations. Thorough coverage is essential for control of susceptible broadleaf weeds. Lower rate can be used if tankmixing with glyphosate for preplant burndown.

Caution Do not exceed 0.009 lb ai/a (1.25 fl oz/a Cadet) per season.

Site of action Group 14: protoporphyrinogen oxidase inhibitor

Chemical family Imine

halosulfuron-methyl (Sanda)

Rate 0.03 to 0.047 lb ai/a (0.66 to 1 oz/a Sanda)

Time Apply postemergence from spike through layby stage.

Remarks Sanda is not recommended for use on "Golden Jubilee." Avoid concentrating into the plant whorl. Controls only susceptible broadleaf weeds and nutsedge. Nightshades are not controlled. Always add a nonionic surfactant if not tank mixed with other herbicides. Apply only with ground equipment. May apply up to two times during growing season.

Caution Not all varieties have been tested for sensitivity to this herbicide. Before using, consider crop rotation plans. Do not replant or rotate to wheat within 2 months.

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

Chemical family Sulfonylurea

mesotrione (Callisto)

Rate 0.078 to 0.094 lb ai/a (2.5 to 3 fl oz/a Callisto)

Time Apply postemergence to corn less than 5 inches tall.

Remarks Good control of some broadleaf weeds, with suppression of wild proso millet. Tank mix with atrazine to improve broadleaf control.

Caution Some sweet corn varieties are much more sensitive to mesotrione than others (See <http://horticulture.oregonstate.edu/content/sweet-corn-hybrid-tolerance-ratings>). Rotation interval is 18 months for peas, snap beans, cucurbits, beets, and many other crops. Crop yield may be reduced if applied to corn treated with the insecticides Counter or Lorsban. See label for adjuvant restrictions for sweet corn, which recommends nonionic surfactant rather than crop oil concentrate, particularly under lush growing conditions. Do not add UAN or AMS. Do not apply more than 0.24 lb ai/a per year (7.7 fl oz).

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

mesotrione + fluthiacet methyl (Solstice)

Rate 0.0739 to 0.0931 lb ai/a mesotrione + 0.0042 to 0.0053 lb ai/a fluthiacet methyl (2.5 to 3.15 oz/a Solstice)

Time Recommended stage is spike to V5–V6 and to weeds < 5 inches tall and 3 inches across.

Remarks Apply with a minimum of 10 gal/a water; 15 gal/a is recommended. Add nonionic surfactant at 0.25% v/v. Crop oil concentrate will improve weed control but may increase injury to corn. Use medium droplets and good pressure to penetrate weed canopy and get good coverage from top to bottom of weeds. Avoid XC (Extremely Coarse) type spray nozzles as coverage is not adequate for contact-type herbicides. May be mixed with other labeled postemergence herbicides.

Caution Do not add urea ammonium nitrate or ammonium sulfate when making postemergence applications of Solstice. Do not harvest for forage within 45 days of application. Do not harvest grain within 70 days of application. Do not harvest sweet corn within 40 days of application.

Site of action (mesotrione) Group 27: 4-HPPD inhibitor; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor

Chemical family (mesotrione) Triazinone; (fluthiacet methyl) Imine

nicosulfuron (Accent Q)

Rate 0.03 to 0.06 lb ai/a (0.9 to 1.8 oz/a Accent Q).

Time Apply to actively growing weeds, either broadcast before corn that is 12 inches tall or up to and including 5 leaf-collars or with drop nozzles according to label instructions if corn is taller than 12 inches.

Remarks See label for details, application restrictions, and ways to minimize potential crop injury. Controls wild proso millet at 0.9 oz/a if weeds are less than 4 in tall or wide. In recent research, tank-mixes of Outlook and/or Lorsban or other insecticides caused severe injury. Adjuvants improve uptake into leaves. Not all varieties of sweet corn tolerate Accent equally. Sweet corn variety tolerance to both Accent and Callisto herbicides can be found online at <https://agsci.oregonstate.edu/sites/agsci7/files/horticulture/attachments/SCRNhybridTolCallisto07.pdf>. Accent Q includes the safener isoxadifen.

Caution Avoid repeat applications in the same field, to minimize selection for resistant weed biotypes. Do not apply as a tank-mix with Basagran (bentazon), as serious injury will result. Do not apply when the difference between the daytime high and the nighttime low temperature is expected to be 35°F or greater. Note precautions about types and timings of insecticide applications and environmental conditions that stress corn growth or reduce corn metabolism of nicosulfuron. Crop rotation is 10 months for corn, except the sweet corn varieties “Merit,” “Carnival,” and “Sweet Success,” for which the minimum time interval is 15 months. Do not graze livestock or feed any treated component within 30 days of application. Read and understand product label thoroughly before treating sweet corn.

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

Chemical family Sulfonylurea

paraquat (Firestorm)

Rate Consult labels.

Time Apply postemergence as a directed spray when corn is at least 10 inches tall.

Remarks Use nozzles arranged to spray no higher than the lower 3 inches of corn stalks. Add a nonionic surfactant or crop oil concentrate according to label specifications, taking care to avoid anionic formulations that react in the tank to form insoluble precipitates.

Caution A restricted-use herbicide. Do not ingest or inhale spray mist. Wear protective face shields, respirators, and clothing.

Site of action Group 22: photosystem I electron diversion.

Chemical family Bipyridilium

pyroxasulfone + fluthiacet methyl (Anthem)

Rate 0.067 to 0.218 lb ai/a (4.0 to 13.0 fl oz/a) depending on soil type, soil organic matter and timing of application.

Time Apply from 1-leaf through V4 stage. See label for soil type, organic matter, and rate information.

Remarks Postemergence applications may be made up to V4 stage. Apply alone or in a tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Do not exceed a total of 16.3 oz/a of Anthem per season. See label for rotational restrictions. Do not harvest field corn for forage for 30 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 40 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine

pyroxasulfone + fluthiacet methyl + atrazine (Anthem ATZ)

Rate 1.126 to 2.253 lb ai/a (32 to 64 oz/a Anthem ATZ)

Time Apply from 1-leaf through V4 stage. See label for soil type, organic matter, and rate information.

Remarks Postemergence applications may be made up to V4 stage. Apply alone or in a tank-mixture to broaden weed spectrum. Where emerged weeds are present at the time of application, use appropriate weed control measures to control emerged weeds. For early preplant applications in reduced-tillage systems, use the higher rate for soil type. Requires rainfall or irrigation to activate.

Caution Restricted-use herbicide. Do not exceed a total of 39 oz/a of Anthem ATZ per season on coarse-textured soils or 70 oz/a on fine-textured soils. See label for rotational restrictions. Preplant surface applications are not recommended on coarse soils where annual rainfall exceeds 40 inches. Do not harvest field corn for forage for 60 days after application. Do not harvest for grain for 70 days after application. Do not harvest sweet corn forage or ears until 45 days after application. Make only one preplant/preemergence application per season.

Site of action (pyroxasulfone) Group 15: inhibits long chain fatty acid synthesis; (fluthiacet methyl) Group 14: protoporphyrinogen oxidase inhibitor; (atrazine) Group 5: photosystem II inhibitor

Chemical family (pyroxasulfone) Chloroacetamide; (fluthiacet methyl) Imine; (atrazine) Triazine

tembotrione (Laudis)

Rate 0.082 lb ai/a (3 fl oz/a Laudis)

Time Apply to actively growing weeds from emergence to the V8 stage of growth, or sweet corn up to the V7 stage of growth.

Remarks One application per season on sweet corn. Consult label for maximum weed size. Use methylated seed oil (MSO) at 1% v/v plus ammonium nitrogen fertilizer (UAN) at 1.5 quarts/a or 1.5 lb/a spray-grade ammonium sulfate (AMS) when tembotrione is used alone, or when a specific adjuvant is not specified on the label. Adding atrazine at 1 pint/a significantly broadens the spectrum of control. Tank-mixes with residual herbicides such as S-metolachlor (Dual Magnum) and dimethenamid-P (Outlook) will improve long-term control but may increase potential of crop injury. Potential injury from these tank-mixes can be minimized by applying after V4 stage of corn growth, by eliminating UAN from the tank-mix, or avoiding application after cool and wet weather.

Caution Not all hybrids of corn have been tested for herbicide tolerance. The variety Captain appears to be more sensitive than other corn varieties to tembotrione. New varieties should be screened for tolerance to tembotrione on small areas of fields. Weed control may be reduced if applied to stressed weeds or weeds covered by dust or heavy dew. Do not graze livestock or harvest for forage within 45 days after application. Note crop rotation restrictions on label.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

tolpyralate (Shieldex 400SC)

Rate 0.026 to 0.035 lb ai/a (1 to 1.35 fl oz/a)

Time Apply broadcast postemergence to actively growing weeds up to 5 inches tall and to corn up to 20 inches tall.

Remarks Controls wild proso millet, several other annual grasses, and many annual broadleaf weeds. Does not control purslane. Rate is dependent on weed size. Best results are obtained when applications are made early postemergence when corn and weeds are small. Apply to corn that is less than 12 inches tall for improved coverage and best overall performance. Tankmixing tolpyralate with 0.25 to 1 lb ai/a of atrazine greatly improves control of most species, particularly common purslane. Spray additives are essential for maximum control. Methylated seed oil (MSO) is recommended (0.5 to 1 % v/v) but NIS (0.25 to 0.5% v/v) and COC (1% v/v) also can be used. UAN at 2.5% v/v will enhance performance. Spray-grade ammonium sulfate at 8.5 lb/100 gal of water may be substituted for the UAN. Tolpyralate may be used sequentially or in combination with all soil- or foliar-applied insecticides registered for use in corn. Tank-mixes with residual herbicides such as S-metolachlor (Dual Magnum) and dimethenamid-P (Outlook) will improve long-term control but may injure the crop. Potential injury from these tank-mixes can be minimized by applying after the V4 to V6 stage of corn growth, by eliminating UAN from the tank-mix, or avoiding application after extended periods of cool and wet weather. Rainfast in 1 hour.

Caution Preharvest interval is 35 days. Has not been tested on all sweet corn lines for tolerance. Rotational interval is 9 months for most vegetable crops but 18 months for sugar beets. Do not make more than 2 applications per year and more than 2.7 oz/a/year.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

topramezone (Impact, Armezon)

Rate 0.0164 to 0.022 lb ai/a (0.75 to 1 oz/a Impact)

Time Apply postemergence to actively growing weeds 3 to 8 inches tall.

Remarks Controls wild proso millet, several other annual grasses, and many annual broadleaf weeds. A supplemental label for Oregon, Washington, and Idaho allows for up to 1 oz/a in single or sequential applications. Rate is dependent on weed size. Add methylated seed oil or crop oil concentrate at 1 to 1.5% v/v and UAN or ammonium phosphate at 1.2 to 1.5% v/v to the spray solution. Spray-grade ammonium sulfate at 8.5 lb/100 gal of water may be substituted for the nitrogen fertilizers. For best performance, tank mix topramezone with 0.25 to 1 lb ai/a of atrazine. Topramezone may be used sequentially or in combination with all soil- or foliar-applied insecticides registered for use in corn. Tank-mixes with residual herbicides such as S-metolachlor (Dual Magnum) and dimethenamid-P (Outlook) will improve long-term control but may injure the crop. Potential injury from these tank-mixes can be minimized by applying after the V4 to V6 stage of corn growth, by eliminating UAN from the tank-mix, or avoiding application after extended periods of cool and wet weather

Caution Apply only once per growing season. Preharvest interval is 45 days. See label (and supplemental label) for Oregon,

Washington, and Idaho rotational crop restrictions. Has not been tested on all sweet corn lines for tolerance.

Site of action Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD)

Chemical family Triketone

topramezone + dimethenamid-P (Armezon PRO)

Rate 0.5 to 0.857 lb ai/a (14 to 24 fl oz/a product)

Time Apply postemergence to actively growing weeds 3 to 8 inches tall.

Remarks Consult label for application rate in relation to soil type. Use lower rates on coarse soils with low organic matter or low cation exchange capacity. Controls many annual broadleaf weeds and several annual grasses. See label for optimum treatment time for weeds of different sizes. Apply to corn from emergence up to 50 days prior to harvest or after corn is 12-inches tall, whichever comes first. Tank mix with atrazine (up to 12" tall corn) where possible to improve weed control speed and spectrum. Refer to label for crop rotation restrictions. Add 0.25-0.5 lb ai/a atrazine for best performance. When tank mixing with atrazine, use COC or NIS (not MSO).

Caution Do not exceed 1.147 lb ai/a (28 fl oz/a product) per growing season. Preharvest interval is 50 days. Crop rotation restrictions for snap beans and sugarbeet are determined by location, whether east or west of the Cascade mountains.

Site of action (topramezone) Group 27: inhibits 4-hydroxyphenylpyruvate-dioxygenase (4-HPPD); (dimethenamid-P) Group 15: inhibits very long chain fatty acid synthesis

Chemical family (topramezone) Triketone; (dimethenamid-P) Chloroacetamide

Quackgrass and Other Perennial Grasses

atrazine

Rate Consult label

Time Apply in fall or, preferably spring either as a single application at higher rates 1 to 3 weeks before plowing to actively growing quackgrass or as a split treatment, first before plowing and second before, during, or after planting, before weeds are 1.5 inches tall.

Remarks Adding a nonionic adjuvant enhances control. Control of wild proso millet is poor. See label for planting sensitive crops within 12 to 24 months, depending on time of application and total applied. Select other herbicides with reduced soil persistence to reduce carryover.

Caution A restricted-use herbicide. Do not graze treated area or feed treated foliage to livestock for 45 days after treatment.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

glyphosate (numerous trade names)

Rate Consult labels.

Time Spot-treat vigorously growing quackgrass 6 to 8 inches tall by eliminating both the weed and crop within the treated area.

Remarks Spray before corn silks to avoid residues in the harvested crop. Inhibits production of three amino acids and protein synthesis.

Caution Do not treat more than 10% of the acreage.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

sethoxydim (Poast)

Poast-protected sweet corn varieties only

Rate Consult label; maximum rate is 0.28 lb ai/a (1.5 pints/a) with a maximum of 0.56 lb ai/a (3 pints/a) per year.

Time Maximum height for quackgrass and wild proso millet control is 8 and 10 inches, respectively.

Remarks Use in Poast-protected sweet corn varieties only, such as Rogers GH 2042, GH 6333, and GH 6631. May be applied over the top. A second application is allowed 10 days after the first. Identify susceptible grasses and add 2 pints/a nonphyto-toxic crop oil concentrate to improve leaf absorption. Control often is erratic on grasses stunted or stressed from drought, high temperatures, or low fertility. Resistant grasses include annual bluegrass and all fine fescues; quackgrass can be suppressed. Grass control may be reduced if applied with bentazon. Inhibits fatty acid production, cell membranes, and new growth.

Caution Do not apply to corn hybrids that are not tolerant to Poast. Do not exceed 3 pints/a per year. Preharvest interval is 30 days.

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

Chemical family Cyclohexanedione

Wild Proso Millet Control

Biology and management Wild proso millet mimics sweet corn growth. Seeds mature before corn harvest, facilitating spread with machinery. Seed longevity in soil, however, is relatively short (3 to 5 years). Rotating to grass seed or summer annual broadleaf crops helps deplete the seedbank if wild proso millet is not allowed to produce seed. Wild proso millet seedlings emerge erratically throughout the season because of inherent seed dormancy, which is strongest for black-seed types. Cultivation that brings new seeds to the surface, or irrigation and rain, often cause a new crop of weed seedlings to emerge.

Selective herbicides that suppress or control wild proso millet include S-metolachlor, dimethenamid-P, nicosulfuron, and topramezone, topyralate and tembotrione. In fields with a very high density of wild proso millet seeds, control efforts may need a preplant herbicide such as dimethenamid-P + S-metolachlor, followed by a preemergence herbicide, followed by cultivation(s) or another postemergence herbicide. Both topramezone and tembotrione provide good control of wild proso millet up to 6 inches tall, but do not provide residual control.

Yellow Nutsedge Control

atrazine

Rate Consult label.

Time Apply as a single application or split applications according to one of six alternative methods listed on label.

Remarks Yearly applications or use of other herbicides can reduce populations if a few plants survive growing season.

Caution A restricted-use herbicide. Consult label for planting sensitive crops within 12 to 24 months, depending on time of application and total amount applied.

Site of action Group 5: photosystem II inhibitor

Chemical family Triazine

bentazon

Rate 0.75 to 1 lb ai/a

Time Apply when yellow nutsedge is 6 to 8 inches tall and, if needed, again at the same rate 7 to 10 days later.

Remarks Results are best with two applications. Add oil concentrate to spray mix as label instructs. Refer to this product in *Postemergence* section above for additional remarks and cautions.

Site of action Group 6: photosystem II inhibitor

Chemical family Benzothiadiazole

halosulfuron-methyl (Sandea)

Rate 0.03 to 0.047 lb ai/a (0.66 to 1 oz/a Sandea)

Time Apply to yellow nutsedge that is at 3- to 5-leaf stage and to corn from spike through layby stage.

Remarks Controls nutsedge if applied when nutsedge is in 3- to 5-leaf stage. May need sequential applications with high densities of nutsedge. Apply up to two times during growing season. Always add a nonionic surfactant if not tank mixed with other herbicides. Use drop nozzles to reduce potential injury to corn, especially with sequential applications. Add 1 to 2 quarts non-ionic surfactant or crop oil concentrate per 100 gal spray solution for broadcast applications. A second application may be required 6 to 10 weeks after the first.

Caution Not all varieties have been tested for sensitivity to halosulfuron. Not recommended on variety Jubilee.

mesotrione (Callisto)

Rate 0.078 to 0.094 lb ai/a (2.5 to 3 fl oz/a Callisto)

Time Apply postemergence to corn less than 5 inches tall.

Remarks Suppresses nutsedge growth.

S-metolachlor

See "Corn—Preemergence, Soil-applied" in this section of this handbook. (Applications inhibit new tuber formation and reduce infestations).

Canada Thistle Control

2,4-D

See “Corn, Sweet—Postemergence” in this section of this handbook.

bentazon

See “Corn, Sweet—Postemergence” in this section of this handbook.

clopyralid (Stinger)

See “Corn, Sweet—Postemergence” in this section of this handbook.

Rate Apply 0.124 to 0.25 lb ae/a (0.33 to 0.66 pint/a of Stinger)

Time Any time after sweet corn emerges until it is more than 18 inches tall.

Remarks To control Canada thistle, apply when most thistle plants have emerged and thistles are at least 6 to 8 inches wide or tall, but before bud stage. For best results on Canada thistle, use at least 0.5 pint/a product. Do not cultivate before treatment; wait

two weeks after treatment before cultivation. Re-treat as necessary but do not exceed 0.66 pint/a product per calendar year.

Caution Note crop rotation restrictions.

Site of action Group 4: synthetic auxin

Chemical family Pyridine

glyphosate (numerous product names)

Rate Consult labels.

Time Apply at late-bud to early-bloom stage of thistle, but before corn silking.

Remarks Spot-spray thistle patches, eliminating weed and crop in the treated area. Spray before corn silking to avoid residue in harvested crop. Inhibits production of three amino acids and protein synthesis.

Caution Do not treat more than 10% of the acreage.

Site of action Group 9: inhibits EPSP synthase

Chemical family None generally accepted

Herbicide Effectiveness in Sweet Corn

Weeds	Preplant incorporated or preemergence							Postemergence							
	atrazine (Atrazine) ¹	mesotrione (Callisto)	s-metolachlor (Dual II Magnum or Dual Magnum)	dimethenamid-P (Outlook)	pendimethalin (Prowl) ²	pyroxasulfone (Zidua)	nicosulfuron (Accent) ³	carfentrazone (Aim) ⁴	atrazine (Atrazine) ⁵	bentazon (Basagran) ⁷	mesotrione (Callisto)	tembotrione (Laudis)	tolpyralate (Shieldex)	topramezone (Impact)	2,4-D ⁶
ANNUAL GRASSES															
Wild proso millet (<i>Panicum miliaceum</i>)	P	P	F	G	G	F	G-E	VP	P	VP	P	E	E	E	VP
Barnyardgrass (<i>Echinochloa crus-galli</i>)	F	P	G	E	G	G	G	VP	G	VP	P	E	E	E	VP
Witchgrass (<i>Panicum capillare</i>)	P	P	E	E	G-E	G	G	P	P	VP	P	G	G	G	VP
Crabgrass	P	P	G	E	E	F	P	P	P	P	P	P	P	P	VP
BROADLEAVES															
Pigweed (<i>Amaranthus</i> spp.)	F-E	G	G	G	G	G	G	G	F-E	G	G	E	E	E	G
Lambsquarters (<i>Chenopodium</i> spp.)	E	G	F	P	G	F	P	G	E	E	G	E	G	E	F
Nightshade (<i>Solanum</i> spp.)	G	G	F	G	P	G	VP	G	G	G	G	E	E	E	F
Smartweed (<i>Polygonum</i> spp.)	G	G	P	F	F	F	P	G	G	E	G	E	E	E	F
Purslane, common (<i>Portulaca oleracea</i>)	G	G	F	G	G	E	P	P	G	P	G	VP	VP	VP	P
Wild buckwheat	F	P	F	F	G	P	F	F	G	G	P	P	P	P	G
PERENNIALS															
Yellow nutsedge (<i>Cyperus esculentus</i>)	F	P	G	G	P	F	F	VP	F	F	F-G	P	P	VP	VP
Canada thistle (<i>Cirsium arvense</i>)	P	P	VP	VP	P	P	F	VP	F	F-G	VP	P	P	P	F
Quackgrass (<i>Elymus repens</i>)	F	P	VP	P	P	P	G	VP	F	VP	VP	VP	P	VP	VP
E = Excellent G = Good F = Fair P = Poor VP = Very poor or no effect															

¹ Depends on level of triazine resistance

² May cause corn to lodge

³ Do not use with organophosphate insecticides

⁴ Must be applied to small seedlings for good effectiveness

⁵ Must be applied with crop oil concentrate to small weeds

⁶ Must be directed to prevent corn injury

⁷ Good control with two applications 10 days apart