Corn

A guide to managing weeds, insects and diseases.
Safety First

Follow the Label. It is a violation of federal pesticide laws to use a pesticide in a manner inconsistent with its labeling. Read the entire label before using.

Applicator Safety. The most serious risk of exposure is during handling and mixing the concentrated product. Use protective equipment specified on the label. Use chemical-resistant gloves, eye shield, long-sleeved clothing, rubber boots and appropriate respirator as required. In case of emergency, contact the Poison Control Center via 24-hour phone line: Poison Control Center – 1-800-222-1222

Water Protection. Water quality is a public concern. Preventing spills and accidents reduces risk of groundwater and surface water contamination. Mix pesticides away from wells and water sources. Prevent back siphoning. Install anti-backflow devices in irrigation equipment used for pesticides. Triple rinse containers. Store pesticides properly. Identify high-risk areas such as coarse soils or areas where the water table is near the surface. Be aware of pesticide properties that increase the risk of contamination in the critical area. Some treatments have specific restrictions requiring buffer strips and border areas around wells, lakes and streams.

Trade names for pesticides are used in this publication to aid reader recognition. The common name is also listed and is used for pesticides that are available in many labeled products. Examples of other product names are listed where possible based on information available. As patents expire and marketing agreements are formed, additional products may be marketed. Be sure crop use and application directions are followed for the product being used.

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Information in this book is intended to be a guideline for label information and is not a label substitute. Pesticide products include herbicides, insecticides and fungicides. Pesticide product labels can change at any time and applicators must follow all label procedures. It is particularly important to be sure pesticide products are being applied in the correct environments (e.g. right-of-way, pasture, cropland, non-crop, etc.), environmental precautions are being followed (rate restrictions, applications on or near surface water or shallower water tables, applications near trees, etc.), and in accordance with grazing/haying restrictions.

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Weed Control in Corn

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Herbicide suggestions
Information in this publication is based on South Dakota Agricultural Experiment Station research and other research or observations. An herbicide is included only after it is registered by the Environmental Protection Agency (EPA) as to residue tolerances in crops used for food or feed. Information in this book provides a summary of label information but is not intended as a label replacement. Labels change regularly. Always verify information on current product labels prior to application. Users are responsible for following all label directions and precautions.

Rates
Rates for most products are listed as product per acre. Product rates for glyphosate and 2,4-D are based on acid equivalent (ae). Refer to accompanying tables to determine the amount for the specific product used.

Tank-mixes and Combinations
Selected tank-mixes are listed for several herbicides where specific products and rates are given on the label. Most interpretations allow mixing products unless prohibited; however, the user assumes responsibility if the specific combination is not shown. Tank-mixes, having the most promise for local situations, are included with at least one of the products. Check the section for each product alone and each product label for the complete listing of combinations for that specific product.

Herbicide Cost
The cost per acre for low and high rates is listed. Cost of additives is not included. Prices do not reflect special marketing programs. Consult your dealer for actual price.

Resistance Management
Refer to the table on page 4 for a brief description of each herbicide site of action. Repeated use of similar herbicide modes of action over multiple years may result in herbicide-resistant weed populations or shifts in weed populations toward weed species that are difficult or costly to control. Maintaining the efficacy of herbicide chemistries through herbicide rotations may be an effective long-term strategy to reduce weed control costs as herbicide patents expire and weed control technology becomes less expensive. To facilitate proper herbicide rotation, the herbicide site of action number is listed next to the herbicide product in this publication.

Buffers
Many labels now have buffer zone recommendations for applying herbicides. Check individual product labels for specific restrictions.

Glyphosate-resistant Weeds
Glyphosate-resistant weeds are becoming more common in South Dakota. The following list includes weed species that are known or suspected to be glyphosate resistant. Early detection of resistance will greatly improve your ability to manage the resistant population. The best solution is to minimize selection for resistant weed species, which may be done by diversifying herbicide programs (using preemergence herbicides and tank-mix partners), rotating different crop species (wheat, sunflowers, alfalfa, etc.), or crop varieties such as Liberty Link or conventional.

Kochia
Several locations in central SD. In no-till, effective burndown applications are critical. 2,4-D may not be effective. Atrazine may have some foliar activity for suppression and residual activity to control later emerging plants. Lumax, which contains atrazine and mesotrione (Callisto), would likely have sufficient foliar and residual activity. To control escapes postemergence, tank-mix partners with glyphosate may include a bleacher herbicide (Callisto, Laudis, Impact, Realm Q, etc.), dicamba (Clarity, DiFlexx, Status, etc.), or a bromoxynil product. To prevent selection for resistance to additional herbicides, consider rotating modes of action in a growing season by using different herbicides for the burndown and postemergence applications. Glufosinate (Liberty, Cheetah, etc.) will control small (less than 6 inches) glyphosate-resistant kochia in Liberty Link corn.

Common ragweed
Some reports and a few confirmed locations in eastern SD. Apply a preemergence herbicide such as atrazine, saflufenacil (Sharpen, Verdict), or isoxaflutole (Balance or Corvus). Tank-mix partners with glyphosate may include a bleacher herbicide (Callisto, Laudis, Impact, Realm Q, etc.), dicamba (Clarity, DiFlexx, Status, etc.), or a bromoxynil product. Glufosinate (Liberty, Cheetah, etc.) will control glyphosate-resistant common ragweed in Liberty Link corn.

Horseweed (marestail)
Several reports in southeastern and northcentral SD. In the burndown application, tank mix glyphosate with 2,4-D ester or saflufenacil (Sharpen, Verdict). Atrazine may provide good residual control but would likely have less foliar activity than saflufenacil. Atrazine (1 qt) + 2,4-D (1 pt) has worked well for foliar and residual control in some SDSU trials. For postemergence applications, make applications while the horseweed is still small (less than 6 inches) and tank mix glyphosate with a dicamba product (Clarity, DiFlexx, Status, etc.). Glufosinate (Liberty, Cheetah, etc.) will control glyphosate-resistant horseweed in Liberty Link corn.

Common lambsquarters
Can be tolerant during adverse conditions. Apply a pre-emergence herbicide such as atrazine, saflufenacil (Sharpen, Verdict), or isoxaflutole (Balance or Corvus). Tank-mix partners with glyphosate may include a bleacher herbicide (Callisto, Laudis,
Capreno, Impact, Realm Q, etc.), dicamba (Clarity, DiFlexx, Status, etc.), thifensulfuron (Harmony), or a bromoxynil product. Glufosinate (Liberty, Cheetah, etc.) will control lambsquarters in Liberty Link corn.

Common waterhemp
Several reports in eastern SD. Apply a preemergence herbicide such as atrazine, saflufenacil (Sharpen, Verdict), acetochlor (Harness, Surpass, etc.), or isoxaflutole (Balance or Corvus). Tank-mix partners with glyphosate may include a bleacher herbicide (Callisto, Laudis, Impact, Realm Q, etc.) or dicamba (Clarity, DiFlexx, Status, etc.). Glufosinate (Liberty, Cheetah, etc.) will control glyphosate-resistant waterhemp in Liberty Link corn.

**ABBREVIATIONS and DEFINITIONS**

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<th>Definition</th>
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<td>EPPS</td>
<td>EARLY PREPLANT SURFACE: Usually applied 2 to 6 weeks before planting in no-till.</td>
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<td>PPS</td>
<td>PREPLANT SURFACE: Prior to planting.</td>
</tr>
<tr>
<td>PPI</td>
<td>PREPLANT INCORPORATED: Before the crop is planted, incorporate as directed.</td>
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<tr>
<td>SPPI</td>
<td>SHALLOW PREPLANT INCORPORATED: Preplant incorporated, but herbicide usually restricted to the top 2 inches of soil with single-pass incorporation.</td>
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<tr>
<td>PRE</td>
<td>PREEMERGENCE: After planting, but before crop or weeds emerge.</td>
</tr>
<tr>
<td>EPOST</td>
<td>EARLY POSTEMERGENCE: After initial emergence or crop and weeds.</td>
</tr>
<tr>
<td>POST</td>
<td>POSTEMERGENCE: After the crop or weeds have emerged.</td>
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<td>ae</td>
<td>acid equivalent</td>
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<tr>
<td>ai</td>
<td>active ingredient</td>
</tr>
<tr>
<td>gal</td>
<td>gallon</td>
</tr>
<tr>
<td>gpa</td>
<td>gallon per acre</td>
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<tr>
<td>in</td>
<td>inch</td>
</tr>
<tr>
<td>lb</td>
<td>pound</td>
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<tr>
<td>lb/gal</td>
<td>pound per gallon</td>
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<tr>
<td>mo</td>
<td>month</td>
</tr>
<tr>
<td>oz</td>
<td>ounce</td>
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<tr>
<td>psi</td>
<td>pounds per square inch pressure</td>
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<tr>
<td>pt</td>
<td>pint</td>
</tr>
<tr>
<td>qt</td>
<td>quart</td>
</tr>
<tr>
<td>%v/v</td>
<td>percent volume per volume</td>
</tr>
<tr>
<td>AMS</td>
<td>ammonium sulfate</td>
</tr>
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<td>CF</td>
<td>Clearfield corn</td>
</tr>
<tr>
<td>COC</td>
<td>crop oil concentrate</td>
</tr>
<tr>
<td>G</td>
<td>granule</td>
</tr>
<tr>
<td>L</td>
<td>liquid, flowable or EC</td>
</tr>
<tr>
<td>LL</td>
<td>Liberty Link corn</td>
</tr>
<tr>
<td>MSO</td>
<td>methylated seed oil</td>
</tr>
<tr>
<td>N</td>
<td>liquid nitrogen fertilizer</td>
</tr>
<tr>
<td>NIS</td>
<td>non-ionic surfactant</td>
</tr>
<tr>
<td>OM</td>
<td>organic matter</td>
</tr>
<tr>
<td>RR</td>
<td>Roundup Ready corn</td>
</tr>
<tr>
<td>SG, DF, WDG</td>
<td>dry flowable, water dispersible granule (spray)</td>
</tr>
<tr>
<td>UAN</td>
<td>urea + ammonium nitrate liquid fertilizer</td>
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<tr>
<td>WSP</td>
<td>water soluble packet</td>
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<th>Site or Mode of Action</th>
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<td>nicosulfuron, rimsulfuron, flumetsulam</td>
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<td>3</td>
<td>Microtubule inhibitor</td>
<td>pendimethalin, trifluralin</td>
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<td>4</td>
<td>Growth regulator</td>
<td>2,4-D, dicamba, clopyralid</td>
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<td>5</td>
<td>Photosynthesis inhibitor (triazine, triazinone)</td>
<td>atrazine, metribuzin</td>
</tr>
<tr>
<td>6</td>
<td>Photosynthesis inhibitor (contact)</td>
<td>bentazon, bromoxynil</td>
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<td>8</td>
<td>Lipid synthesis inhibitor (thiocarbamates)</td>
<td>EPTC</td>
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<td>9</td>
<td>EPSP inhibitor</td>
<td>glyphosate</td>
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<td>10</td>
<td>Glutamine synthase inhibitor</td>
<td>glufosinate</td>
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<td>14</td>
<td>Cell membrane disrupter (PPO inhibitor)</td>
<td>carfentrazone, flumiclorac, saflufenacil, tiafenacil</td>
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<td>15</td>
<td>Seedling shoot inhibitor</td>
<td>acetochlor, metolachlor</td>
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<td>19</td>
<td>Auxin transport inhibitor</td>
<td>diflufenpyr</td>
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<td>22</td>
<td>Cell membrane disrupter (PSI inhibitor)</td>
<td>paraquat</td>
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<td>27</td>
<td>Bleacher (HPPD)</td>
<td>mesotrione, tembotrione, topramezone</td>
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<td>Gramoxone (paraquat)</td>
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<td>Grapple (rimsulfuron)</td>
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<td>Halex GT (s-metolachlor + glyphosate + mesotrione)</td>
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<td>Palace (s-metolachlor + mesotrione)</td>
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<td>Resolve Q (rimsulfuron + thifensulfuron)</td>
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<td>Rifle-D (dicamba + 2,4-D)</td>
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<td>Rixa (metolachlor + mesotrione + atrazine)</td>
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<td>Sandea (halosulfuron)</td>
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<td>Satellite Flex, Satellite HydroCap (pendimethalin)</td>
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<td>Sequence (s-metolachlor + glyphosate)</td>
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<td>Sharpen (saflufenacil)</td>
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<td>Shiledex 400SC (tolpyralate)</td>
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<td>Sinate (glufosinate + topramezone)</td>
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<td>Slider (dimethenamid)</td>
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<td>Smackdown (acetochlor + flumetsulam + clopyralid)</td>
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<td>Solida (rimsulfuron)</td>
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<td>Solstice (fluthiacet + mesotrione)</td>
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<td>Spitfire (dicamba + 2,4-D)</td>
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<td>Stalwart C (metolachlor)</td>
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<tr>
<td>Stalwart Xtra (metolachlor + atrazine)</td>
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CORN HERBICIDES

ATRAZINE (atrazine) Site of Action: 5 Restricted Use Pesticide ($5.75-17.70)
1-2 qt atrazine 4L (1-2 lb ai) 1.1-2.2 lb atrazine 90DF
1.6-3.2 pt Atra-5 5L

Excellent control of several small-seeded annual broadleaves. High rate provides fair control of several large-seeded broadleaves. Annual grass control erratic. Good late-season control. Excellent crop tolerance. Atrazine at 2 qt of 4L or 2.2 lb of 90DF per acre has been satisfactory.

The maximum atrazine rate is 2 lb ai per acre for soil applications. The maximum rate is reduced to 1.6 lb ai per acre on fields designated as "highly erodible soil" (HEL) if there is less than 30% residue. A 66-foot buffer setback is required on HEL land. Atrazine cannot be applied within 66 feet of points where surface water enters streams, rivers, within 200 feet of lakes or reservoirs, or loaded or applied within 50 feet of a well or sinkhole.

Carryover may damage soybeans, sunflowers, small grain, and legume/grass seedings the following year. Corn and sorghum are tolerant. Risk of carryover is greatest on high pH, low-organic matter soils or eroded knolls. Soybeans and flax usually tolerate carryover rates up to 1 lb ai per acre. Minimum carrier for ground application is 10 gpa. For aerial preplant or preemergence application, minimum carrier is 1 qt for each quart of 4L or 1 gallon for each pound of dry formulation. Minimum carrier is 2 gpa for postemergence aerial application.

FALL. 1-2 qt (4L), 1.6-3.2 pt (5L) or 1.1-2.2 lb (90DF) Labeling allows fall application in wheat stubble in a wheat-corn-fallow rotation. Rates of 1 to 1.25 lb ai per acre have been used in SDSU tests as late fall application in no-till systems. Do not exceed 1.5 lb ai per acre on soils with a pH over 7.5. Results have been favorable if a follow-up herbicide is used to improve grass control.

EPPS. 1.6-2 qt (4L), 2.5-3.2 pt (5L) or 1.8-2.2 lb (90DF) Apply two-thirds of the total amount as the first part of a split application if treating 30-45 days before planting and apply the remainder at planting. Do not apply more than 2 weeks before planting on sandy soil.

SPPL. 1.6-2 qt (4L), 2.5-3.2 pt (5L) or 1.8-2.2 lb (90DF) Incorporate into the top 2 inches within 2 weeks of planting. Most consistent application. Provides best large-seeded broadleaf control.

PRE. 1.6-2 qt (4L), 2.5-3.2 pt (5L) or 1.8-2.2 lb (90DF) Requires 0.75-1-inch rain within one week after application. Less consistent.

EPOST. 1.25-2 qt (4L), 1.9-3.2 pt (5L) or 1.3-2.2 lb (90DF) With or without crop oil. Crop oil strongly preferred. Intended for annual broadleaves only. Weeds should be less than 1.5 inches high. Corn should not exceed 12 inches. Rainfall, high humidity, and dew improve results. Grass control is fair to poor. Some crop yellowing or leaf tip burn may occur under extremely cold, wet conditions. Use COC at the rate of 1 qt for ground or 1-2 pt per acre for air. Do not add 2,4-D or dicamba. Do not use liquid fertilizer carrier.

TANK-MIXES Atrazine may be used in several preemergence tank-mixes. Gramoxone and glyphosate may be used for burndown. Atrazine is included in numerous tank-mixes on other herbicide labels.

METRIBUZIN PRODUCTS (metribuzin) Site of Action: 5 ($1.40-6.60)
1.6-5.33 oz Dimetric EXT, Glory, Metribuzin, MetriCor, or TriCor 75DF (0.075-0.25 lb ai)
1.7-5.67 oz Metrixx 70DF
2.4-8 oz Glory, MetriCor, Metriflex SC, Metrixx SC, Me-Try-Buzin or TriCor 4F
3.2-10.72 oz Dimetric 3L

Provides control of cocklebur, sunflower, kochia, pigweed, and smartweed. Fits where carryover from other herbicides must be avoided. Leaf yellowing may be noted in cool weather. Metribuzin is usually tank-mixed with other grass and broadleaf herbicides. Do not use additives unless specified. Rotation interval is 4 months for alfalfa and forage grasses; 8 months for barley, wheat, peas and lentils; 12 months for potatoes; and 18 months for most other crops. Do not harvest for grain or forage for 60 days.

Do not apply on coarse texture soils with less than 1.5% organic matter (O.M.) or soils with a pH greater than 7.0. Do not apply more than 4 oz DF, 6 oz 4F, or 8 oz 3L on soils with less than 2% O.M. Corn seed should be planted at least 1.5 inches deep. Do not apply more than 0.25 lb ai/A per season.

PPS, PRE. Apply 3-8 fl oz/A 4F, 4-10.72 fl oz/A 3L, 2.14-5.67 oz/A 70DF, or 2.5-3.23 oz/A 75DF. Apply up to 30 days prior to planting or preemergence. Use metribuzin with 2,4-D LV ester, Gramoxone, or glyphosate product.

POST. Apply 2.4-3 fl oz/A 4F, 3.2-6 fl oz/A 3L, 1.7-2.1 oz/A 70DF or 1.6-2 oz/A 75DF tank-mixed with herbicides including 2,4-D (0.12-0.25 lb ae), dicamba 4L (0.5-1 pt), Basagran (1 pt) per acre. Bromoxynil (1-1.5 pt) may be tank-mixed as a rescue treatment using drop nozzles. May also be tank-mixed with the following broadleaf herbicides: atrazine, bromoxynil, Pursuit (IMI corn only), and Resource. Apply after crop emergence to just prior to tasseling. Refer to label of tank-mix partner for specific directions and restrictions.

SHARPEN (saflufenacil) Site of Action: 14 ($8.25-28.80)
1.3-3.5 oz Sharpen 2.85L (0.02-0.078 lb ai)

Rate range is 2-3.5 fl oz/A depending on soil texture. May use 1 oz to improve burndown with limited residual control. Foliar and residual control of broadleaf weed species such as wild buckwheat, common lambquarters, waterhemp, pigweed, mustard species, Russian thistle, horseweed (mairestail), cocklebur, kochia, and several others. After application, at least 0.5
inches of rain is needed to activate the herbicide. Do not apply in fields where organophosphate or carbamate insecticides are applied at planting. Do not apply more than 6 fl oz/A per growing season.

For foliar activity, add MSO (1% v/v or minimum of 1 pt/A with low volume applications) and either AMS (8.5-17 lb per 100 gallons) or UAN (1.25-2.5% v/v). The minimum carrier volume is 5 gpa (15-20 gpa is suggested for emerged weeds) for ground applications or 3 gpa for aerial applications. May be impregnated onto dry granular fertilizer.

More flexible rotation options than atrazine. At the 2 oz/A rate, rotation intervals are 1 month for sweet corn, edible beans/peas, and lentils; 1-1.5 months for soybeans; 2 months for cover crops; 5 months for sunflowers and most other crops. Corn, sorghum, small grains, chickpeas, and field peas can be planted anytime. See label for rotation intervals at higher rates.

**PPS or SPPI.** For applications up to 14 days prior to corn planting. May also apply up to 30 days prior to planting, but this is not recommended for coarse soils.

**PRE.** Do not apply after corn begins to emerge.

**TANK-MIXES.** May tank-mix with glyphosate, atrazine, Outlook, Clarity, Status, Harness, or other herbicides for control of grass and additional broadleaf weed species.

## PREMIXES

**VERDICT** *(saflufenacil + dimethenamid)* Site of Action: 14 + 15 ($21.45-38.60)

10-18 oz Verdict 5.57L (0.044-0.08 + 0.39-0.7 lb ai)

Rate range is 10-18 fl oz/A depending on soil texture. The 13 oz rate for medium-textured soils is equivalent to 2.6 fl oz/A Sharpen + 10.8 fl oz/A Outlook. Intended for use in two-pass programs that will include a postemergence application. Provides foliar and residual control of several annual broadleaf weed species and grass species such as foxtail, crabgrass, and barnyardgrass. After application, at least 0.5 inches of rain is needed to activate the herbicide. Crop injury may occur during stressful conditions such as extreme hot or cold conditions, excessive moisture or drought, high soil pH, or disease injury.

Label prohibits application on specific soil types classified as sand, where O.M. is 3% or less, and the water table is less than 30 feet below the soil surface. Do not apply in fields where organophosphate or carbamate insecticides are applied at planting.

For foliar activity, add MSO (1% v/v) and either AMS (8.5-17 lb per 100 gallons) or UAN (1.25-2.5% v/v). Minimum carrier volume is 3 gpa (15-20 gpa is suggested for emerged weeds) for ground or aerial applications. Rotation intervals for soybeans range from 0-4 months after application depending on rate applied, soil texture, and organic matter. If 10-12 oz/A is applied on coarse soils with ≤ 2% O.M. soybeans may be planted after 1.5 months or after 1 month on all other soils. Replant corn and grain sorghum anytime. Wheat may be planted 4 months after application and any crop may be planted one year after application.

**PPS or SPPI.** For applications up to 14 days prior to corn planting. May also apply up to 30 days prior to planting, but this is not recommended for coarse soils.

**PRE.** Do not apply after corn begins to emerge.

**FORTITRI** *(saflufenacil + dimethenamid + pyroxasulfone)* Site of Action: 14 + 15 + 15

11-21 oz FortiTRI 3.83L (0.043-0.08 + 0.25-0.48 + 0.035-0.067 lb ai)

Rate range is 11-21 oz depending on soil texture. Provides residual control of annual grasses, annual broadleaves and sedges. After application, at least 0.5 inches of rain is needed to activate the herbicide. Crop injury may occur during stressful conditions such as extreme hot or cold conditions, excessive moisture or drought, high soil pH, or disease injury.

Do not apply in fields where organophosphate or carbamate insecticides are applied at planting.

For burndown activity add MSO (1% v/v) and either AMS (8.5-17 lb/100 gallons) or UAN (1.25-2.5% v/v). Minimum carrier is 3 gpa for ground or aerial applications. Rotation interval depending on rate (11-21 oz) applied is 1-4 months for soybean; 4 months for lentil, field pea and wheat; 4-6 months for sorghum; 5-7 months for sunflower; 6-11 months for small grains other than wheat; and 9-12 months for canola. See label for other crops.

**FALL.** Apply 21-28 oz to medium or fine texture soils with more than 2.5% O.M. Apply after October 1 when soil temperature at 4 inches is less than 55 degrees and before the ground freezes.

**EPPS.** Apply within 15-30 days of planting. Use the highest rate for the soil texture. Not recommended for coarse soils.

**PPS or PPI.** Apply within 14 days of planting.

**PRE.** Apply before crop emergence.

**REVITON** *(tiafenacil)* Site of Action: 14 ($6.05-18.15)

1-3 oz Reviton 2.83L (0.02-0.066 lb ai)

Reviton is a non-selective herbicide that controls many broadleaves and grasses and is labeled for preemergence burndown activity up to crop emergence. Severe injury to crop loss will occur when applications are made to emerged corn stands. Foliar control of broadleaf weed species such as wild buckwheat, common lambsquarters, common and giant ragweed, waterhemp (PPO susceptible biotypes), mustard species, Russian thistle, cocklebur, and several others. Control and suppression of grass species has been reported in many studies but not observed in SDSU trials. Do not apply more than 6 fl oz/A per growing season.

For foliar activity, add MSO (1% v/v or minimum of 1 pt/A with low volume applications). The minimum carrier volume is 10 gpa (15-20 gpa is suggested for best results or in heavy weed pressure) for ground applications.
More flexible rotation options than atrazine. At the 1-3 fl oz/A the rotation interval is 0 days for corn (field, seed, and silage), wheat; 0 or 7 days for soybean (depending on rate, soil type and O.M.); and 120-180 days for all other crops not listed on the label.

**BURNDOWN EPP/PRE.** Do not apply after corn begins to emerge. Limited preemergence activity.

**TANK-MIXES.** May tank-mix with glyphosate, glufosinate, atrazine, acetochlor, metolachlor, dicamba or any other herbicides for broader spectrum and residual control of grass and broadleaf weeds.

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### ELEVORE (halauxifen) Site of Action: 4

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<tr>
<th>1 oz Elevore 0.572L (0.0045 lb ai)</th>
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Elevore is labeled for preplant burndown and controls several annual broadleaf weeds such as marestail, lambsquarter, redroot pigweed, common ragweed and others. Apply to emerged actively growing weeds.

Add COC or MSO at 1% v/v. The minimum carrier volume is 8 gpa for ground and 5 gpa for aerial applications. Use medium to very coarse nozzles. Apply when wind is between 2 to 15 mph. May be tankmixed with most other labeled herbicides. See ElevoreTankMix.com for a list of prohibited tankmixes.

Rotation interval is 14 days for soybeans, canola, millet, oat, sorghum, sunflower, barley, triticale and wheat; 9 months for alfalfa dry beans, peas, flax, and safflower; and 15 months for most other crops.

**BURNDOWN EPP.** Corn may be planted 3 days after application if corn is planted at least 1.5 inches deep and the furrow is completely covered. Otherwise wait 14 days before planting corn.

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### FLUMIOXAZIN PRODUCTS (flumioxazin) Site of Action: 14

| 2-4 oz Valor SX, Flumi 51WDG, Flumi SX, Outflank, or Panther 51WDG (0.06-0.125 lb ai) |
| 2-4 oz Valor EZ, Panther SC, or Tuscany SC 4L (0.06-0.125 lb ai) |

Flumioxazin controls broadleaf weeds and suppresses some annual grasses. Can be applied as a burndown in fall or early preplant in the spring. May use a lower rate of 1 oz with glyphosate to increase burndown with limited residual control.

Minimum spray volume is 15 gpa for ground and 7 gpa for aerial application. Do not apply more than 3 oz/acre per growing season.

At rates up to 2 oz/acre, corn (conventional tillage), sorghum, sunflower, and wheat can be planted after 1 month with 1 inch rainfall; barley, dry bean, flax, peas, rye, and safflower after 3 months; alfalfa, canola, clover, and oats after 4 months if soil is tilled before planting or 8 months for no-till; lentils after 6 months; and most other crops are 4 months (if tilled) or 8 months (no-till) and a successful soil bioassay. Consult label for rates greater than 2 oz/acre. Soybeans may be planted immediately.

**FALL.** Apply 2-4 oz in the fall. Do not apply to frozen or snow-covered ground. Do not till after application or residual weed control will be reduced.

**EPPS.** Use only on no-till or minimum tillage fields where crop residue has not been incorporated into the soil. Apply 3.0 oz/acre 14-30 days prior to corn planting. Use 2.0 oz/acre 7-30 days before planting with a minimum of 25% residue cover and at least 0.25 inch rainfall between application and planting. After application do not irrigate from emergence to 2-leaf corn.

**TANK-MIXES.** Tank mix partners include atrazine, 2,4-D LVE, dicamba, Express, glyphosate, metribuzin, paraquat, and others.

Use COC or MSO at 1% v/v. The minimum carrier volume is 8 gpa for ground and 7 gpa for aerial applications. Do not apply more than 3 oz/acre per growing season.

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### PREMIXES

**FIERCE (flumioxazin + pyroxasulfone) Site of Action: 14 + 15**

| 3-4.5 oz Fierce 76WDG (0.063-0.094 + 0.08-0.12 lb ai) |
| 6-9 oz Fierce EZ 3.04SC (0.063-0.094+0.08+0.12 lb ai) |

Premix containing 33.5% flumioxazin (Valor) and 42.5% pyroxasulfone (Zidua). Liquid formulation is a suspension concentrate containing 1.34 lb flumioxazin and 1.7 lb pyroxasulfone per gallon. Flumioxazin controls broadleaf weeds and suppresses some annual grasses. Addition of pyroxasulfone provides residual control of many grasses and increases broadleaf control.

Rates vary depending on soil type, organic matter and application timing. An activating rainfall is required before planting on soils with less than 1% O.M. Can be applied as a burndown in fall or early preplant in the spring. Minimum spray volume is 15 gpa for ground and 7 gpa for aerial application.

Do not apply more than 3 oz/A Fierce or 6 oz/A Fierce EZ per year to field corn. At the 6 oz/A rate of Fierce EZ, the rotation interval is 7 days for minimum or no-till corn; 1 month for wheat and conventional till corn; 2 months for field peas; 4 months for sunflower; 6 months for lentil and sorghum; 9 months for edible peas and edible beans; 10 months for alfalfa; 11 months for other small grains; and 18 months for most other crops. Consult label for rates greater than 6 oz/A. Soybeans may be planted immediately.

**FALL.** Apply 3-4.5 oz Fierce or 6-9 oz Fierce EZ in the fall. Do not apply to frozen or snow-covered ground. Do not till after application or residual weed control will be reduced.

**EPPS.** Apply 3 oz Fierce or 6 oz Fierce EZ 7-30 days before planting. Use only on no-till or minimum tillage fields where crop residue has not been incorporated. An activating rainfall or irrigation of 0.5 inch or more is required before planting on soils with less than 1% O.M.
TANK-MIXES. Tank mix partners include 2,4-D LVE, atrazine, dicamba, Express, glyphosate, paraquat, and others. Use COC or MSO at 1-2 pt/acre or NIS at 0.25% v/v in tank-mixes applied to control emerged weeds. AMS at 2-2.5 lbs/acre or UAN at 1-2 qt/acre may also be added. Tank-mixing with metolachlor (Dual, etc.), dimethenamid (Outlook, etc.), acetochlor (Surpass, Harness, etc.) products is not recommended.

FIERCE MTZ or KYBER (flumioxazin + pyroxasulfone + metribuzin) Site of Action: 14 + 15 + 5 ($30.20-51.40)

1-1.5 pt Fierce MTZ or Kyber 2.64 SC (0.063-0.094 + 0.08-0.12 + 0.188-0.28 lb ai)
Premix containing 0.5 lb flumioxazin, 0.64 lb pyroxasulfone and 1.5 lb metribuzin per gallon formulated as a suspension concentrate. Flumioxazin controls broadleaf weeds and suppresses some annual grasses. Addition of pyroxasulfone and metribuzin provides residual control of many grasses and increases broadleaf control. Rates vary depending on soil type, organic matter and application timing. Can be applied as a burndown in fall or early preplant in the spring. Minimum spray volume is 15 gpa for ground and 7 gpa for aerial application. Do not apply more than 1.5 pt per acre per year to field corn. Do not use on popcorn, sweet corn, or corn grown for seed. Do not apply on coarse textured soils with less than 1.5% O.M. Do not apply on soils having a pH 7 or greater.

At the 1 pt/A use rate, the rotation interval is 7 days for minimum or no-till corn, 1 month for conventional till corn; 2 months for field peas; 4 months for sweet corn; 6 months for lentil; 8 months for wheat (4 if following peas, lentils, or soybean); 9 months for edible peas, edible beans, and potato; 10 months for alfalfa; 11 months for small grains (other than wheat); 12 months to dry bean and sunflower; and 18 months for most other crops. Consult label for rates greater than 1 pt/A. Soybeans may be planted immediately.

FALL. Apply 1-1.5 pt/A in the fall. Do not apply to frozen or snow-covered ground. Do not till after application or residual weed control will be reduced.

EPPS. Apply 1-1.5 pt/A 7-30 days before planting. Use only on no-till or minimum tillage fields where crop residue has not been incorporated. An activating rainfall or irrigation of 0.5 inch or more water is required before planting on soils with less than 1% O.M.

TANK-MIXES. Tank mix partners include 2,4-D LVE, atrazine, dicamba, Express, glyphosate, paraquat, and others. Use COC or MSO at 1-2 pt/acre or NIS at 0.25% v/v in tank-mixes applied to control emerged weeds. AMS at 2-2.5 lbs/acre or UAN at 1-2 qt/acre may also be added.

ZIDUA (pyroxasulfone) Site of Action: 15 ($13.05-48.40)

1-4 oz Zidua 85WG (0.053-0.213 lb ai)
1.75-6.5 oz Zidua SC 4.17L (0.057-0.212 lb ai)
Zidua is an acetamide herbicide that provides residual control of many annual grasses and broadleaves. Controls broadleaf weeds such as pigweed, waterhemp, nightshade, and provides suppression of several other broadleaf weeds. May be more persistent on the soil surface and can provide more consistent weed control than other soil applied grass herbicides. After application, at least 0.5 inches of rain is required for activation.

Rates vary from 1-4 oz/A (WG) or 1.75-6.5 oz (SC) for EPOST and 1.5-4 oz/A (WG) or 2.5-6.5 oz (SC) for other timings depending on soil texture. Do not apply more than 2.75 oz/A (WG) or 4.5 oz/A (SC) on coarse soils or more than 5 oz/A (WG) or 8.25 oz/A (SC) on medium and fine soils per season. Minimum carrier is 5 gpa for ground or 3 gpa for air.

With an application rate of <3 oz/A (WG) or <5 oz/A (SC) the rotation interval is soybeans anytime, 1 month for field pea, 2 months for lentil, 3 months for safflower and sunflower, 4 months for wheat, 10 months for alfalfa, 11 months for edible peas, edible dry bean and other small grain, and 18 months for most other crops.

FALL. Do not apply if soil is frozen or snow-covered.

EPPS. Apply 15-45 days before planting using highest application rate depending on soil texture.

PPI. Incorporate into upper 1-2 inches of soil up to 14 days before planting.

PRE. Apply after planting and before crop emergence.

EPOST. Apply to corn from spiking up to V-4 stage. Do not use adjuvants. Provides residual control of weeds germinating after application.

TANK-MIXES/SEQUENTIAL May be tank mixed or applied sequentially with, but not limited to, Outlook, Prowl H2O, Sharpen, Status, Verdict, atrazine, and glyphosate.

PREMIXES

MAVERICK (pyroxasulfone + mesotrione + clopyralid) Site of Action: 15 + 27 + 4

14-32 oz Maverick 2.2 SC (0.08-0.17 + 0.09-0.21 + 0.06-0.13 lb ai)
Premix containing 0.693 lb pyroxasulfone (Zidua), 0.829 lb mesotrione (Callisto) and 0.693 lb clopyralid (Stinger) per gallon. Provides broad spectrum preemergence and postemergence weed control.

For PPS, SPPI, PRE applications, the maximum use rate on coarse soils is 18 fl oz/A, medium soils is 24 fl oz/A, and fine soils is 32 fl oz/A. Sequential applications may only be made to fine soils. DO NOT use nitrogen-based adjuvants (AMS or UAN) or methylated seed oil (MSO) with Maverick applied to emerged corn except for inclusion of AMS to glyphosate or glufosinate tank mixes. For postemergence applications, use 0.25% v/v NIS or COC at 1-2 pt/A. Minimum carrier is 10 gpa for ground and 2 gpa for aerial applications. Rainfast 6 hours after application.
Do not graze sooner than 45 days after application. PHI is 30 days for ears and forage and 60 days for stover. See label precautions when using organophosphate soil applied insecticides.

The rotation interval is 8 months for flax, 10.5 months for soybean and sunflower, 4 months for wheat (up to 24 oz), 6 months for wheat (32 oz/A), and 18 months for all other crops. See label for rainfall and soil requirements.

PPS. Apply 18-32 oz/A in combination with labeled burndown herbicides to help control emerged weeds prior to crop emergence. Maximum use rate dependent on soil type.

SPPI. Uniformly incorporate into the upper 2 inches of the soil within 14 days prior to planting. Maximum use rate dependent on soil type.

PRE. Apply 18-32 oz/A. Maximum use rate dependent on soil type.

POST. Apply 14 oz/A up to 18 inch height or V6 stage of corn, whichever occurs first.

PERPETUO (pyroxasulfone + flumiclorac) Site of Action: 15 + 14 ($19.40-32.30)

6-10 oz Perpetuo 2.3 SC (0.08-0.134 + 0.027-0.046 lb ai)
Premix containing 1.71 lb pyroxasulfone (Zidua) and 0.59 lb flumiclorac (Resource) per gallon. Provides preemergence and postemergence weed control. Residual activity controls small seeded broadleaf and grass weeds, including late season germinating weeds.

For postemergence applications, use COC or MSO at 1-2 pt/A. Certain tank mixes may require NIS instead of oil; follow tank mix partner recommendation. AMS or UAN may be added to enhance weed control. Add a tank mix herbicide when weeds are taller than specified on label. Minimum carrier is 15 gpa for ground and 7 gpa for aerial applications. Rainfast one hour after application.

Do not make more than one application per year. Do not apply more than 10 oz/A per year.

At 6-8 oz/A the rotation interval is 1 month for chickpea, lentil, field peas, safflower, and wheat; 2 months for sunflower; 4 months for flax and potato; 6 months for grain sorghum; 8 months for sweet corn; 9 months for succulent peas; 10 months for alfalfa; 11 months for dry beans, succulent beans, and small grains other than wheat; 12 months for canola and sugar beet; and 18 months for most other crops. Field corn and soybean can be planted anytime.

EPP or PRE. Apply 6-10 oz/A. Add a tank mix for emerged weeds. May be tank mixed with dicamba, glyphosate, glufosinate, 2,4-D and others.

POST. Apply 6-10 oz/A from the V2 to V6 stage of corn.

ANTHEM MAXX (pyroxasulfone + fluthiacet methyl) Site of Action: 15 + 14 ($16.90-54.85)

2-6.5 oz Anthem Maxx 4.3L (0.08-0.21 + 0.002-0.006 lb ai)
Premix containing 4.174 lb ai pyroxasulfone (Zidua) and 0.126 lb ai fluthiacet methyl (Cadet) per gallon. Preemergence application provides residual control of most grasses and several broadleaf species including pigweed, weehemp, and nightshade. Moisture required for activation. Early post applications control many broadleaf weeds up to 2-4 inches. A tank-mix partner is required to control emerged grasses and broadleaves larger than the maximum listed height. Use 2.5-6.5 fl oz/acre when applied preplant or preemergence or 2-6 fl oz/acre applied postemergence depending on soil texture and organic matter. Can be tank-mixed with Cadet for improved postemergence performance; however, do not exceed a total of 0.009 lb ai fluthiacet per acre per year.

For burndown and post application, may use NIS (0.25% v/v), COC or MSO (1-2 pt/acre but not to exceed 2.5% v/v). May also use a silicone-based surfactant at 0.25% v/v or as listed on the adjuvant label. Can add UAN at 1-2 qts/acre or AMS at recommended rates. When tank mixing with other herbicides, use the adjuvant directions of the tank-mix partner and follow all restrictions and precautions. Minimum carrier is 5 gpa for ground application or 3 gpa for aerial application. For postemergence application use 10-40 gallons of spray solution per acre.

Avoid application when corn foliage is wet and shortly before or after rainfall as temporary crop response can occur. Do not apply postemergence if corn plants are severely stressed. Do not tank mix post emergence with any insecticide containing chlorpyrifos. If herbicides containing the same active ingredients as Anthem Maxx are used, do not exceed the maximum allowable use rates for pyroxasulfone and fluthiacet methyl. Do not apply more than 4.5 oz/acre of Anthem Maxx on coarse soils or 8.15 oz/acre on medium and fine soils per cropping season. Do not harvest forage for 30 days or grain or stover for 70 days. Corn and soybeans can be planted anytime. Rotation interval for 4.875 oz/A or less is 4 months for wheat and sunflower, 6 months for lentils and peas, 10 months for alfalfa and grain sorghum, 11 months for edible beans, edible dry beans and other small grains, 15 months for canola and 18 months for most other crops. See label for rotation interval with higher use rates.

PPS. Apply up to 45 days before planting.

PPI. Incorporate into the top 1-2 inches of soil up to 14 days before planting.

PRE. Apply at or after planting, but prior to crop or weed emergence.

EPOST. Apply 2-6 oz from crop emergence through V4 stage of corn.

ANTHEM ATZ (pyroxasulfone + fluthiacet methyl + atrazine) Site of Action: 15 + 14 + 5 Restricted Use Pesticide

1.5–4 pt Anthem ATZ 4.5L (0.09-0.24 + 0.003-0.007 + 0.75-2 lb ai)
Premix containing 0.485 lb ai pyroxasulfone (Zidua), 0.014 lb ai fluthiacet methyl (Cadet), and 4.006 lb ai atrazine per gallon. Addition of atrazine improves residual and post emergence weed control. Moisture required for activation. Early post
METOLACHLOR PRODUCTS (s-metolachlor) Site of Action: 15

1-2 pt Dual II Magnum, Brawl II, Charger Max, Cinch, Ladem, Medal II, Moccasin II Plus, StreliuS II 7.64L 1-2 pt Dual Magnum, Brawl, Charger Basic, EverpreX or Medal 7.62L

6-12 lb Dual II Magnum 16G (0.95-1.9 lb ai)

Very good to excellent control of several annual grasses. Fair control of pigweed with high rates. Weak on lambquarters. Consistent on annual grasses when rainfall or soil moisture requirements are met. Rates of 1.67-2 pt/A Dual II Magnum or 10-12 lb/acre 16G per acre (broadcast) have been satisfactory in most SDSU tests. Labeling includes higher rates for special grass problems. Very good crop tolerance.

Minimum carrier is 5 or 10 gpa for ground depending on equipment and 2 gpa for air. No carryover. Labeled for field, silage, and sweet corn. S-metolachlor products contain the resolved form of metolachlor. Dual II Magnum SI is labeled for use on dry fertilizer only. No fertilizer driers are needed with this product. Use comparable rates(ai) as for Dual II Magnum. Do not apply more than 3.9 pt/A per crop year depending on soil texture.

FALL. Apply after September 30 when soil temperature is 55°F and falling but before soil freezes. For soil having greater than 2.5% O.M. Use 1.67-2 pt/A Dual II Magnum or Cinch on medium soils. Use the high rate on fine textured soil. Performs best in early, dry spring seasons and where water can percolate. Apply 2.5-7.28 oz per acre.

EPPS. Apply 2/3 of the total as the first part of a split application if treating 30-45 days before planting and apply the remainder at planting. Applications less than 30 days before planting may be as a split or single application. Split application usually preferred if more than 14 days before planting. Do not apply more than 2 weeks before planting on sandy soil.

SPPI. Incorporate into top 2 inches within 14 days. Better results than preemergence when rain is very limited but gives slightly less control than preemergence with adequate rain. May be more consistent in low rainfall areas. Heavy rain reduces effectiveness. Proper incorporation may be difficult with trashy, lumpy seedbed. Deeper incorporation reduces control. Use maximum rate for soil type.

PRE. Requires 0.5-0.75 inch rain within one week after application. Rate depends on soil texture and organic matter.

POST. Apply up to 2 pt postemergence until corn reaches 40 inches. Less consistent. Use with a tank-mix partner that controls emerged weeds.
**TANK-MIXES.** Labeling includes preemergence or burndown mixes with Gramoxone, glyphosate, 2-4-D, or dicamba. Postemergence mixes include glyphosate, Liberty and atrazine. Refer to label restrictions or the section for each herbicide.

**STALWART C, HELMET, METALICA, ME-TOO-LACHLOR II, or PARALLEL 7.8L**

(0.98-2 lb ai) (metolachlor) ($11.20-22.45)

Apply 1-2 pt/A as for s-metolachlor above. Products contain metolachlor. EPA has limited the rate to the same amount of product as for Dual II Magnum containing s-metolachlor. Higher rates are included for certain grassy weed problems.

**METOLACHLOR + ATRAZINE PREMIXES** Site of Action: 15 + 5

<table>
<thead>
<tr>
<th>Herbicides</th>
<th>Metolachlor + atrazine lb/ gal</th>
<th>s-metolachlor + atrazine lb/ gal</th>
<th>product/A qt</th>
<th>Equivalent atrazine/A lb ai</th>
<th>Rate qt/A</th>
<th>POST</th>
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<tbody>
<tr>
<td>Bicep II Magnum 5.5L, Brawl ATZ, Cinch ATZ, Ladem AT, Medal II ATZ</td>
<td>---</td>
<td>2.4+3.1</td>
<td>1.3-2.6</td>
<td>1-2</td>
<td>2.1-2.6</td>
<td>1.3-2.1</td>
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<tr>
<td>Bicep Lite II Magnum 6L, Charger Max ATZ Lite, Cinch ATZ Lite 6L</td>
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<td>3.3+2.7</td>
<td>0.9-2.2</td>
<td>0.6-1.5</td>
<td>1.5-2.2</td>
<td>0.9-1.5</td>
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<tr>
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<td>2.4+3.1</td>
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<td>1-2</td>
<td>2.1-2.6</td>
<td>1.3-2.1</td>
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<tr>
<td>Parallel Plus</td>
<td>2.7+2.8</td>
<td>---</td>
<td>1.4-2.83</td>
<td>1-2</td>
<td>1.9-2.83</td>
<td>1.4-2.29</td>
</tr>
</tbody>
</table>

**SEQUENCE (s-metolachlor + glyphosate)** Site of Action: 15 + 9 ($22.10-35.40)

2.5-4 pt Sequence 5.25L (0.94-1.5 + 0.7-1.13 lb ai)

Rates vary from 2.5-4 pt/A depending on weed height at the time of application. Intended to control emerged weeds and provide residual control of several annual grass weed species. Each pint of Sequence contains the equivalent of 0.4 pt Dual Magnum.

**PPS and PRE.** Do not apply more than 3.5 pt/A on coarse soils or 4 pt/A on medium- or fine-textured soils.

**EPOST.** Apply only to glyphosate-tolerant (e. g. Roundup Ready) corn from emergence to the V-8 stage or until 30 inches tall. Do not exceed 2.5 pt/A in a single application or a total of 5 pt/A per season. Do not exceed 1.5 lb ae/A glyphosate per season (each pint of Sequence contains approximately 0.3 lb ae). Do not apply to corn stressed from weather, insects, disease, or cultivation injury. Do not graze or feed treated forage until 30 days or harvest for 50 days after application. May be tank mixed with atrazine, dicamba, 2,4-D, Callisto, or others (see label).

**ACETOCHLOR PRODUCTS** Site of Action: 15 ($12.75-54.05)

1.25-3 pt Arrest Plus, Cadence NXT, Confidence, Fearless, Harness, OverTime NXT, Surpass NXT, Tremor NXT, or Volley NXT 7L

6-12 lb Harness 20G (1.2-2.4 lb ai)

Products contain acetochlor plus safener. General labeling and precautions are similar. Annual grass control has been very good to excellent. Gives fair to good control of waterhemp/pigweed, but often less control of other broadleaf weed species. Crop tolerance is very good. Approved rotational crops include wheat (4 months); soybeans and milo the following year.

Several environmental restrictions are intended to reduce the risk of groundwater contamination. Mixing and loading pads are required if within 50 feet of a well. Application is prohibited on sandy soil with less than 3% O.M. if groundwater is within 30 feet of the surface. In addition, loamy sands with less than 2% O.M. or sandy loams with less than 1% O.M. should not be treated if groundwater is within 30 feet. Minimum carrier is 10 gpa. Acetochlor is not approved for aerial application.

**FALL.** Several acetochlor products are registered for fall application after soybean harvest. Apply after October 15, but before the soil freezes. For medium and fine textured soils with greater than 2.5% O.M. Best suited for fields where light or moderate grass pressure is anticipated. Do not incorporate more than 2 inches deep if tilled after application.

**EPPS.** For no-till or reduced tillage systems on medium or fine soils. Apply within 30 days of planting. High rates are suggested if applied more than 10 days before planting. Incorporated applications should be made within 10 days of planting. Some products may be used as a split application if applied within 45 days of planting. Slightly higher rates are used for early preplant applications. Performance is best in early, dry spring seasons.

**SPPI.** Apply within 14 days of planting. Incorporate shallowly into the top 1-2 inches.

**PRE.** Apply within 5 days of the last tillage. At 0.25 inches of rainfall required for activation.

**POST.** Apply postemergence until corn reaches 11 inches. Do not use fluid fertilizer carrier. Use with tank-mix partner that controls emerged weeds.
**Restricted Use Pesticides**

**Site of Action:** 15 + 5

**ACETOCHLOR + ATRAZINE PREMIXES** Site of Action: 15 + 5

Restricted Use Pesticides

Encapsulated acetochlor products increase crop safety. Use with tank-mix partner to control emerged weeds.

Rates vary depending on soil texture and organic matter (O.M.). For Warrant on soils with more than 3% O.M., apply 2 qt/A on coarse soil, 2-2.75 qt/A on medium or 2.75-3 qt/A on fine-textured soil. Do not use on sweet corn.

**POST.** May be applied from corn emergence until corn is 30 inches tall. For better coverage, use drop nozzles for corn 24-30 inches tall. Do not use liquid fertilizer as the carrier with postemergence applications.

**ACETOCHLOR + ATRAZINE PREMIXES** Site of Action: 15 + 5

<table>
<thead>
<tr>
<th>Herbicides</th>
<th>Acetochlor + atrazine lb/gal</th>
<th>Encapsulated acetochlor + atrazine lb/gal</th>
<th>Rate (qt/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<td></td>
<td>Coarse soil</td>
</tr>
<tr>
<td>Harness Xtra 5.6L, Acellus ATZ, Cadence ATZ NXT, Electra 5.6L, Fearless XTRA 5.6L, Confidence Xtra 5.6L, Keystone NXT, OverTime ATZ NXT, Tremor ATZ NXT, Volley ATZ NXT</td>
<td>3.1 + 2.5</td>
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<td>1.4-1.7</td>
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<tr>
<td>Harness Xtra 6L, Acellus ATZ Lite, Cadence LA NXT, Confidence Xtra, Electra Plus, Fearless XTRA, Keystone LA NXT, OverTime ATZ Lite NXT, Tremor ATZ Lite NXT, Volley ATZ Lite NXT</td>
<td>4.3 + 1.7</td>
<td>---</td>
<td>1.8</td>
</tr>
<tr>
<td>Degree Xtra, Fulltime NXT</td>
<td>---</td>
<td>2.7 + 1.34</td>
<td>1.5-2.9</td>
</tr>
</tbody>
</table>

**EPP, PPI, PRE, or EPOST.** Apply to corn up to 11 inches. Most rates vary by O.M. within each soil texture classification. Slightly greater rates required for EPP (more than 14 days prior to planting) or no-till applications. See restrictions for acetochlor products.

**HARNESS MAX or DOUBLE HEADER (acetochlor + mesotrione)** Site of Action: 15+27

40-88 oz Harness Max 3.85L (1.1-2.42 + 0.103-0.227 lb ai)

1.4-2.4 qt Double Header 3.58L (1.12-1.92 + 0.133-0.228 lb ai)

Harness Max is a premix containing 3.52 lb acetochlor + 0.33 lb mesotrione per gallon. Double Header contains 3.2 lb acetochlor + 0.38 lb mesotrione per gallon. Controls many annual grasses and broadleaf weeds. Rates vary based on soil texture and organic matter. Minimum carrier is 10 gpa for ground. Do not apply by air. For post applications add NIS (0.25% v/v) or COC (1% v/v). Use COC for more consistent weed control however temporary crop injury may occur. May also add AMS or UAN with Harness Max (do not add with Double Header). Do not use MSO.

Do not make more than 2 applications per year. Do not make a second application within 14 days. Do not apply more than 95 oz/A Harness Max or 2.4 qt/A Double Header per year. Do not harvest forage, grain, or stover for 60 days. Do not tank-mix with or apply within 7 days of an organophosphate or carbamate insecticide postemergence. Severe crop injury may result if applied postemergence following an at-planting organophosphate insecticide application.

Rotation interval is 4 months for wheat, 10 months for alfalfa, and soybeans, the following spring for barley, rye, oats, and millet, and 18 months for dry beans, peas, and other crops.

**PPS, PPI, or PRE.** Apply 55 to 88 oz/A Harness Max. Make preplant surface applications less than 30 days before planting and before weed emergence. May be shallow incorporated (upper 1 inch) within 14 days of planting.

**POST.** Apply 40-75 oz/A Harness Max to corn up to 11 inches tall. Apply to actively growing weeds up to 3 inches tall. Requires precipitation or overhead irrigation after application to control weeds that have not emerged. If a product containing mesotrione was applied preemergence only the 40 oz rate may be used postemergence.

**RESICORE XL or RECITE (acetochlor + mesotrione + clopyralid)** Site of Action: 15+27+4

1.4-3.25 qt Resicore XL (0.98-2.3 + 0.095-0.22 + 0.066-0.15 lb ai)

1.25-3 qt Recite or Recite 3.29 SE (0.88-2.1 + 0.09-0.23 + 0.06-0.14 lb ai)

Premix containing 2.8 lb acetochlor + 0.27 lb (0.3 lb Recite and Resicore) mesotrione + 0.19 lb clopyralid per gallon. May be applied pre-emergence at 2.25-3 qt/A depending on soil organic matter and texture, but 2 qt/A (1.8 qt Recite or Resicore) may be applied if additional herbicides will be applied post-emergence, weed densities are low to moderate, and weeds are not herbicide resistant. Resicore XL may be applied post-emergence at rates as low as 1.4 qt/A when tankmixed with glyphosate or glufosinate. Resicore XL at 1.4 qt/A provides equivalent active ingredients as 1.1 qt/A Surpass NXT, 3 oz/A Callisto, and 2.8 oz/A Stinger. Provides excellent residual grass control and residual and foliar broadleaf control. Contains multiple modes of action for resistance management. The clopyralid component provides added activity on several weeds, such as common and giant ragweed and wild buckwheat, compared to mesotrione alone.

Minimum carrier is 10 gpa for ground applications. Do not apply by air. Do not over agitate. For post-emergence applications, only AMS at 8.5 lbs/100 gal may be needed if a “loaded” or surfactant-containing glyphosate is added. Otherwise, AMS plus NIS at 0.25% v/v may be added. Do not add UAN, COC, or MSO as unacceptable corn leaf burn may result. COC and other additives listed may be used pre-emergence to improve burndown.

Avoid post-emergence applications within 7 days before or after organophosphate or carbamate insecticide applications. See label restrictions when using organophosphate soil applied insecticides. Rotation interval is 4 months for wheat; 10.5 months for barley, rye, oats, and millet, and 12 months for dry beans, peas, and other crops.
for alfalfa, sunflowers, soybeans, sorghum, millet, barley, and oats; and 18 months for most other crops. Do not graze or feed forage for 45 days. Pre-harvest interval is 60 days for grain or silage. Do not use over 3.25 qt/A per year, or 0.24 lb ai/A mesotrione per year.

EPP. May be applied up to 28 days prior to planting.

PRE. Broadcast applications. Incorporation desirable within 7 days after application with rainfall (0.25 in), irrigation, or shallow tillage or inconsistent weed control may result.

EPOST. May be applied post-emergence in water after corn is emerged and up to 24 inches (Resicore XL) or 11 inches (Recite and Resicore) in height. Apply to small broadleaf weeds (<3 inches).

TANK-MIXES. May be tank-mixed early post-emergence with atrazine, Accent Q, Basis products, Steadfast Q, or glyphosate. Follow label directions for adjuvant recommendations.

SURESTART II, SMACKDOWN, STAUNCH II, TRIPLEFLEX II, or THREESIDUAL

\[(acetochlor + flumetsulam + clopyralid)\] Site of Action: 15 + 2 + 4

1.5-3 pt SureStart II, Smackdown, Staunche, Tribflouence, Tripleflex II, or Threesidual 4.16L (0.7-1.4 + 0.023-0.045 + 0.054-0.109 lb ai)

Rate is 1.5-3 pt/A depending on soil texture and O.M. or use higher rates (2-3 pt/A) for fall or spring early preplant applications. Lower rates are intended for limited residual control that will be followed by a postemergence herbicide application. It is recommended to apply just prior to weed germination. Minimum carrier is 10 gpa for ground. Not labeled for aerial application.

Provides control or suppression of several annual grass and broadleaf weed species. SureStart II contains 3.75 lb acetochlor + 0.12 lb flumetsulam + 0.29 lb clopyralid per gallon. SureStart II at 2 pt/A is equivalent to 1.1 pt/A Surpass NXT + 0.6 oz wt/A Python + 4 fl oz/A Stinger.

Crop rotation restriction is 4 months for wheat, the spring following application for barley, oats, alfalfa, dry beans, and soybeans, 12 months for sorghum, 18 months for sunflowers, and 26 months for canola. Rotation restrictions increase to 18 months for soybeans, alfalfa, and dry beans if annual rainfall is less than 15 inches on soils with less than 2% organic matter. Do not apply to sweet corn or popcorn.

Corn tolerance is greater when applied early postemergence (prior to 11-inch-tall corn) than preemergence. Preemergence injury has not been seen in SDSU research; however, in cool wet conditions cases of injury have been observed in grower fields. For preemergence applications, corn must be planted at least 1.5 inches deep. Do not apply preemergence to soils with a pH >7.8. Do not apply preemergence to soils with less than 1.5% organic matter (unless risk of crop injury is acceptable).

Do not use Counter or Thimet insecticide and do not apply other organophosphate insecticides in furrow. Do not tank mix with organophosphate insecticides when making postemergence applications. Where the water table is less than 30 feet below the soil surface, do not apply within 50 feet of a well if the soil is a sand with less than 3% organic matter (O.M.), loamy sand with less than 2% O.M., or sandy loam with less than 1% O.M. Do not mix or load within 50 feet of a well unless it is done on a properly constructed impervious pad.

FALL. May be applied at 2-3 pt in the fall after October 15 when the soil temperature falls below 50°F at 4 inches but before the ground freezes.

EPPS. Apply 2-3 pt more than 21 days days prior to planting in spring on medium and fine textured soils.

PPI. Incorporate into the top 1-2 inches of soil up to 14 days before planting.

PRE. Apply after planting. 0.25 inches of rainfall required for activation.

EPOST. Apply to corn up to 11 inches tall.

OUTLOOK or SLIDER (dimethenamid-p) Site of Action: 15

8-21 oz Outlook or Slider 6L (0.4-1 lb ai)

Chloroacetamide herbicide. Very good to excellent control of several annual grasses. Sandbur and wild proso millet are partially controlled. Fair to good control of certain annual broadleaves such as pigweed, waterhemp, or black nightshade. Crop tolerance is adequate.

Do not apply to coarse soil (sand) with less than 3% O.M. and where groundwater is 30 feet or less below surface. A supplemental label for SD lists specific soil series where application is prohibited. Rates of 14-16 oz Outlook 6L per acre are suggested for most situations. Minimum carrier is 5 gpa for ground and 2 gpa air. There are no rotational crop restrictions for the next season. Winter wheat can be planted after 4 months. Do not graze or feed corn for 40 days after application.

FALL. Apply after October 1 when soil temperature at 4 inches is less than 55°F but before soil freezes. Use up to 21 oz per acre for medium- and fine-textured soil with >2.5% O.M.

EPPS. For reduced or no-till systems. Apply up to 45 days before planting. A split application (2/3 early and 1/3 at planting) is preferred if applying more than 30 days before planting. Burndown herbicide may be added for emerged weeds.

SPPI. Apply within 2 weeks of planting and incorporate into the top 1-2 inches. Avoid deep incorporation. Better results than with preemergence if rain is very limited.

PRE. Requires rain prior to weed emergence. Use a rotary hoe or harrow if weeds emerge before it rains.

POST. May be applied early postemergence on corn up to 12 inches. Emerged weeds are not controlled. Preemergence preferred.
TANK-MIXES/SEQUENTIAL. Labeling lists tankmix or sequential applications preemergence with atrazine, Armezon, Callisto, Clarity, Prowl, Sharpen, Verdict, Zidua, glyphosate, gramoxone, and 2,4-D. May be tank-mixed postemergence with glyphosate. Consult label for other tank-mix options. Refer to label restrictions for each herbicide and follow the most restrictive label.

PREMIX

SLIDER ATZ LITE (dimethenamid-p + atrazine) Site of Action: 15 + 5 Restricted Use Pesticide

2-3.5 pt Slider ATZ Lite 5L (0.56-0.98 + 0.69-1.2 lb ai)

EPPS, PPI, PRE, and POST. Premix containing 2.25 lb dimethenamid-p (Outlook) + 2.75 lb atrazine per gallon. Preemergence preferred. COC may be added to early post timing. The 3 pt rate provides the equivalent of 18 oz Outlook plus 1 lb atrazine per acre. Do not graze or feed corn forage for 60 days after application.

BALANCE FLEXX (isoxaflutole) Site of Action: 27 Restricted Use Pesticide ($18.55-37.10)

3-6 oz Balance Flexx 2L (0.05-0.09 lb ai)

Balance Flexx is a soil-applied herbicide with root and shoot uptake. Isoxaflutole is an HPPD-inhibiting herbicide that can inhibit pigment functions causing leaves to turn white. Contains the safener cyprosulfamide that allows early postemergence applications. Controls annual broadleaf weed species such as pigweed, waterhemp, velvetleaf, lambquarters, kochia, common ragweed, black nightshade, and others. May also control some annual grass weed species, such as green foxtail, barnyardgrass, and field sandbur. May only suppress yellow foxtail and wild buckwheat. Rainfall is required for incorporation and uptake.

Rates vary from 3-6 fl oz/A depending on application timing, soil organic matter, and soil texture. For coarse textured soils, apply 3 oz/A if organic matter is less than 1.5% or 4 oz/A if O.M. is greater than 1.5%. For medium textured soils, apply 5 oz/A if O.M. is less than 1.5% or 6 oz/A if O.M. is greater than 1.5%. For fine-textured soils, apply 6 oz/A. Minimum carrier rate is 10 gpa. Do not apply using aerial equipment. The potential for corn injury increases in soils with low O.M., coarse texture, or high soil pH.

If the water table is less than 25 feet below the soil surface, do not apply to sandy, sandy loam, or loamy sand soils or subsoils where the average organic matter in the upper 12 inches is less than 2% by weight. Plant corn at least 1.5 inches deep and make sure the seed is adequately covered. Do not exceed 6 oz/A per year. Off-site movement may occur if applied in areas that receive less than 15 inches annual precipitation. Do not mix or load within 50 feet of wells, sinkholes, streams, rivers, lakes, or reservoirs.

Rotation interval is 4 months for wheat, rye and triticate; 6 months for soybeans, sweet corn, barley, grain sorghum, and sunflower; 10 months for alfalfa (with 15 inches annual precipitation); and 18 months for most other crops (with 15 inches annual precipitation). Cover crops may be planted 90-120 days after application however, some injury may occur. Do not graze or harvest cover crops for livestock feed.

BURNDOWN. If weeds have emerged at time of application prior to corn emergence, mixing a COC or MSO may aid in foliar activity of weeds less than 3 inches tall (use NIS rather than MSO or COC when tank-mixing with certain glyphosate formulations (non-loaded) or mixing with liquid nitrogen). Tank mix an additional herbicide, such as Gramoxone, glyphosate, or 2,4-D if weeds are greater than 3 inches tall or weed species are present that may not be controlled by Balance Flexxx. Tank-mixing atrazine may improve control of emerged giant ragweed, common cocklebur, or Pennsylvania smartweed.

PPS. Apply up to 21 days prior to planting or up to 30 days prior to planting if a postemergence herbicide application is also planned. If splitting the application, apply 60% of the rate 15-30 days prior to planting and the remaining 40% at planting.

PPI. Apply up to 21 days prior to planting or up to 30 days prior to planting if a postemergence herbicide application is also planned. Incorporate less than 2 inches below the soil surface.

PRE. Apply after planting but prior to crop emergence. Failure to properly close the seed furrow could result in crop injury.

EPOST. Apply from corn spiking to the V2 growth stage (2 leaf collars). May not provide control of weeds larger than the 1st true leaf growth stage. Do not use liquid fertilizers, COC or MSO, or a loaded glyphosate when applying to emerged corn. Do not harvest corn forage until 45 days after application.

TANK-MIXES Balance Flexxx may be tank-mixed with herbicides to improve burndown or mixed with other preemergence herbicides, including atrazine, Dual, Harness, Prowl, Surpass, Outlook, Bicep, Harness Xtra, and Degree Xtra. Additional 2(ee) labels allow postemergence tank-mixes with glyphosate, atrazine+glyphosate, and atrazine+dicamba. See individual labels for restrictions.

PREMIXES

CORVUS (isoxaflutole + thiencarbazone) Site of Action: 27 + 2 Restricted Use Pesticide ($31.80-53.95)

3.3-5.6 oz Corvus 2.63L (0.048-0.082 + 0.019-0.033 lb ai)

Rates depend on soil texture and organic matter. The addition of thiencarbazone may increase grass control relative to Balance Flexxx. Controls many common annual grass and broadleaf weed species. Add atrazine to control wild buckwheat and increase broadleaf weed control. Laudis may be applied post-emergence if Corvus is applied pre-emergence, but it is best to diversify herbicide mode of actions to prevent selection for resistance and carryover.

Minimum carrier rate is 10 gpa for ground applications. Do not apply with aerial equipment. Rotation restriction is 4 months for wheat, rye, and triticate; 9 months for soybeans, sweet corn, popcorn, and barley (with 15 inches precipitation); and 17 months for alfalfa, dry beans, oats, sorghum, sunflower, canola, and most others (with 30 inches precipitation). Intervals may be much
longer on soils with a pH greater than 7.5. Cover crops may be planted 90-120 days after application however, some injury may occur. Do not graze or harvest cover crops for livestock feed.

Do not apply in areas where the water table is less than 25 feet deep, soil texture is coarse (sandy loam, loamy sand, or sand), subsoil texture is loamy sand or sand, and the O.M. in upper 12 inches is less than 2%. Do not apply more than 5.6 fl oz/A in a growing season. Do not harvest for forage within 45 days of application.

**BURNDOWN.** To increase foliar activity, add COC or MSO. May use NIS if mixing with a loaded glyphosate product.

**PPS, PPI.** Apply up to 21 days prior to corn planting or 30 days if planning additional herbicide applications. Do not incorporate deeper than 2 inches below the soil surface.

**PRE.** Make sure furrows are closed to prevent seedling injury.

**EPOST.** Do not add adjuvants for postemergence applications. Additional 2(ee) labels for SD allow tank-mixes with atrazine and glyphosate or atrazine and dicamba for post-emergence applications up to 2-leaf collar corn. Do not add foliar insecticides.

### TRIVOLT (isoxaflutole + flufenacet + thiencarbazone)  
**Site of Action: 27 + 15 + 2 Restricted Use Pesticide**  
**($28.10-56.15)**

10-20 oz TriVolt 3.65L

TriVolt contains 0.57 lb isoxaflutole + 2.85 lb flufenacet + 0.23 lb thiencarbazone per gallon. Provides broadleaf and grass control. Rate depends on soil texture and organic matter.

Minimum carrier is 10 gpa for ground application. Do not apply with aerial equipment. Do not use liquid fertilizer as carrier for early post applications. Rotation interval is 4 months for wheat or triticale; 9 months for soybean; 12 months for barley and rye; 17 months for alfalfa, oats, sorghum, sunflower, canola; and 17 months with a field bioassay for most other crops.

Do not apply in areas where the water table is less than 25 feet deep and all three of the following criteria are met. The soil texture is coarse (sandy loam, loamy sand, or sand), the subsoil texture is loamy sand or sand, and the O.M. in upper 12 inches is less than 2%. Do not make more than one application per year. Do not apply more than 20 oz/A per year. Do not use certain soil applied organophosphate or carbamate insecticides in the same season with TriVolt (see label).

**PPS, PPI.** May be applied up to 21 days before planting. May be applied up to 30 days before planting in a planned two pass program. Uniformly incorporate into the top 2 inches of soil.

**PRE.** Apply during or after planting but before weeds emerge. Failure to properly close the seed furrow could result in crop injury.

**EPOST.** Can be applied in a tank mix with atrazine from corn spiking to the V2 growth stage (2 leaf collars). Do not use COC or MSO. Do not mix tank mix with organophosphate or carbamate insecticides. Do not make foliar applications of organophosphate or carbamate insecticides within 7 days of TriVolt application.

### PREQUEL (isoxaflutole + rimsulfuron)  
**Site of Action: 2 + 27 Restricted Use Pesticide**  
**($14.80-22.10)**

1.66-2.5 oz Prequel 45DF (0.031-0.047+ 0.016-0.023 lb ai)

Apply 1.66-2.5 oz wt/A, which is equivalent to 1-1.5 oz wt/A Resolve SG + 2-3 fl oz/A Balance Flexo. Do not apply on corn with a maturity less than 77 days. Corn must be planted at least 1.5 inches deep. Most effective if rain falls within 14 days after the application. The label recommended carrier rate is 15 gpa for dense weeds or 10 gpa for low weed densities with ground applications (do not apply with aerial equipment). Do not apply on coarse texture soil (sand, sandy loam, or loamy sand) with less than 1% organic matter. Do not apply on coarse texture soils where the water table is less than 25 feet below the soil surface (see supplemental label for restricted soil types). See label restrictions when using organophosphate insecticides. Do not load, rinse, or empty equipment within 150 feet of a well or surface water unless doing so on a properly constructed impermeable containment area.

**PPS, PPI, or PRE.** Apply from 30 days prior to planting but prior to corn emergence. If incorporating, do not incorporate more than 2 inches deep. For PRE applications, make sure the seed furrow is closed to avoid corn injury. May control or suppress many emerged broadleaf weed species less than 3 inches tall. If weeds are emerged, add COC or MSO. If weeds are taller than 3 inches, add tank-mix partner such as glyphosate, 2,4-D, dicamba, or Gramoxone. If mixing with a loaded glyphosate product or Liberty, no additional surfactant is needed.

### MESOTRIONE PRODUCTS (mesotrione)  
**Site of Action: 27**  
**($3.75-22.60)**

3-7.7 oz Callisto, Argos, Cavallo, Explorer, Incinerate, Meso, Meso Star, Mesotrione, MesoTryOne or Motif 4L (0.09-0.24 lb ai)

Callisto is a systemic preemergence or postemergence HPPD inhibiting herbicide that can cause “bleaching” injury symptoms on weeds. Callisto gives very good control of annual broadleaves including pigweed, waterhemp, lambsquarters, ragweed, alfalfa, velvetleaf, nightshade, and smartweed. Sunflower and cocklebur are controlled with postemergence applications. Atrazine improves control of kochia, wild buckwheat, and waterhemp; results in SDSU tests have been very good. Callisto is used in programs with preemergence or postemergence grass herbicides. Do not tank mix with emulsifiable concentrate grass herbicides.

Note rates for preemergence or postemergence. Crop tolerance has been satisfactory in SDSU tests. Consider avoiding application on fields treated with Counter or Lorsban. Do not tank mix postemergence applications with an organophosphate or carbamate insecticide or apply these insecticides 7 days before or after a Callisto application. Do not cultivate 7 days before or after application. Do not harvest forage, grain, or stover for 45 days after application.
Minimum carrier is 10 gpa for ground application or 2 gpa for aerial application. For postemergence application use COC at 1 gal/100 gal and 28% N at 2.5 gal/100 gal or AMS at 8.5 lb/100 gal. NIS at 1 qt/100 gal may be used instead of COC but control may be reduced. Do not use MSO. If mixing with glyphosate, AMS and perhaps a NIS may be added if necessary but do not add UAN, COC, or MSO.

Sorghum, flax, and oats may be planted any time after application. Rotation interval is 4 months for other small grains; 10 months for alfalfa, canola, soybeans, and sunflowers; and 18 months for most other crops.

**PRE.** Rate is 6-7.7 oz/A. Rain required. May be applied with liquid fertilizer.

**POST.** Apply 3 oz/A from emergence to 30 inches or up to the 8-leaf stage.

**TANK-MIXES.** Callisto at 5.3-7.7 oz/A may be tank-mixed preemergence with several other herbicides. Callisto may be mixed with Gramoxone, glyphosate, dicamba, and 2,4-D for burndown. Several postemergence tank mixes are allowed including atrazine, glyphosate, glufosinate and others.

**PREMIXES**

**CALLISTO XTRA (mesotrione + atrazine)** Site of Action: 27 + 5 Restricted Use Pesticide ($9.70-11.65)

20-24 oz Callisto Xtra 3.7L (0.078-0.094 + 0.5-0.6 lb ai)

For added foliar and residual control of wild buckwheat and other common broadleaf species. Apply 20 fl oz/A on susceptible weeds less than 5 inches tall or 24 fl oz/A for weeds 5-10 inches tall or for added residual control. Do not apply more than 24 fl oz per year. Callisto Xtra at 20-24 fl oz/A is equivalent to 2.5-3 oz Callisto and 0.5-0.6 qt atrazine 4L.

Add NIS (0.25% v/v) or COC (1% v/v). Choosing COC may result in more consistent weed control, but the risk of crop injury will be greater relative to NIS. In addition, UAN (28%N, 2.5% v/v spray solution) or AMS (8.5-17 lb/100 gal spray solution) may be added. Adding MSO may result in severe crop injury. If tank-mixing with a fully loaded glyphosate product for Roundup Ready corn or Liberty for Liberty Link corn, only add AMS. NIS may be added if needed for the glyphosate product. Do not add UAN when mixing with glyphosate. See label restrictions when using organophosphate soil insecticides or postemergence organophosphate and carbamate insecticides as corn injury may occur. Crop injury may occur if Callisto Xtra is tank-mixed postemergence with emulsifiable concentrate grass herbicides.

**EPOST.** Apply to corn less than 12 inches tall.

**CALLISTO GT (glyphosate + mesotrione)** Site of Action: 9 + 27

2 pt Callisto GT 4.18L (0.95 + 0.095 lb ai)

For glyphosate-tolerant corn only. Premix containing 3.8 lb ae glyphosate and 0.38 lb ai mesotrione (Callisto) per gallon. Apply postemergence at 2 pt/acre before weeds exceed 4 inches for optimum weed control. Several postemergence tank mixes are approved for additional weed control. Callisto GT should be used in a planned pre and postemergence two-pass weed control program.

Carrier volume should be 10-30 gpa for ground. Not labeled for aerial application. Use NIS at 0.25-0.50% v/v and AMS at 8.5-17 lb/100 gallons. COC (1% v/v) may be used instead of NIS but will increase the risk of crop injury. MSO products are not recommended.

See label restrictions when using organophosphate soil insecticides or postemergence organophosphate and carbamate insecticides as corn injury may occur. Crop injury may occur if Callisto GT is tank-mixed postemergence with emulsifiable concentrate grass herbicides. When using other products containing mesotrione, do not apply more than 0.24 lb ai/acre mesotrione per year.

Sorghum and corn may be planted any time after application. Rotation interval is 4 months for wheat; 10.5 months for alfalfa, sunflowers, soybeans, sorghum, millet, rye barley, and oats; and 18 months for most other crops. Do not harvest treated crop for 45 days after application.

**EPOST.** May be applied after corn emergence to corn plants less than 30 inches tall or the V8 growth stage.

**MESOCORE (mesotrione + clopyralid)** Site of Action: 27 + 4

18-24 oz MesoCore 1.96L (0.169-0.225 + 0.107-0.143 lb ai)

Premix containing 1.2 lb mesotrione + 0.76 lb clopyralid per gallon. Provides excellent residual and foliar broadleaf control. Contains two modes of action for resistance management. The clopyralid component provides added activity on several weeds, such as common and giant ragweed and wild buckwheat, compared to mesotrione alone.

Rate depends on soil type and organic matter. Minimum carrier is 10 gpa for ground applications. For post-emergence applications add NIS at 0.25% v/v. COC may be added at 1% v/v however, temporary crop injury may occur. Do not add UAN, AMS, or MSO as unacceptable corn leaf burn may result. COC and other additives listed may be used pre-emergence to improve burndown.

Avoid post-emergence applications with organophosphate or carbamate insecticide applications. See label restrictions when using organophosphate soil applied insecticides. Rotation interval is 4 months for wheat; 10.5 months for alfalfa, sunflowers, soybeans, sorghum, millet, rye barley, and oats; and 18 months for most other crops. Do not graze or feed forage for 45 days. Pre-harvest interval is 60 days for grain or silage.

**EPP.** Apply up to 28 days before planting.

**PPI.** Apply up to 14 days before planting and incorporate into top 2 inches of soil.
PRE. Apply before corn emergence. At least 0.25 inch of precipitation/irrigation is required for activation.

EPOST. May be applied postemergence in water only after corn is emerged and up to 11 inches in height. Apply to small broadleaf weeds (<3 inches). May use reduced rates of 10 or 15 oz when tank-mixed with glyphosate or glufosinate, respectively.

HALEX GT or MES-O-SATE (s-metolachlor + glyphosate + mesotrione)  
Site of Action: 15 + 9 + 27  
3.6-4 pt Halex GT or Mes-O-Sate 4.39L (0.94-1.05 + 0.94-1.05 + 0.094-0.105 lb ai)  
EPOST. For glyphosate-tolerant corn only. Mes-O-Sate contains metolachlor. Add NIS at 1-2 qt/100 gal water and AMS at 8.5-17 lb/100 gal water. Using UAN rather than AMS could result in crop injury. See label restrictions when using organophosphate soil insecticides or postemergence organophosphate and carbamate insecticides as corn injury may occur. Crop injury may occur if Halex GT is tank-mixed postemergence with emulsifiable concentrate grass herbicides. Minimum carrier is 10 gpa for ground applications. An application of 3.6 pt/A will be equivalent to 3 oz/A Callisto, 0.99 pt/A Dual Magnum, and 24 oz/A Touchdown HiTech.

ACURON (s-metolachlor + atrazine + mesotrione + bicyclopyrone)  
Site of Action: 15 + 5 + 27 + 27 Restricted Use Pesticide  
2.5-3 qt Acuron 3.44L (1.35-1.6 + 0.635-0.75 +0.15-0.18 + 0.038-0.045 lb ai)  
Premix containing 2.14 lb s-metolachlor + 1 lb atrazine + 0.24 lb mesotrione + 0.06 lb bicyclopyrone per gallon. Rate is 2.5 qt for soils with less than 3 % O.M. or 3 qt for soils with greater than or equal to 3% O.M. Provides grass and excellent broadleaf control. Provides multiple modes of action for resistance management. Has performed well in SDSU tests.

Minimum carrier is 10 gpa for ground applications. Do not apply by air. For postemergence applications add NIS at 0.25 % v/v. COC up to 1% v/v (maximum 1 qt/A) may be used if temporary crop injury is acceptable. Do not add MSO, AMS, or UAN postemergence. Other additives may be used preemergence to improve burndown.

Do not apply postemergence if Counter insecticide was used at planting. Some injury may occur if applied postemergence where other organophosphate insecticides were used at planting. Crop injury may occur if an organophosphate or carbamate insecticide is applied postemergence within 7 days before or after Acuron. Rotation interval is anytime corn, 4 months for wheat, barley, and rye; 10 months for dry beans, soybeans, and sorghum; and 18 months for most other crops. Do not graze or feed forage for 45 days. Preharvest interval is 60 days for postemergence applications. Do not use over 3 qt/A per year.

EPP. May be applied up to 28 days prior to planting.

PRE. Preemergence may be applied broadcast or banded.

EPOST. May be applied postemergence in water only after corn is emerged and up to 12 inches in height. Apply to small broadleaf weeds (<3 inches).

TANK-MIXES. May be tank-mixed early postemergence with atrazine, Accent Q, Basis products, Status, Steadfast Q, or glyphosate. Follow label directions for adjuvant recommendations.

ACURON FLEXI (s-metolachlor + mesotrione + bicyclopyrone) Site of Action: 15 + 27 + 27  
2-2.25 qt Acuron Flexi 3.26L (1.43-1.6 + 0.16-0.18 + 0.04-0.045 lb ai)  
Premix containing 2.86 lb s-metolachlor + 0.32 lb mesotrione + 0.08 lb bicyclopyrone per gallon. Rate is 2 qt for soils with less than 3 % O.M or 2.25 qt for soils with greater than or equal to 3% O.M. Provides grass and broadleaf control. Provides multiple modes of action for resistance management. May be an alternative to Acuron in areas where less or no atrazine is desired.

Minimum carrier is 10 gpa for ground applications. Do not apply by air. For postemergence applications add NIS at 0.25 % v/v. COC up to 1% v/v (maximum 1 qt/A) may be used if temporary crop injury is acceptable. Do not add MSO, AMS, or UAN postemergence. Other additives may be used preemergence to improve burndown.

Do not make more than one postemergence application or more than two total applications per year. Allow 14 days between applications. Do not use over 2.25 qt/A per year. Do not apply postemergence if Counter insecticide was used at planting.

Some injury may occur if applied postemergence where other organophosphate insecticides were used at planting. Crop injury may occur if an organophosphate or carbamate insecticide is applied postemergence within 7 days before or after Acuron Flexi. Rotation interval is anytime corn, 4 months for wheat, barley, and rye; 10 months for dry beans, soybeans, and sorghum; and 18 months for most other crops. Do not graze or feed forage for 45 days. Do not harvest forage, grain, or stover for 60 days after postemergence.

EPP, PRE. May be applied up to 28 days prior to planting.

EPOST. Apply after emergence until 30 inches or until corn reaches 8-leaf stage.

TANK-MIXES. May be tank-mixed early postemergence with atrazine, Accent Q, Basis Blend, Resolve Q, Status, Steadfast Q, or glyphosate. Follow label directions for adjuvant recommendations.
ACURON GT (glyphosate + s-metolachlor + mesotrione + bicyclopyrone) ($42.05)

Site of Action: 9 +15 + 27 + 27

3.75 pt Acuron GT 4.29L (0.94 + 0.94 + 0.094 + 0.045 lb ai)

For glyphosate-tolerant corn only. Premix containing 2.0 lb ai glyphosate, 2.0 lb s-metolachlor, 0.20 lb mesotrione and 0.095 lb bicyclopyrone per gallon. Apply postemergence before weeds exceed 4 inches for optimum weed control. Several postemergence tank mixes are approved for additional weed control. Acuron GT can be used in a planned pre and postemergence two-pass weed control program.

Carrier volume should be 10-30 gpa for ground. Not labeled for aerial application. Use NIS at 0.25-0.5% v/v and AMS at 8.5-17 lb/100 gallons. COC may increase the risk of crop injury. Do not use MSO or UAN.

See label restrictions when using organophosphate soil insecticides or postemergence organophosphate and carbamate insecticides as corn injury may occur. Crop injury may occur if Acuron GT is tank-mixed with emulsifiable concentrate formulation products. When using other products do not apply more than 3.7 lb ai/acre s-metolachlor, 0.24 lb ai/acre mesotrione or 0.045 lb ai/acre bicyclopyrone per year. Make only one application per year.

Corn may be planted anytime after application. Rotation interval is 4.5 months for wheat, barley, rye and oats; 10 months for alfalfa, soybean, or sorghum; and 18 months for most other crops. Do not graze, feed forage or harvest treated crop for 45 days after application.

LUMAX EZ (s-metolachlor + mesotrione + atrazine) ($52.50-63.25)

Site of Action: 15 + 27 + 5 Restricted Use Pesticide

2.7-3.25 qt Lumax EZ 3.67L (1.68-2.0 + 0.17-0.2 + 0.63-0.76 lb ai)

Lumax EZ is a premix containing 2.49 lb s-metolachlor (Dual II Magnum) + 0.249 lb mesotrione (Callisto) + 0.935 lb ai atrazine per gal. The low rate is for soils with less than 3% OM; use the high rate for soils with more than 3% O.M.

Equivalent Product Rates in Lumax EZ

<table>
<thead>
<tr>
<th>Lumax EZ</th>
<th>Dual II Magnum</th>
<th>Callisto</th>
<th>Atrazine (ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.7 qt</td>
<td>1.8 pt</td>
<td>5.4 oz</td>
<td>0.60 lb</td>
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<td>3.25 qt</td>
<td>2.1 pt</td>
<td>6.5 oz</td>
<td>0.75 lb</td>
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Lumax EZ provides good to excellent control of foxtails and very good to excellent control of annual broadleaf weeds including velvetleaf, lambquarters, pigweed, waterhemp, common ragweed, smartweed, nightshade, buffalobur, and kochia. Crop tolerance has been good in SDSU tests. Note corn insecticide and other restrictions as for Callisto. Rotation interval for winter wheat is 4.5 months. Do not rotate to crops other than corn, barley, rye, wheat, soybeans, or sorghum the following year.

Rotate only to corn or sorghum if applied after June 1. Do not graze or harvest forage or grain for 45 days after application. Minimum carrier is 10 gpa for ground applications. Do not apply with aerial equipment.

RIXA or TRIZMAX (metolachlor + mesotrione + atrazine) ($15.95-19.10)

Site of Action: 15 + 27 + 5 Restricted Use Pesticide

2.5-3 qt Rixa 3.87L
2.5-3 qt TrizMax 3.95L

Apply as for Lumax EZ above. Products contain metolachlor as compared to s-metolachlor in Lumax EZ. Rixa contains 2.63 lb metolachlor + 0.263 lb mesotrione + 0.98 lb atrazine per gallon. TrizMax contains 2.68 lb metolachlor + 0.268 lb mesotrione + 1 lb atrazine per gallon.

CALIBRA, COYOTE or PALACE (s-metolachlor + mesotrione) ($34.40-40.15)

Site of Action: 15 + 27

2.4-2.8 qt Calibra 3.1L (1.7-2.0 + 0.17-0.2 lb ai)
2.2-2.4 qt Coyote or Palace 3.67L (1.67-2.0 + 0.17-0.2 lb ai)
2.2-2.4 qt Evinco or Villain 3.59L (1.63-1.96 + 0.17-0.2 lb ai)

Calibra is a premix containing 2.82 lb ai s-metolachlor (Dual II Magnum) and 0.28 lb ai mesotrione (Callisto) per gallon. Coyote and Palace are premixes containing 3.34 lb ai s-metolachlor and 0.33 lb ai mesotrione per gallon. Evinco and Villain contain 3.26 lb ai metolachlor and 0.33 lb ai mesotrione. The low rate is for soils with less than 3% O.M. May be an alternative to Lumax EZ (s-metolachlor + mesotrione + atrazine) in areas where atrazine is not desired. Lower rates (1-1.6 qt/acre or 1.4-1.9 qt Calibra) may be used as part of a planned two pass program.

Carrier volume should be 10-80 gpa for preemergence applications or 10-30 gpa for postemergence applications (20 gpa in dense canopy). Not labeled for aerial application. For postemergence applications, use NIS at 0.25% v/v (1 qt/100 gallons)
Weed Control

or COC at 1% v/v. COC may provide more consistent weed control but may result in temporary crop injury. AMS or UAN may be added to increase consistency of control but will increase risk of temporary crop injury. Only use AMS if tank-mixing with surfactant loaded glyphosate or Liberty postemergence. Do not use MSO or use liquid fertilizer as a carrier when applied to emerged corn.

Do not apply organophosphate or carbamate insecticides 7 days before or after product application. Product applied postemergence to corn that received an at planting application of an organophosphate insecticide can result in crop injury.

Do not rotate to crops other than corn, soybean, sorghum, wheat, barley, oats, rye or potatoes. Do not graze or harvest forage or grain for 45 days after application. For Calibra do not feed or harvest forage for 45 days and do not harvest grain for 60 days.

EPP, PRE. Apply to soil surface up to 14 days (28 days for Calibra) before planting.

EPOST. May be applied after corn emergence to corn plants less than 30 inches tall or the V8 growth stage. Does not control emerged grasses but controls most small broadleaf weeds less than 3 inches tall.

**IMPACT or ARMEZON (topramezone)** Site of Action: 27 ($12.35-49.70)

- 0.5-2 oz Impact 2.8SC (0.011-0.044 lb ai)
- 0.5-1 oz Armezon 2.8SC (0.011-0.022 lb ai)

Impact and Armezon inhibit a similar site of action as Callisto. They control several broadleaf weed species and suppress some common annual grass weed species (crabgrass, foxtail species, etc.). Add atrazine at 0.25-1.5 lb ai/A to improve control. Lower atrazine rates may improve burndown and higher rates may provide residual control. Apply to small weeds 3-8 inches tall, depending on the species.

Many tank-mix options with broadleaf or grass herbicides. Follow adjuvant recommendations for specific tank-mixes. Do not apply with other herbicides that have a similar site of action, such as Callisto or Lumax.

Add adjuvant and nitrogen. Adjuvants include COC or MSO at a rate of 1-1.5% v/v. Preferred adjuvant is MSO, particularly in conditions of moisture and temperature stress and to improve grass control. Nitrogen fertilizers include 28 or 34% UAN or ammonium phosphate (10-34-0) at 1.25-2.5% v/v, or AMS at 8.5-17 lb per 100 gallons. Minimum water carrier volume is 15 gpa for ground equipment or 3 gpa for aerial applications. Rainfast 1 hour after application.

Rotation interval is 3 months for cereal crops; 9 months for alfalfa, sorghum, soybean, sunflower, and peas; and 18 months for dry beans, snap beans and most other crops.

**POST.** May be applied up to V8 or 45 days prior to harvest (whichever comes first) for Armezon and 45 days prior to harvest for Impact (which includes harvesting for forage). Use drop nozzles if crop canopy inhibits herbicide contact to weeds.

**PREMIXES**

**ARMEZON PRO (topramezone + dimethenamid-p)** Site of Action: 27 + 15 ($21.80-37.35)

- 14-24 oz Armezon Pro 5.35L (0.011-0.019 + 0.57-0.98 lb ai)

Armezon Pro is a premix containing 0.1 lb topramezone and 5.25 lb dimethenamid-p per gallon. Premix improves control of grass and some small seeded broadleaves. Rate varies depending on soil texture and organic matter. Do not apply to sand soil with less than 3% O.M. where ground water is 30 feet or less from the surface. Minimum water carrier volume is 10 gpa for ground (15 gpa preferred) and 3 gpa for aerial application. Add MSO (1-1.5%) and UAN (1.25-2.5%) or AMS (8.5-17 lb/100 gal).

Do not apply more than 10.7 oz/A per year. Do not apply within 45 days of harvest. Do not graze or feed for 60 days. Rotation interval is 9 months for alfalfa, grain sorghum, soybean or sunflower; 9-18 months (depending on rate) for canola, dry beans or peas; and 18 months for most other crops. Do not apply within 45 days of grazing or harvest (feed, forage or grain).

**PRE.** Apply appropriate rate for soil texture and organic matter.

**POST.** Apply from emergence to V8 or 30-inch corn. Use drop nozzles if corn is over 12 inches tall for optimum coverage. Do not use fluid fertilizer as a carrier.

**IMPACTZ (topramezone + atrazine)** Site of Action: 27 + 5 Restricted Use Pesticide ($15.10-20.25)

- 8-10.7 oz ImpactZ 4.26L (0.016-0.022 + 0.25-0.334 lb ai)

Premix containing 0.26 lb topramezone and 4 lb atrazine per gallon. Minimum carrier is 10 gpa for ground (15 gpa preferred) and 3 gpa for aerial application. Add MSO (1-1.5%) and UAN (1.25-2.5%) or AMS (8.5-17 lb/100 gal).

Do not apply more than 10.7 oz/A per year. Do not apply within 45 days of harvest. Do not graze or feed for 60 days. Rotation interval is 9 months for alfalfa, barley, rye, sorghum, soybean, sunflower, and wheat; 9 months (8 oz) or 18 months (10.7 oz) for canola and flax; and 18 months for most other crops.

**POST.** Apply to emerged weeds in up to 12 inches tall corn.

**IMPACT CORE (topramezone + acetochlor)** Site of Action: 27 + 15 ($18.45-36.90)

- 20-40 oz Impact Core 7.15L (0.011-0.022 + 1.11-2.21 lb ai)

Premix containing 0.071 lb topramezone and 7.08 lb acetochlor per gallon. Rates vary by soil texture and organic matter.
Minimum carrier is 10 gpa (15 gpa for larger weeds) for ground applications. Do not apply by air. Add MSO (0.25-0.5%) when used alone. Add NIS (0.25%) when used in a tank mix. Also add AMS (1.5-2.5 lb/A) or UAN (1.25-2.5%).

Do not apply more than 40 oz/A per year. May make up to 2 sequential applications with at least 14 days between applications. Do not apply within 45 days of harvest. Rotation interval is 4 months for wheat; 9 months for barley, oat, rye, millet, alfalfa, and sorghum; 10 months for soybean and sunflower; and 18 months for most other crops.

POST. Apply 20-40 oz to corn from spike stage up to 11 inches. Recommended rate is 24-30 oz. Target 1-4” weeds. Tank mix with atrazine for enhanced control.

**LAUDIS** (tembotrione) Site of Action: 27

2 oz Laudis 3.5L (0.08 lb ai)

Laudis is a “bleacher” herbicide that inhibits a similar site of action as Impact or Callisto. Controls several annual broadleaf weed species and some annual grass weed species, such as barnyardgrass, crabgrass, and yellow foxtail. Suppresses green foxtail and field sandbur. Apply to broadleaf weeds less than 6 inches tall or grasses less than 4 inches tall. Add atrazine to improve weed control.

Add a surfactant and nitrogen fertilizer. Add MSO at 1% v/v or COC at 1% v/v. MSO is preferred where permitted. Also add UAN at 1.5 qt/A or AMS at 1.5 lb/A (8.5 lb/100 gal). UAN may be preferred during dry conditions. Minimum carrier is 10 gpa for ground applications. Special 24(c) label allows for aerial application in South Dakota with minimum carrier of 7 gpa.

Laudis may be rainfast after 1 hour. Control may be reduced if applied during heavy dew or drought conditions. Apply when weeds are actively growing. Do not harvest corn forage prior to 45 days after application. Rotation interval is 4 months for small grains; 8 months for soybeans; 10 months for sorghum, peas, canola, dry beans, sunflowers and alfalfa; or 18 months for most other crops.

POST. Apply up to the V8 corn growth stage.

**TANK-MIXES.** Tank-mix partners may include atrazine, Liberty, glyphosate, Accent, Steadfast, and bromoxynil products. Add atrazine at 0.5 lb ai/A to increase broadleaf and grass weed control or increase control of weeds greater than 6 inches tall. With atrazine, it is recommended to use COC at 1% v/v + UAN at 1.5 qt/A or AMS at 8.5 lb/100 gal but may use MSO at 1% v/v + UAN at 1.5 qt/A in dry conditions. Do not use MSO or COC when tank-mixing with glyphosate or Liberty. With Liberty, Laudis may be applied at 2-3 oz/A and add AMS at 8.5 lb/100 gal (1.5 lb/A). With bromoxynil products, it is recommended to use COC rather than MSO.

**CAPRENO** (tembotrione + thiencarbazone) Site of Action: 27 + 2

3 oz Capreno 3.45L (0.068+ 0.013 lb ai)

Capreno is a premix containing Laudis (tembotrione + safener) and thiencarbazone, an ALS-inhibiting herbicide that primarily improves grass control, but also has activity on some broadleaf weed species. Capreno controls broadleaf weed species such as lambsquarters, pigweed, kochia, ragweeds, velvetleaf, Russian thistle, waterhemp, and others. Controls grass weed species such as foxtail (green, giant, yellow), barnyardgrass, crabgrass, wild oat, field sandbur, and others.

Add COC at 1% v/v or a minimum of 1.25 pt/A and a nitrogen fertilizer such as UAN at 1.5 qt/A or AMS at 1.5 lb/A or 8.5 lb per 100 gal spray solution. High surfactant oil concentrate (HSOC) may be used in place of COC to minimize adjuvant antagonism with glyphosate. Use of NIS may result in inconsistent and incomplete weed control.

Minimum carrier rate is 10 gpa for ground applications. Special 24(c) label allows for aerial application in South Dakota. Rainfall within 1 hour after application may reduce weed control. Applications to wet foliage may reduce control. Do not apply Capreno within 45 days of harvest. Rotation interval is 4 months for wheat; 9 months for barley, oat, rye, millet, alfalfa, and sorghum; 10 months for soybean and sunflower (with 15 inches of precipitation); 18 months for alfalfa, oats, sunflower, canola and most other crops (with 30 inches of precipitation). If soil pH is greater than 7.5, increase rotation restrictions to the next higher interval or 24 months for crops in the 18-month interval.

POST. Apply 3 oz from V1 (1 leaf collar) up to V7 or 20-inch corn (whichever occurs first). Best results if applied to young, actively growing weeds.

**TANK-MIXES.**

**Atrazine:** Tank-mixing atrazine at 0.5 lb ai/A may increase the spectrum and consistency of weed control. Do not use atrazine on corn greater than 12 inches tall.

**Liberty:** For corn designated as Liberty Link only. Capreno may be used at 2 fl oz/A when tank-mixing with Liberty at 22 fl oz/A. Only use AMS and avoid the use of COC or MSO/ESO.

**Glyphosate:** (e.g. Roundup): For use on glyphosate-tolerant corn. Capreno may be used at 3 fl oz/A when tank-mixing with a glyphosate product. It is recommended to use glyphosate compatible HSOC rather than COC with loaded glyphosate products, and HSOC is required with non-loaded glyphosate products. Use AMS at recommended rates.

**Bromoxynil:** Capreno may be used at 3 fl oz/A with bromoxynil up to 6 fl oz/A to aid in control of difficult broadleaf weeds such as common ragweed. Bromoxynil may be used in place of atrazine in corn greater than 12 inches tall. Use of COC and N fertilizer is recommended.
SHIELDEX 400SC  (tolpyralate)  Site of Action: 27

1-1.35 oz Shieldex 400SC 3.33L (0.026-0.035 lb ai)

Controls select grass and small seeded broadleaf weeds. Apply to actively growing weeds less than 5 inches tall. For ground application only with a minimum carrier of 10 gpa. Allow 14 days between applications. Addition of MSO (0.5% v/v) is recommended. COC (1% v/v) or NIS (0.25% v/v) may be used but may be less effective. Add UAN (2.5% v/v) or AMS (8.5 lb/100 gal).

Do not apply more than 2 applications or 2.7 oz/A per year. Do not graze or feed forage or silage for 21 days or harvest grain for 45 days. Rotation interval is 3 months for wheat, barley, oats, and rye; 9 months for alfalfa, dry bean, canola, peas, sorghum, soybean, and sunflower; and 12 months for most other crops.

POST. Apply to corn up to 20 inches tall or the V6 growth stage (whichever occurs first). Best results when corn is less than 12 inches tall.

KATAGON (nicosulfuron + tolypyralate)  Site of Action: 2 + 27

2.3-3.4 fl oz Katagon 2 lb (0.018-0.027 + 0.018-0.027 lb ai)

Controls grass and small seeded broadleaf weeds. Apply to actively growing weeds less than 5 inches tall. For ground application only with a minimum carrier of 10 gpa. Allow 14 days between applications. Addition of MSO (0.5% v/v) is recommended. COC (1% v/v) or NIS (0.25% v/v) may be used but may be less effective. Add UAN (2.5% v/v) or AMS (8.5 lb/100 gal).

Do not apply more than 2 applications or 6.8 fl oz A/year. Do not apply if corn was treated with terbufos insecticide. Do not graze or feed forage or silage for 45 days or harvest grain for 70 days. Rotation interval is 4 months for winter wheat, barley, oats and rye; 8 months for spring wheat, barley, oats, and rye; 10 months dry bean, peas, snap peas, and pop and sweet corn. 12 months for alfalfa and clover; 18 months for all other crops.

POST. Apply to corn up to 20 inches tall or the V5 growth stage (whichever occurs first).

TANK-MIXES. Best results occur when tank-mixing with a minimum 0.5 lb a.i/A of atrazine. Also consider tank-mixtures with acetochlor or metolachlor products, dicamba, or any other herbicides for increased spectrum and residual control of grass and broadleaf weeds. Do not tankmix with bentazon or 2,4-D.

RERAINT (tolpyralate + acetochlor) Site of Action: 27 + 15

30-48 oz Restraint 6.5L (0.022-0.035 + 1.5-2.4 lb ai)

Controls select grasses and small seeded broadleaf weeds such as waterhemp, redroot pigweed, and common ragweed. Apply preemergence or to actively growing weeds less than 5 inches tall. For ground application only with 10-30 gpa carrier. Allow 14 days between applications. For postemergence weed control always use COC (1% v/v). NIS (0.25% v/v) may be used but may be less effective. May be tank mixed with atrazine and other labeled corn herbicides.

Do not apply more than 2 applications or 60 oz/A per year. Do not apply if corn was treated with terbufos insecticide. Do not graze or feed forage or silage for 21 days or harvest grain for 45 days. See well head setback restrictions for acetochlor. Rotation interval is 4 months for wheat; 9 months for alfalfa or sorghum; 10 months for soybean, sunflower, dry beans, and peas; and 12 months for most other crops.

EPP, PRE. Apply up to 30 days before planting. Rate depends on soil texture and O.M. At least 0.5 inch precipitation is required for activation.

POST. Apply to corn up to 11 inches tall or the V6 growth stage (whichever occurs first). Use higher rates for dense weed infestations.

EMPYROS (s-metolachlor + tolypyralate) Site of Action: 15 + 27

1.4 qt Empyros 3.82L (1.3 + 0.035 lb ai)

Controls annual grass and broadleaf weeds. Apply preemergence or early post to actively growing weeds 3 inches or less. For ground application only with a minimum carrier of 10 gpa. For postemergence weed control add NIS (0.25% v/v) or COC (1% v/v). May also add AMS or UAN to increase weed control however risk of crop injury is increased. Do not use MSO.

Do not apply postemergence if corn was treated at planting with terbufos or other organophosphate insecticide. Do not apply postemergence within 7 days of any organophosphate or carbamate insecticide. Do not apply more than 2 applications or 2 qt/A per year. Do not graze or feed forage/silage for 24 days or harvest grain for 45 days. Rotation interval is 4.5 months for barley, oats, and rye; 9 months for alfalfa or sorghum; 10 months for soybean, sunflower, dry beans, and peas; and 12 months for most other crops.

EPP, PRE. Apply up to 14 days before planting.

EPOST. Apply to corn up to 20 inches or the V6 growth stage. Best results when corn is less than 12 inches tall.

PYTHON, ACCOLADE, or REPTILE (flumetsulam) Site of Acton: 2

0.8-1.33 oz Python, Accolade or Reptile 80WDG (0.04-0.067 lb ai)

Broadleaf herbicide with residual activity. Use 0.8-0.89 oz on coarse soils and 0.89-1 oz on medium to fine soils for kochia, Russian thistle, common lambsquarters, Venice mallow, wild mustard, redroot pigweed, smooth pigweed, velvetleaf, and common waterhemp, including triazine resistance biotypes of these weeds. Use the higher rate on soils with greater than 3%
OM. Do not apply these rates more than 14 days before planting. Use 0.89-1 oz on coarse soils and 1.14-1.33 oz per acre on medium to fine soils for marestail, ladysthumb, black nightshade, and wild sunflower. Giant ragweed is partially controlled, and cocklebur, common ragweed, and jimsonweed are partially to variably controlled. Use the higher rate on soils with greater than 3% O.M. and/or when applications are made 14-30 days before planting.

Do not exceed 1.4 oz per acre in a single crop year. Do not exceed 0.07 lb ai cumulative flumetsulam per acre if using sequential or tank-mix applications. Do not apply more than 30 days before planting or less than 85 days before harvest. Do not apply on soils that have a pH greater than 7.8 or contain greater than 5% O.M. and the pH is less than 5.9. Applications on soils with less than 1.5% O.M. may cause crop injury. Approved for ground or aerial application.

Applications made under adverse (dry or cold) conditions result in less effective weed control. Do not apply under conditions which favor runoff or erosion of soil. Corn must be planted at least 1.5 inches deep. Do not use on corn treated with Counter or Thimet insecticides. Other insecticides should be applied in T-band or band. Organophosphate insecticides including Counter or Thimet can be applied to IR, IMR or Clearfield hybrids. IR, IMR or Clearfield hybrids may reduce injury to corn from Python on soils with less than 1.5% O.M or pH greater than 7.8.

Follow crop rotation guidelines. Alfalfa, dry beans, peas, and small grains may be planted after 4 months; grain sorghum after 12 months; sunflower after 18 months; and canola after 26 months plus field bioassay. Soybeans can be planted anytime.

FALL. Apply in late fall when soil temperature has dropped below 50°F.

PPI. Incorporate 2-3 inches deep up to 30 days prior to planting.

PPS. Use in reduced and no-till systems. May be applied up to 30 days prior to planting. PRE. Apply at planting or after planting, but prior to weed emergence. Rainfall required. PRE-SPIKE. Use water carrier if corn is emerged and up to 2 inches.

TANK-MIXES/SEQUENTIAL. Tank-mixes of Python for burndown include Gramoxone, glyphosate products, and 2,4-D. Tank-mixes of a reduced Python rate (0.8-0.9 oz) in preemergence application include Bicep, and Harness Xtra. Sequential applications of postemergence treatments include Hornet at reduced rate; Banvel, Clarity, 2,4-D, bromoxynil, or Beacon.

PREMIX

HORNET or STANZA (flumetsulam + clopyralid) Site of Action: 2 + 4 ($11.20-27.95)

2-5 oz Hornet or Stanza 78.5 WDG (0.023-0.058 + 0.063-0.156 lb ai)

Hornet contains 0.185 lb flumetsulam (Python) plus 0.5 lb clopyralid acid (Stinger) per pound of product. Hornet provides residual control of many broadleaf weeds and controls emerged Canada thistle. Use a tank-mix or sequential program for grass control.

For preplant and preemergence applications use 4-5 oz on coarse soil and 5-6 oz for medium and fine soil. The high rates are for soil over 3% O.M. or if applying 14-30 days before planting. It is most widely used as a postemergence herbicide for broadleaf weeds.

Rates for postemergence application are 2-5 oz per acre. The 3 oz rate is used for most annual broadleaf weeds. Good Canada thistle activity. Use higher rates to control heavy infestations, larger weeds, or when a longer period of residual control is desired. All postemergence applications must include NIS at 1 qt/100 gal or COC or MSO at 1 gal/100 gal. Do not use liquid fertilizer as the total carrier as crop injury may occur. Do not cultivate for 10 days before or after application. Rainfast in 2 hours. Use a minimum spray volume of 5 gpa for air and 10 gpa for ground application.

Refer to the section for Python for soil restrictions for preemergence applications and for restrictions to prevent insecticide interaction with Hornet applied to the soil or postemergence.

Follow crop rotation guidelines to avoid carryover. Small grain can be planted after 4 months; alfalfa, dry beans, peas, soybeans after 10.5 months; grain sorghum after 12 months; sunflower, sweet corn after 18 months; canola after 26 months plus field bioassay.

PPS. Hornet may be applied up to 30 days before planting.

PPI. Incorporate into the top 2-3 inches within 30 days prior to planting.

PRE. Apply at or after planting, but prior to crop or weed emergence.

PRE-SPIKE. Apply from corn emergence to before corn is 2 inches. Established broadleaf weeds at time of application may be controlled; rainfall is required for those weeds not emerged.

POST. Apply from crop emergence (spike) stage to V6 stage (six visible leaf collars) or 20 inches tall, whichever occurs first. For best control, apply when broadleaf weeds are less than 8 inches tall.

TANK-MIXES. Hornet may be tank-mixed with Gramoxone or glyphosate products for burndown in no-till. Tank-mixes with soil-applied grass herbicides or certain postemergence herbicides add weed spectrum. Do not tank-mix with Basagran.

PENDIMETHALIN PRODUCTS (pendimethalin) Site of Action: 3 ($10.80-32.35)

1.8-4.8 pt Prowl, Acumen, Framework, Pendimethalin, Pin-Dee or Stealth 3.3L (0.75-2 lb ai)
1.7-4.5 pt Satellite Flex 3.5L
2-4 pt Prowl H2O or Satellite HydroCap 3.8L

Good control of several annual grasses and fair control of certain small-seeded broadleaves. Early-season weed control less consistent than for some other treatments. Rates vary depending on soil texture and organic matter. The 3.6 pt of 3.3L per acre rate has been used in most SDSU tests. Prowl H2O is a water-based formulation that has improved performance in high residue and is preferred when tank-mixing post application in corn. Crop tolerance is adequate if the seed furrow is completely
closed and seed planted at least 1.5 inches deep. Do not incorporate. Plant before applying herbicide. Minimum carrier is 10 gpa for ground or 5 gpa for air. Use 20 gpa for minimum-till systems or when using fertilizer carrier preemergence. Do not graze or feed forage from treated corn for 21 days after application. No label restrictions for crops the following year.

**PRE.** Apply after planting. Rain critical for good results. Do not harrow before crop emergence. However, if crusting or early weed emergence requires cultivation, use shallow tillage such as a rotary hoe.

**POST.** Apply until corn is 30 inches or has 8 leaf collars. Do not apply in liquid fertilizer.

**POST INCORPORATED.** Use 1.8-3.6 pt (3.3L) 1.7-3.4 pt (3.5L) or 2-3 pt (3.8L). Culti-spray application. Intended for late-season annual weeds. Apply from 4-inch crop until layby cultivation. Cultivate to move untreated soil over the corn root zone before application. Incorporate with cultivation unless there is sufficient rain or irrigation before weed emergence.

**TANK-MIXES.** Tank-mixes include atrazine, Bicep, bromoxynil, Bullet, Dual, Outlook, Harness Xtra, Hornet, Python, or Surpass. Refer to label restrictions or the section for each herbicide.

### TRIFLURALIN PRODUCTS (trifluralin)

*Site of Action: 3

- 0.75-2 pt Treflan, Trifluralin, Triflurex or Trust 4E (0.38-1 lb ai)

Trifluralin is available in several brand name products. Formulation and use may vary. Follow label for product used.

**POST INCORPORATED.** Intended to control late-season grasses. Apply to corn from V2 up to 30 inches and incorporate with row cultivator. Cultivate before application to remove emerged weeds and to move untreated soil over corn root zone. Not labeled for preplant or preemergence use as injury can be severe. Not for seed fields. Has limited potential as a general weed program. Do not apply within 6 weeks of forage, fodder or silage harvest.

### HARMONY SG, TREATY, or VOLTA (thifensulfuron)

*Site of Action: 2

- 0.125-0.9 oz Harmony 50SG (0.004-0.028 lb ai)
- 0.083-0.6 oz Treaty or Volta 75DF (0.004-0.028 lb ai)

**BURNDOWN.** Apply Harmony SG at 0.45-0.9 oz/A or 75DF product at 0.3-0.6 oz/A prior to planting or after planting but prior to corn emergence. May be tank-mixed with glyphosate to improve control of difficult weeds such as wild buckwheat, mustards, or lambsquarters. Add NIS at 0.25% v/v and AMS at 2-4 lb/A.

**POST.** Apply Harmony SG at 0.125 (1/8) oz/A or 75DF product at 0.083 (1/12) oz/A in field corn with 2-6 leaves or 1-5 leaf collars or up to 16 inches tall. Do not make more than one application per season. Add NIS (0.25% v/v) or COC (1% v/v) plus either AMS (2-4 lb/A) or UAN (28% N) and NIS (0.25% v/v) or AMS (2-4 lb/A) or UAN (28% N, 2-4 qt/A). Only apply to corn with a relative maturity of 88 days or more. May provide control or suppression of velvetleaf, lambsquarters, pigweed, smartweed, and mustards.

### GRAPPLE, HINGE, INFLECT, PRUVIN, SOLIDA, or TETRIS (rimsulfuron)

*Site of Action: 2

- 0.5-2 oz Grapple, Hinge, Inflict, Pruvin, Solida, or Tetris 25DF (0.008-0.03 lb ai)

Pre or early postemergence application in corn to control some grass weed species such as foxtail, wild oats, and barnyardgrass and several broadleaf weed species such as lambquarters, pigweed, mustard, and others.

Label recommends 1 oz/A for most situations and suggests tank-mixing with glyphosate for added residual control in Roundup Ready corn. Do not apply more than 0.03 lb a.i./A (Pruvin) or 0.0625 lb a.i./A (Grapple, Hinge, Solida) of rimsulfuron per year. Recommended carrier volume 15 gpa for most circumstances or 10 gpa for low weed densities. Minimum carrier volume is 5 gpa for aerial applications. Adequate soil moisture for plant growth will enhance herbicide activity. Rimsulfuron is absorbed by weed roots, so sprinkler irrigation (>0.5 in) or rain within 5-7 days of application is necessary for adequate control. If this activating precipitation is not received, follow with cultivation or a postemergence herbicide application as needed.

Postemergence applications should include a NIS (0.25% v/v) and nitrogen fertilizer (either AMS at 2 lb/A or UAN (28% N) at 2 qt/A). Adjuvants are not needed if rimsulfuron is tank-mixed with glyphosate or glufosinate herbicides that contain premixed adjuvants. For burndown applications prior to corn emergence, COC (1% v/v) or MSO (0.5% v/v) may be added in place of NIS. Do not tank mix post emergence with Basagran or organophosphate insecticides. See label for precautions and restrictions when using soil or foliar applied organophosphate insecticides.

**PPS or PRE.** Will provide residual control of weeds that are not emerged. Add an adjuvant if weeds are emerged.

**POST.** May be applied in corn up to 12 inches tall or less than 6 leaf collars.

**TANK-MIXES.** May be tank-mixed with glyphosate (Roundup Ready corn) or glufosinate (Liberty Link corn). Greater broadleaf control may be achieved by tank-mixing with dicamba. Tank-mixtures with 2,4-D will result in severe grass control antagonism.

### PREMIXES

**RESOLVE Q or STRINGENT (rimsulfuron + thifensulfuron)

*Site of Action: 2 + 2

- 1.25-2.5 oz Resolve Q or Stringent 22.4DF (0.014-0.029 + 0.003-0.006 lb ai)

Controls or suppresses several grass weed species, such as foxtail, barnyardgrass, woolly cupgrass, and others, and broadleaf weed species such as pigweed, kochia, velvetleaf, mustards, small dandelion, and others. Provides control of emerged weeds (1-3 inches tall) and limited residual control. Resolve Q at 1.25 oz/A provides the similar amount of active ingredient as rimsulfuron 25DF at 1 oz/A and Harmony 50SG at 0.1 oz/A. This is a greater amount of rimsulfuron, and less amount of Harmony compared to Basis or Basis Blend, so Resolve Q may have slightly greater grass activity. Do not apply more than 0.03 lb a.i. rimsulfuron per acre per year. Rainfall within 5-7 days after application may improve residual weed control. May be tank-mixed with glyphosate (Roundup) or glufosinate (Liberty) herbicides.

**($13.30-26.60)
Follow adjuvant recommendations and carrier volumes as described for rimsulfuron 25 DF. Do not tank mix post emergence with Basagran or organophosphate insecticides. See label for precautions and restrictions when using soil or foliar applied organophosphate insecticides.

**PPS or PRE.** Apply 1.25-2.5 oz wt/A prior to corn emergence. Do not apply pre-emergence on coarse texture soils with less than 1% O.M. Do not apply more than 1.25 oz/A if planning to use another rimsulfuron containing product POST.

**POST.** Apply 1.25 oz to corn up to 20 inches tall or less than 7 leaf collars.

**BASIS or BASIS BLEND** *(rimsulfuron + thifensulfuron)* Site of Action: 2 + 2 ($7.65-23.25)

0.33-1 oz Basis 75WDG
0.825-2.5 oz Basis Blend 30SG (0.01-0.03 + 0.005-0.015 lb ai)

Basis is intended for early postemergence grass control. It provides good to excellent control of green, bristly, yellow, and giant foxtail, barnyardgrass, and fall panicum. Basis also controls early flushes of smartweed, lambquarters, mustard, and pigweed. Basis may be tank-mixed for additional broadleaf control. Wild oat, quackgrass, woolly cupgrass, wild proso millet, and smooth crabgrass are not controlled adequately. Basis is 50% rimsulfuron and 25% thifensulfuron, so Basis at 0.33 oz contains the equivalent active ingredient as 0.66 oz rimsulfuron 25DF and 0.17 oz Harmony 50SG. Basis Blend contains 20% rimsulfuron and 10% thifensulfuron. The post-emergence rate of Basis Blend is 0.825 oz/A. This is equivalent to the amount of rimsulfuron and thifensulfuron applied using Basis. Do not apply more than 0.0625 lb ai. rimsulfuron per acre per year.

Early-season weed control has been satisfactory in SDSU tests; late flushes require cultivation 10-15 days after application. Applications should be made when grasses are 1-2 inches and actively growing. Crop tolerance has been good in SDSU tests. Avoid late application. Apply to hybrids with a relative maturity rating of 88 days or more. Consult your seed supplier before applying to specialty corn or hybrids less than 88 days relative maturity.

Do not apply Basis to corn treated with Counter 15G or 20CR; Basis may be applied to corn treated with Fortress, Force, or Aztec insecticide. Applications made to corn treated with other soil insecticides may cause unacceptable crop injury. There are no restrictions for Basis in “IR” corn previously treated with any insecticide. Basis should not be tank-mixed with foliar applied organophosphate insecticides, Basagran, Beacon, or other ALS herbicides. To avoid antagonism or crop injury, apply these products 7 days prior to or 3 days after Basis applications. Add COC at 1-2 gal/100 gal plus 28% N at 2-4 qt or AMS at 2-4 lb per acre. Minimum carrier is 15 gpa for ground or 5 gpa for air.

Soybeans may be planted 15 days after treatment with the low rate (0.33 or 0.825 oz); winter cereals after 4 months; spring cereals after 8 months; alfalfa, grain sorghum and sunflower after 10 months. Applying tank-mixes with dicamba to small corn (V-3 stage or smaller) during stress conditions may increase the chance of rattail after the V-11 stage of growth.

**BURNDOWN.** Apply Basis (0.33-1 oz wt/A) or Basis Blend (0.825-2.5 oz wt/A) as a fall treatment prior to ground freezing or in the spring prior to corn planting. Rates above 0.5 oz for Basis or 1.25 oz for Basis Blend increase weed spectrum and can lengthen residual control. Refer to tank-mix partner label for rates and precaution information.

**POST.** Apply Basis (0.33 oz wt/A) or Basis Blend (0.825 oz wt/A) as a broadcast or banded treatment on field corn that is spike to 4-leaf (2 collar) growth stage, prior to emergence of the third collar and/or less than 6 inches tall.

**ALLUVEX** *(rimsulfuron + thifensulfuron)* Site of Action: 2 + 2

1.5 oz Alluvex 33.4DF (0.016 + 0.016 lb ai)

Premix of rimsulfuron and thifensulfuron (Harmony). Controls emerged weeds and provides limited residual. Add COC or MSO at 1% v/v or NIS at 0.25% v/v. May also add UAN (2 qt/A) or AMS (2 lb/A). Additional 2(ee) label allows for tank-mix with dicamba burndown before corn for control of ALS resistant kochia. Corn may be planted anytime. Rotation interval is 3 months for winter cereals; 9 months for spring cereals; 10 months for Alfalfa, canola, flax, potatoes, and 18 months for alfalfa, canola, and most other crops. Do not apply more than 0.0625 lb ai. rimsulfuron per acre per year to field corn. Do not apply preemergence on coarse soils with less than 1% O.M. See label for precautions and restrictions when using soil or foliar applied organophosphate insecticides.

**BURNDOWN, PPS, PRE.** May be applied anytime before corn emergence. May be tank-mixed with several preplant/preemergence herbicides to increase residual weed control.

**INSTIGATE** *(rimsulfuron + mesotrione)* Site of Action: 2 + 27

5.25-7 oz Instigate 45.84DF (0.014-0.018 + 0.14-0.18 lb ai)

Instigate is a premix containing 4.17% rimsulfuron and 41.67% mesotrione (Callisto). Intended for preplant or preemergence application. Provides burndown and residual control of many grass and broadleaf weeds. May be tank-mixed with several preemergence corn herbicides. A 6 oz/acre use rate is suggested for most soil applications. Use higher rates for fine soils and more than 3% OM. Do not use preemergence on coarse soils with less than 1% OM.

For preplant burndown applications add COC or MSO and UAN or AMS for control of labeled weeds less than 3 inches. Substitute NIS for COC/MSO when mixing with glyphosate. Check label guidelines for appropriate adjuvants when tank-mixing other herbicides.

Do not tank mix post emergence with Basagran or organophosphate insecticides. See label for precautions and restrictions when using soil or foliar applied organophosphate insecticides. Do not use another postemergence HPPD inhibitor (Callisto, Impact, Laudis) with Instigate in the same season. When using other products containing mesotrione or rimsulfuron, do not apply more than 0.24 lb ai/acre mesotrione or 0.0625 lb ai/acre rimsulfuron per year.

Rotation interval is 4 months for winter cereals, 9 months for spring cereals, 10 months for alfalfa, canola, flax, potatoes,
sorghum, soybeans, and sunflower. Rotation interval for most other crops is 18 months. Do not graze, feed forage, grain, or stover for 45 days after application.

**PPS.** Apply up to 14 days before planting.

**PPI.** Incorporate less than 2 inches up to 14 days before planting.

**PRE.** Apply during or after planting before crop emergence. Check that seed furrow is thoroughly closed.

**EPOST.** Apply 5.25-6 oz/acre up through V2 corn.

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### REALM Q (rimsulfuron + mesotrione) Site of Action: 2 + 27 ($19.50)

*4 oz Realm Q 38.75DF (0.019 + 0.078 lb ai)*

Standard rate is 4 oz which provides the similar active ingredients as rimsulfuron 25DF at 1.2 oz/A and Callisto at 2.5 oz/A. Best results if applied to small (1-2 inch grasses or broadleaves less than 5 inches), actively growing weeds. Do not apply to field corn grown for seed. Do not apply more than 4 oz Realm Q per growing season. When using other products containing mesotrione or rimsulfuron, do not apply more than 0.24 lb ai/acre mesotrione or 0.0625 lb ai/acre rimsulfuron per year.

Thoroughly clean the application equipment immediately after use.

Minimum carrier is 10 gpa for ground applications or 2 gpa for aerial applications. Preferred adjuvants are COC + AMS. Apply COC at 1% v/v or 2% v/v during dry conditions. Also add AMS at 2 lb/A or UAN (28% N) at 2 qt/A. Instead of COC, NIS (0.25% v/v) may be added. Do not use MSO. Do not add adjuvants that significantly alter the solution pH. Do not tank mix post emergence with Basagran or organophosphate and carbamate insecticides. See label for precautions and restrictions when using soil or foliar applied organophosphate insecticides.

Rotation restriction is 4 months for winter wheat; 9 months for spring wheat, oats, and barley; 10 months for soybeans, sunflowers, sorghum, alfalfa, flax and canola; and 18 months for most other crops.

**POST.** It is best to apply when corn is less than 12 inches tall but may apply to corn up to 20 inches tall or 6 leaf collars.

**TANK-MIXES.** May tank-mix with glyphosate (Roundup), glufosinate (Liberty), dicamba, and several other herbicides. Check label guidelines for appropriate adjuvants when tank mixing other herbicides. Use only NIS (no AMS or UAN) if tank mixing Cinch postemergence or leaf burn may result.

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### ACCENT Q or PRIMERO (nicosulfuron) Site of Action: 2 ($21.80)

*0.9 oz Accent Q 54.5 WDG (0.031 lb ai) 0.67 oz Primero 75 WDG (0.031 lb ai)*

Excellent control of shattercane and good to excellent control of green and giant foxtail. Accent Q also controls barnyardgrass, yellow foxtail, sandbur, woolly cupgrass, and quackgrass. Pigweed and smartweed are controlled.

Foxtail, wild oat, sandbur, and woolly cupgrass should not exceed 2-3 inches, shattercane 4-12 inches, and quackgrass 4-10 inches. Results are more variable if grasses such as yellow foxtail or barnyardgrass are present. Corn tolerance has appeared good in SDSU tests. Cultivation 10-14 days after application will control late weed flushes.

Weeds stop growth soon after treatment but yellowing or stunting is not apparent for several days. Results are best when weeds are growing rapidly and plants are free of stress. Thorough coverage is important. Always add COC at 1 gal/100 gal or NIS at 1-2 qt/100 gal. Use 28% N at 2-4 qt or AMS at 2-4 lb per acre. Rainfall within 4 hours of application will reduce effectiveness. Minimum carrier is 10 gpa for ground or 3 gpa for air. Increase the carrier to 15 gpa for ground or 5 gpa for air under less favorable conditions. Avoid concentrating spray into plant whorl. Two-nozzle units are suggested for banding.

Do not apply Accent Q to corn that was treated with Counter 15G or 20 CR at planting. To avoid crop injury or antagonism, apply Basagran, 2,4-D, or organophosphate insecticides such as Lorsban, Malathion, etc., at least 7 days before or 3 days after application of Accent Q. Fortress, Aztec, and other non-organophosphate insecticide treated fields can be treated with Accent Q. Corn may develop rat-tailing after the V-11 stage of growth when Accent Q is tank-mixed with products containing dicamba and applied to small corn (V3 stage or smaller) under stress conditions.

**POST.** Apply on corn up to 20 inches or up to and including 6 collars, whichever is most restrictive. Early application is important, especially in heavy infestations. Late applications to control escaped grasses or as a rescue treatment may be made using drop nozzles for 20-36-inch corn. Do not apply after corn is 36 inches or has 10 or more collars.

**TANK-MIXES/SEQUENTIAL.** May be tank-mixed or applied sequentially with many corn herbicides. Some options include atrazine, dicamba, Callisto, Impact, Lumax, Cinch, Cinch ATZ, Prowl, Surpass, Dual, Outlook and others. Refer to labels for rates and restrictions.

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### PREMIXES

### REVULIN Q (nicosulfuron + mesotrione) Site of Action: 2 + 27 ($22.60-26.60)

*3.4-4 oz Revulin Q 51.2DF (0.03-0.036 + 0.078-0.092 lb ai)*

Revulin Q is a premix of 14.4 % nicosulfuron (Accent) and 36.8 % mesotrione (Callisto). Provides postemergence grass and broadleaf control.

Minimum carrier is 10 gpa, increase to 15 gpa for heavy weed stands. Do not apply by air. Water only carrier. Add COC (1% v/v) or HSOC (0.5% v/v) plus UAN (2 qt/A) or AMS (2 lb/A). NIS (0.25%) may be used but weed control is not as consistent. MSO is not recommended.

Do not tank mix with Basagran. If a foliar applied organophosphate insecticide is used, apply 7 days before or 3 days after application.
Revulin Q. Do not apply within 45 days of crop emergence where terbufos (Counter) insecticide was used. Crop injury may occur if Revulin Q is applied where other organophosphate insecticides were previously applied. Do not harvest grain for 70 days or feed or forage for 45 days. Do not apply more than 1 oz ai nicosulfuron or 3.85 oz ai mesotrione per acre per year.

Rotation interval is 4 months for winter cereals; 8 months for spring cereals; 10 months for alfalfa, canola, flax, sorghum, soybeans, and sunflower; and 18 months for most other crops. Canola and alfalfa increase to 18 months with less than 15 inches precipitation.

**POST.** Apply up to 20 inch or 6 leaf collar corn, whichever comes first. Apply with drop nozzles for 20 to 30 inch or 8 leaf collar corn, whichever comes first.

**STEADFAST Q (nicosulfuron + rimsulfuron)** Site of Action: 2 + 2 ($22.05)

1.5 oz Steadfast Q 37.7WDG (0.023 + 0.002 lb ai)

Steadfast Q 37.7WDG at 1.5 oz/A is equivalent to 0.5 oz Accent + 0.75 oz rimsulfuron 25DF. Weed height should not exceed 4 inches for barnyardgrass, foxtail, wild proso millet, common sunflower, and pigweeds; 3 inches for woolly cupgrass and smartweed; 2 inches for volunteer cereals, sandbur, and wild oat.

Consult your seed supplier before applying Steadfast Q to specialty corn or hybrids with 77-88 days relative maturity.

Adequate soil moisture is required. Rainfall within 5 days will enhance residual activity. Rainfast in 4 hours. Applications must include either COC at 1 gal/100 gal or NIS at 1-2 qt/100 gal + AMS or 28% N. Minimum carrier is 15 gpa for ground or 5 gpa for air. Do not graze or feed forage, hay, or straw from treated areas to livestock within 30 days of application.

Do not tank-mix Steadfast Q with Basagran. 2,4-D may cause grass antagonism. Do not tank-mix with foliar applied organophosphate insecticides such as Lorsban, or malathion. Apply these products at least 7 days before or 3 days after application of Steadfast Q. May be tank-mixed with Asana XL or Lannate insecticides.

Soybeans may be planted after 15 days; winter small grain 4 months; spring wheat, barley, oats, or rye 8 months; dry beans, peas 10 months; alfalfa, canola, flax, and sunflower 10 months (18 months if drought conditions after application); sorghum 10 months if pH is 7.5 or less; and 18 months for most other crops.

**POST.** Apply to corn up to 20 inches or up to and including 6 collars, whichever is most including 6 collars, whichever is most restrictive.

**TANK-MIXES/SEQUENTIAL.** Tank-mix Steadfast Q 37.7WDG with full or reduced rates of preemergence grass herbicide to be applied early postemergence. Preemergence grass herbicides include Prowl, and Dual. Rate for preemergence herbicide is 2/3 of full rate. If preemergence herbicide contains atrazine use less than 1.0 lb ai atrazine in tank-mix. If Prowl is used as tank-mix EPOST on small grass use NIS in place of COC. Provides residual grass control. Refer to the label or section for each herbicide alone.

Sequential programs provide for reduced rates of preemergence herbicides prior to postemergence Steadfast Q. Herbicides include Dual II, Surpass, and Harness Xtra. Rates are usually 50% of normal rate for the preemergence herbicide. Provides early season protection and expands timing for postemergence application.

**AUTUMN SUPER (iodosulfuron + thiencarbazone)** Site of Action: 2 + 2 ($8.95-14.90)

0.3-0.5 oz Autumn Super 51WDG (0.0011-0.0019 + 0.0084-0.014 lb ai)

Controls several mustard species, marestail, chickweed, alfalfa, and other broadleaf weed species. Apply while weeds are actively growing. May provide short-term residual control of some small-seeded broadleaf weeds. The addition of thiencarbazone increases suppression of grasses, such as foxtail barley and downy brome (cheatgrass). Rotation interval is 1 month for corn, 2 months for soybeans, 3 months for wheat, and 9 months for barley with a minimum of 15 inches precipitation, and 18 months for most other crops with a minimum of 30 inches of precipitation. Minimum carrier is 10 gpa. Add COC or MSO at 1% v/v and UAN at 1.5-2 qts/A or AMS at 1.5-3 lb/A.

**EPPS.** 0.3-0.5 oz/A The 0.3 oz rate is only for soils with a pH between 7.0-8.0. Apply in fall to small weeds (less than 3 inches) at least 30 days prior to corn planting. Do not apply to frozen ground. Do not graze for 45 days after application.

**DICamba PRODUCTS (dicamba)** Site of Action: 4 Restricted Use Pesticide ($3.50-34.75)

0.5-1 pt dicamba 4L (0.25-0.5 lb ae)

0.5-1 pt DiFlexx 4L

Dicamba is available in several brandname products including Banvel, Clarifier, Clarity, Clash, Detonate, Diablo, Dicamba, DiFlexx, Disha DMA, Opti-DGA, Oracle, Rifle, Sterling Blue (DGA), Strut, Topeka, Vision, and others. Formulation and use may vary. Follow label for product use.

Good to very good control of several small-seeded annual broadleaves and perennial broadleaves. Does not control mustard. Better crop tolerance than 2,4-D. Very good tolerance up to 8 inches. May cause brittleness, lodging, or breakage associated with green snap problems. Risk of injury greatest during periods of rapid growth, especially if crop is beyond suggested crop stage. DiFlexx contains a safener to reduce the potential for crop injury.

Banvel and Sterling are formulated as a dimethylamine salt; Clarity, Strut and DiFlexx are formulated as a diglycolamine salt. Clarity, Strut and DiFlexx have less temperature or humidity restrictions than dimethylamine formulations for application near sensitive crops. Weed control has been similar for these products. Minimum carrier for Clarity, Strut and DiFlexx is 3 gpa for ground and 1 gpa for air. Minimum carrier for other dicamba 4L is 5 gpa for ground or 3 gpa for air except when sensitive crops may be affected.

May make up to 2 applications per season with at least 2 weeks between sequential applications. Sunflowers become more sensitive after they are beyond the 6-leaf stage. Do not harvest for dairy cattle prior to milk stage or kernel fill. Rates vary
Weed Control

Use precautions to reduce risk of droplet drift. Do not apply if wind is gusty or in excess of 5 mph and moving toward sensitive crops or if expected high temperature is over 85°F. Slight wind moving away from sensitive crops is preferred. Do not apply dicamba when corn is over 8 inches tall or soybeans are over 10 inches or are starting to bloom. A June 20 cut-off date for dicamba is suggested if soybeans are planted at normal dates.

DICAMBA PRODUCTS (excluding DiFlexx):

PPS, PRE. Apply 1 pt/A on medium and fine soils with more than 2.5% organic matter (O.M.). PPS applications are for no-till only; apply 0.5 pt/A if soils have coarse texture or less than 2.5% O.M. Do not make PRE applications on coarse texture soils or soils with less than 2.5% O.M.

EPOST. Apply 1 pt/A when corn is spike to 5-leaf or up to 8 inches (whichever occurs first). For coarse soils, use 8 oz. Useful for Canada thistle in seasons where weeds emerge ahead of corn. Some crop effects noted if heavy rain is received soon after application. Consider patch treatments.

POST. Apply 0.5 pt/A as a directed spray to 8-36-inch-tall corn or not later than 15 days before tassel (whichever occurs first).

TANK-MIXES/SEQUENTIAL. Dicamba 4L may be tank-mixed or applied sequentially with many herbicides; some examples include atrazine, acetochlor, Outlook, glyphosate, paraquat, metolachlor, and pendimethalin. Refer to label restrictions for each herbicide.

DIFLEXX ONLY:

DiFlexx contains a safener to reduce the potential for crop injury. May add NIS (0.25% v/v), COC (1% v/v), or MSO (1% v/v) plus UAN (2-4 qt/A) or AMS (8.5-17 lb/100 gal) for emerged weeds, especially with dry conditions. Do not apply more than 16 oz per application or 24 oz per year. Do not harvest for forage for 45 days. Corn grain and stover may be harvested once crop reaches milk stage.

PPS, PRE. Apply 8-16 oz/A in all tillage systems. Use higher rate range for soils with higher O.M. PPS application can be made up to 14 days before planting. Plant corn at 1.5 inches deep and ensure furrow is closed. COC or MSO preferred for increased burndown activity.

POST. Apply 6-16 oz/A when corn is spike to V10 or 36 inches (whichever occurs first). Control results are best when applied to weeds less than 3 inches.

TANK-MIXES/SEQUENTIAL. DiFlexx tank-mixes include Balance Flexx, Capreno, Corvus, glyphosate, Laudis, Liberty and others. Refer to label restrictions for each herbicide.

DISTINCT (dicamba + diflufenzopyr) Site of Action: 4 + 19 ($13.00-19.50)

4-6 oz Distinct 70WDG (0.125-0.18 + 0.05-0.075 lb ae)

Distinct contains 50% dicamba ae + 20% diflufenzopyr ae. Use NIS at 0.25% v/v with UAN or AMS. Minimum carrier is 3 gpa for ground applications. Do not apply aerially. Do not apply if wind is more than 10 mph. Do not apply additional products with dicamba in the same spring season. Do not cut for forage for 32 days after application. Do not harvest grain or stover for 72 days after application.

PPS. Apply preplant in reduced or no-till corn up to 7 days before planting.

STATUS (dicamba + diflufenzopyr) Site of Action: 4 + 19 ($14.00-56.00)

2.5-10 oz Status 56DF (0.06-0.25 + 0.025-0.1 lb ae)

Status is a postemergence, translocated herbicide containing 40% dicamba ae + 16% diflufenzopyr ae + safener. Diflufenzopyr is an auxin transport inhibitor that blocks movement of natural auxins and growth regulators from active meristematic regions in the stem and roots. The safener in Status reduces the potential for corn injury. These herbicides give very good to excellent control of many annual broadleaves including waterhemp and normal or ALS kochia. They also control perennials such as Canada thistle and field bindweed.

When tank mixing with glyphosate or glufosinate, Status may be used at 2.5 oz/A for increased broadleaf weed control or 5 oz/A for perennial weeds or weeds taller than 6 inches. Early application is suggested.

Minimum carrier is 3 gpa for ground equipment. For Status, add a surfactant such as NIS (0.25% v/v), COC (1.2 pt/A), or MSO (1-2 pt/A) with a nitrogen fertilizer such as UAN (1.25% v/v) or AMS (5-17 lb/100 gallons). Do not plant any crop within 120 days after application unless 1 inch of rainfall is received after Status applied at less than 5 oz/A. Forage may be harvested 32 days and grain harvested 72 days after application.

POST. Apply 5-10 oz/A on corn 4-36 inches tall (V2-V8 growth stage) or 2.5-10 oz/A when tank-mixed with glyphosate or glufosinate.

TANK-MIXES/SEQUENTIAL. May be applied sequentially or tank-mixed with other registered corn herbicides. Do not tank-mix with other growth regulator herbicides (site of action 4), such as dicamba, 2,4-D, or clopyralid, or apply one of these herbicides within 15 days of applying Status. Do not tank-mix with emulsifiable concentrate chloroacetamide herbicides such as Dual II Magnum, Harness, Outlook, or Surpass. Follow crop size and carrier requirements for tank-mix or combination partners.
DIFLEXX DUO (dicamba + tembotrione) Site of Action: 4 + 27 ($22.75-37.95)

24-40 oz DiFlexx Duo 1.53L (0.24-0.39 + 0.05-0.08)

DiFlexx Duo is a mixture of dicamba (DiFlexx) and tembotrione (Laudis). Good to very good control of most annual broadleaf weeds and some perennial broadleaf weeds. Provides some grass control; marginal on green foxtail.

Minimum carrier is 10 gpa ground. Not labeled for air. Apply no more than 15 inches above the canopy. MSO or COC at 1% v/v is recommended and add UAN at 1.5 qt/A or AMS at 8.5-17 lb per 100 gal. UAN is preferred with dry conditions. Rotation interval is 4 months for small grains; 8 months for soybeans; 10 months for sorghum, peas, canola, alfalfa, and sunflower; 10 months for dry beans with 20 inches precipitation; and 18 months for most other crops. Do not apply over 78 oz per season. Rain fast in 4 hours. Do not graze or harvest forage for 45 days.

PPS, PRE. Apply 32-40 oz. Requires a tank-mix partner or a planned postemergence for full season weed control. Plant corn at 1.5 inches deep and ensure furrow is closed.

POST. Apply 24-40 oz from emergence to 36 inches but before the V7-stage; whichever comes first. Do not apply with liquid fertilizer as the main carrier.

TANK-MIXES. May be tank-mixed with atrazine, Liberty, glyphosate and other herbicides. Refer to label restrictions for each herbicide.

SCORCH (dicamba + 2,4-D + fluroxypyr) Site of Action: 4 + 4 + 4 ($8.10-16.20)

1.25-1.5 pt Scorch 4.77L (0.16-0.19 + 0.47-0.57 + 0.12-0.14 lb ae)

Scorch is a premix containing 1 lb dicamba, 3.02 lb 2,4-D and 0.75 lb fluroxypyr per gallon. Controls annual broadleaf weed species such as wild buckwheat, lambsquarters, pigweed, kochia, Russian thistle, and others. Minimum carrier is 3 gpa for air and 5 gpa for ground. Check label for adjuvant recommendations. Do not graze or harvest for livestock feed for 47 days. Preharvest interval is 90 days for grain or stover.

PPS. Apply 1.25-1.5 pts to actively growing weeds 7-14 days before planting.

SPITFIRE or RIFLE-D (dicamba + 2,4-D) Site of Action: 4 + 4 ($3.90-7.80)

1.25-2.5 pt Spitfire 3.57L (0.078-0.156 + 0.48-0.96 lb ae)
1.25-2.5 pt Rifle-D 3.88L (0.156-0.313 + 0.45-0.9 lb ae)

Good burndown for most broadleaf weeds. Add 0.25-0.5% NIS and 2-4 qt UAN or 1 qt COC to improve burndown. Minimum carrier is 3 gpa for air and 5 gpa for ground. Plant corn at least 1.5 inches deep. Do not harvest or graze until corn has reached the milk stage or later.

PPS. Apply 1.25-2.5 pt 7-14 days before planting. Do not apply more than 2 pt/A on soil that has less than 2% O.M.

PRE. Apply 2-2.5 pt 3 to 5 days after planting but before corn emerges. Do not use this product preemergence if soil has less than 2 % OM.

AIM, ANTIK or LONGBOW (carfentrazone) Site of Action: 14 ($4.15-9.30)

0.5-1.0 oz Aim EC, Antik or Longbow 2L (0.008-0.016 lb ai)

Aim is a contact herbicide for broadleaf weeds. It has little or no residual activity. It controls kochia including glyphosate and ALS resistant. Velveteen control is excellent; it also controls black nightshade, redroot pigweed, and lambsquarters.

Ragweed and sunflower are less sensitive and require a tank-mix partner. Atrazine tank-mix adds control of weeds such as buffalobur, cocklebur, Venice mallow, and waterhemp. Performance on velveteen and waterhemp has been very good in SDSU tests. Crop tolerance is adequate.

Apply when weeds are 1-4 inches. Larger weeds may not be completely controlled with lower rate. Warm, humid conditions favor activity. Action on weeds is rapid, membrane disruption results in rapid necrosis. Minimum carrier is 10 gpa for ground or 3 gpa for aerial equipment. Add NIS at 2 pt/100 gal; COC at 1% may be used under very dry conditions but crop response (speckling) may be noted. Avoid concentration into leaf whorl. Avoid application within 8 hours of rain before or after application. There are no crop rotation restrictions for the following season.

BURNDOWN. For emerged weeds in no-till. Maximum rate is 2.0 oz/A total for preplant and in-crop use. Use COC additive. Additional burndown herbicide may be required for grass and large weeds.

POST. Postemergence up to 14 collars. For corn greater than V8, Aim can be applied with drop nozzles or as a directed spray at rates up to 2.0 oz per acre.

TANK-MIXES. May be tank-mixed with other labeled herbicides including 2,4-D amine, atrazine, dicamba, and glyphosate. Do not mix Aim with emulsifiable concentrate formulations, fertilizer, or additives other than given on label. Add Aim to the tank first. Refer to the label or section for each herbicide alone.

CADET (fluthiacet-methyl) Site of Action: 14 ($4.15-9.30)

0.4-0.9 oz Cadet 0.91L (0.003-0.009 lb ai)

Cadet is a PPO-inhibiting herbicide with a similar mechanism of action as Aim. The standard rate range is 0.6-0.9 fl oz/A depending on the size of the weeds. Use 0.4 oz/A when tank mixing with a glyphosate product. Controls some common broadleaf weed species, such as pigweed, waterhemp, lambsquarters, velvetleaf, and nightshade. Generally, controls
broadleaf weeds 2-6 inches tall, but may control velvetleaf up to 36 inches tall. Controls or injures weeds within 48 hours. Control may decline if weeds are large or not actively growing. May be tank mixed with several broadleaf or grass herbicides.

Thorough coverage is important to optimize control. Minimum carrier is 15 gpa for ground applications or 5 gpa for aerial applications. Use up to 40 gpa if canopy is dense. May use NIS (0.25% v/v), COC up to 2.5% v/v (recommended during dry conditions), or a silicone-based surfactant (0.25% v/v). May also add UAN at 1-2 qt/A or AMS. Do not irrigate or apply within 4 hours of precipitation. Do not harvest or feed forage until 30 days after application or harvest grain until 90 days after application. Do not mix or load within 50 feet of a well, sink holes, streams, rivers, lakes, or reservoirs.

**POST.** Apply to corn up to 48 inches tall or prior to tasseling, whichever comes first.

**PREMIX**

**SOLSTICE (fluthiacet-methyl + mesotrione)** Site of Action: 14 + 27

2.5-3.15 oz Solstice 4L (0.004-0.005 + 0.074-0.093 lb ai)

Premix containing 0.216 lb fluthiacet (Cadet) and 3.784 lb mesotrione (Callisto) intended for postemergence broadleaf control. May be tank-mixed with several postemergence herbicides.

COC at 0.5-1% v/v is the preferred adjuvant. NIS at 0.25% v/v can be used but control may be reduced. Also add UAN at 2.5% v/v or AMS at 8.5 lb/100 gal. Severe crop injury may result if MSO is used. Minimum carrier is 10 gpa ground or 15 gpa with dense cover. Do not apply aerially. Do not apply more than 5.25 oz/A per year. Do not apply at more than 28% N at 2 gal/100 gal or AMS at 2.5 lb per acre.

Corn may be planted any time after application. Sorghum, flax, millet, and oats may be planted immediately after corn harvest. Rotation interval is 4 months for wheat, barley, and rye; 10 months for canola, soybeans, and sunflowers; and 18 months for drybeans and most other crops.

**POST.** Apply up to the V8 growth stage. Performance is best when weeds are small.

**RESOURCE (flumiclorac)** Site of Action: 14 ($9.05-18.05)

4-8 oz Resource 0.86L (0.027-0.054 lb ai)

Resource is a contact herbicide used to control certain annual broadleaf weeds. Apply from the 2-leaf through 10-leaf crop stage. Count leaves with visible leaf collars. Velvetleaf is the most sensitive weed. Control has been very good in SDSU tests. Lambsquarters and ragweed also labeled for Resource alone. It is frequently used in a tank-mix.

Resource activity is enhanced by COC adjuvants. COC is added for Resource alone and in some tank-mixes. Addition of 28% N at 2 gal/100 gal or AMS at 2.5 lb per acre improves activity.

Minimum carrier is 15 gpa for ground and 7 gpa for aerial applications. Do not apply if rain is expected in 1 hour. Do not graze or use forage for 28 days after treatments. There are no crop rotation restrictions for the next season.

**POST.** Rates are 4-6 ft oz per acre. Use COC at 1 pt per acre. Rates up to 8 fl oz may be used with COC at 1 qt per acre applied with drop nozzles. Labeling includes velvetleaf up to 10-leaf stage.

**TANK-MIXES.** Tank-mixes include Accent, Basis, Beacon, Bromoxynil, dicamba, glyphosate (RR corn), Hornet, Liberty (LL Corn), Permit, Stinger and 2,4-D. Refer to label restrictions or the section for each herbicide.

**BASAGRAN, BASHAZON, BENTAZON 4, or BROADLOOM (bentazon)** Site of Action: 6 ($10.60-21.25)

1-2 pt Basagran, BashAzon, Bentazon 4, or Broadloom 4L (0.5-1 lb ai) 1.2-1.6 pt Basagran 5L (0.75-1 lb ai)

Excellent control of cocklebur. Very good control of sunflower and velvetleaf. Control is best on actively growing, small weeds. The 1.5 pt/A (4L) or 1.2 pt/A (5L) rate is for cocklebur under 6 inches, velvetleaf under 2 inches, and sunflower under 5 inches. Use the 2 pt/A (4L) or 1.6 pt/A (5L) rate for cocklebur under 10 inches, velvetleaf to 5 inches, and sunflower to 8 inches. For Canada thistle, use high rate and retreat if necessary.

Use COC at 1 qt in minimum of 10-20 gpa carrier with minimum of 40 psi pressure for ground and 1 pt COC per acre in minimum of 5 gpa at 40 psi for air. Velvetleaf control is improved with 28% N at 2 qt per acre as part of the carrier. Primarily for special situations where maximum crop safety is important. Drift to adjacent crops such as soybeans, small grain, or forage legumes does not cause visual harm. Do not graze for 12 days after application.

**POST.** Corn is usually at the 1- to 5-leaf stage when treated.

**TANK-MIXES.** Tank-mix Basagran with one of the following herbicides to expand weed spectrum: atrazine, Clarity, Outlook, Status, or Roundup (RR corn). Refer to label restrictions and directions for each herbicide.

**BROMOXYNIL PRODUCTS (bromoxynil)** Site of Action: 6 ($6.00-18.25)

0.75-2 pt bromoxynil 2L (0.18-0.5 lb ae)

Bromoxynil is available in several products, examples include Broclean, Brox, Maestro, Moxy and others.

Contact herbicide. Excellent for sunflower and cocklebur. Pigweed is somewhat tolerant. Velvetleaf control is variable; plants must be under 3-4 inches. Gives top growth burn on Canada thistle. Not intended as a rescue treatment for large weeds. No soil residual. Control is reduced if plants are under stress. Bromoxynil does not cause brittleness or lodging. No vapor drift. Some crop leaf burn is frequently noted. Symptoms disappear as new growth develops. Wet foliage and high temperature at time of spraying increase risk.
Bromoxynil alone is used at 1-2 pt per acre. Apply before weeds exceed the most susceptible stage; cocklebur (8 inches), sunflower (6 inches), wild buckwheat (6 inches), and nightshade (6 inches). Less susceptible weeds like pigweed, velvetleaf, and wild mustard require the higher rates and must be treated before they reach 2-4 inches, depending on species. Good coverage is important. Suggested carrier is 5 gpa for air or 10 gpa with ground equipment. Spray additives or liquid fertilizer may cause excessive crop leaf burn.

**PRE.** May be applied before planting to emerged weeds. Rate is 1-1.5 pt per acre.

**POST.** Optimum stage is 4- to 8-leaf. Bromoxynil at 1-1.5 pt per acre may be used from emergence to tassel. Rates of 1.5-2 pt per acre can be used after corn reaches the 4-leaf stage.

**TANK-MIXES.** Tank-mix combinations include atrazine, Accent, dicamba, Stinger and 2,4-D. Refer to other sections or product label. Refer to label for specific bromoxynil product for tank-mix and rate directions for that product.

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### DEADBOLT (bromoxynil + 2,4-D) Site of Action: 6 + 4

<table>
<thead>
<tr>
<th>0.6-1.6 pt Deadbolt 5.625L (0.188-0.5 + 0.23-0.625 lb ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Premix containing 2.5 lb bromoxynil and 3.125 lb 2,4-D ester per gallon. Do not graze or cut for feed within 45 days. Preharvest interval is 7 days. Avoid cultivation for 2 weeks after application. Do not use on light sandy soils.</td>
</tr>
<tr>
<td><strong>PPS.</strong> Apply 0.8-1.6 pt/A 7-14 days before planting.</td>
</tr>
<tr>
<td><strong>PRE.</strong> Apply 0.8-1.2 pt/A 3-5 days after planting but before crop emerges, plant corn as deep as practical.</td>
</tr>
<tr>
<td><strong>POST.</strong> Apply 0.6 pt/A from emergence to before tassel. May apply 0.9 pt/A after the 4-leaf stage. Use drop nozzles for corn that is greater than 8 inches tall.</td>
</tr>
</tbody>
</table>

### TOUGH 5EC (pyridate) Site of Action: 6

<table>
<thead>
<tr>
<th>24 oz Tough 5EC 5L (0.94 lb ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tough has a similar mode of action as Basagran or bromoxynil. It controls several broadleaf weed species such as common waterhemp, cocklebur, kochia, lambsquarters, redroot pigweed, sunflower, and others. Tough at 8-24 oz/A may be tankmixed with atrazine and other herbicides listed on the label to broaden weed spectrum. Follow adjuvant recommendations for specific tankmixes.</td>
</tr>
<tr>
<td>Add COC at 1-4 pt/A (do not exceed 2.5% v/v) or NIS at 0.25% v/v. May also add UAN at 2-4 qt/A or AMS at 2-4 lb/A.</td>
</tr>
<tr>
<td>Minimum water carrier volume is 15 gpa (20-30 gpa recommended) for ground equipment. Do not apply aerially. Do not apply more than 24 oz per year.</td>
</tr>
<tr>
<td>Corn and chickpeas may be replanted anytime. There are no rotation restrictions for other crops following a normal grain harvest.</td>
</tr>
<tr>
<td><strong>POST.</strong> Apply up to V8 corn or 68 days prior to harvest (whichever comes first). Apply to small weeds (&lt; 4-leaf stage).</td>
</tr>
</tbody>
</table>

### PERMIT, HALOMAX, HERBIVORE, PROFINE, PROMOTE or SANDEA (halosulfuron) Site of Action: 2

<table>
<thead>
<tr>
<th>0.67-1.33 oz Permit, Halomax, Herbivore, Profine 75, Promote or Sandea 75WSG (0.032-0.063 lb ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Permit is a sulfonyl-urea herbicide that controls annual broadleaf weeds. Permit provides very good to excellent control of cocklebur, sunflower, pigweed, velvetleaf, and common ragweed. Labeling also includes non-ALS kochia, Venice mallow, and smartweed. The higher rates control larger weeds and add yellow nutsedge and suppression of common milkweed. Control has been generally consistent in SDSU tests. There is no activity on annual grass.</td>
</tr>
<tr>
<td>Use the low rate for non-ALS kochia, pigweed, and Venice mallow up to 3 inches; cocklebur, common ragweed, and velvetleaf up to 9 inches, and sunflower to 12 inches. Control is more consistent if weeds are treated at early stages. Crop tolerance has been satisfactory.</td>
</tr>
<tr>
<td>Use NIS at 1-2 qt or COC at 1 gal per 100 gal per acre. Addition of 28% N at 4 gal/100 gal is allowed if required by a tank-mix partner. Minimum carrier is 10 gpa for ground or 3 gpa for air.</td>
</tr>
<tr>
<td>Treated fields may be rotated the next season to milo, field corn, winter or spring wheat. Allow 9 months for soybeans or alfalfa or 2 months for small grain or millet. Do not graze or harvest forage for 30 days after application. Do not make more than 2 applications or more than 2 2/3 oz/A per year.</td>
</tr>
<tr>
<td><strong>PRE.</strong> Apply 1.33-2 oz/A as a soil application. Plant only IR hybrids.</td>
</tr>
<tr>
<td><strong>POST.</strong> Apply 0.67-1.33 oz/A from spike through layby stage. Use drop nozzles for canopied corn.</td>
</tr>
<tr>
<td><strong>TANK-MIXES.</strong> Can be tank-mixed with dicamba, bromoxynil, atrazine, Accent, and others. Refer to label restrictions or the section for each herbicide.</td>
</tr>
</tbody>
</table>

### PREMIX

### YUKON (halosulfuron + dicamba) Site of Action: 2 + 4

<table>
<thead>
<tr>
<th>4-8 oz Yukon 67.5 WSG (0.031-0.063 + 0.138-0.275 lb ai)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yukon contains 12.5% halosulfuron (Permit) plus 55% dicamba. Yukon can be tank-mixed with atrazine, Accent, Armezon, bromoxynil, Callisto, glyphosate, Impact or Laudis. Minimum carrier is 10 gpa for ground or 5 gpa for air. Always add NIS at...</td>
</tr>
</tbody>
</table>
Weed Control

POST. Apply from spike to 36-inch corn. Drop nozzles recommended for corn 20 inches or taller.

**2,4-D** Site of Action: 4  
($0.80-9.40)

0.12-1 lb 2,4-D amine or ester

Less risk of vapor drift with amine formulations. Reduce risk of droplet drift by using less than 20 psi pressure and using at least 20 gpa carrier. Soybeans will be affected more at bloom stage. Sunflowers are more seriously affected as plant size increases. Windstorms may cause lodging or breakage. Hybrids vary in tolerance; however, hybrid susceptibility is also affected by growing conditions. Drop nozzles reduce risk of injury. Avoid cultivation for 7 days after spraying. Do not use wetting agents or other additives. Slightly higher rates will improve perennial weed control, but risk of injury increases.

EPP. May apply up to 0.5 lb ae/A at least 7 days prior to planting or 0.5-1 lb ae/A at least 14 days prior to planting.

PRE. May apply up to 1 lb ae/A after corn planting but prior to corn emergence in tilled fields. Seed furrow must be completely closed prior to application to avoid corn injury. Check labels for guidelines as labels may vary.

POST. Very good control of most emerged annual and perennial broadleaved weeds. Apply before crop is more than 4-5 inches tall for best tolerance. Corn tolerance has been acceptable with early postemergence applications in SDSU tests. Use drop nozzles if corn exceeds 8 inches (soil to tip of whorl leaf). Avoid application during the period of rapid elongation. Do not apply later than 1 week before silking. Risk of brittleness increases in cool and wet or hot and humid conditions.

HARVEST AID. Apply after silks are brown or after black-layer stage. Substantially reduces viability of cocklebur and sunflower seed if first flush was controlled in early season. Good retreatment for perennials. Excellent crop tolerance. Use 1 lb ae of ester or amine per acre with high-clearance sprayer. Check labels for aerial application. Do not harvest fodder or grain for 7 days following application.

### 2,4-D Rate Product Per Acre

*Rates for 2,4-D are stated as acid equivalent (ae) per acre. The amount of product varies according to the formulation.*

<table>
<thead>
<tr>
<th>Lb/ae Required</th>
<th>3.8L</th>
<th>5.7L</th>
<th>80% WSP</th>
<th>90% WSP</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.12</td>
<td>0.25 pt</td>
<td>0.17 pt</td>
<td>0.17 lb</td>
<td>0.15 lb</td>
</tr>
<tr>
<td>0.25</td>
<td>0.5 pt</td>
<td>0.33 pt</td>
<td>0.33 lb</td>
<td>0.3 lb</td>
</tr>
<tr>
<td>0.5</td>
<td>1 pt</td>
<td>0.66 pt</td>
<td>0.66 lb</td>
<td>0.6 lb</td>
</tr>
<tr>
<td>1</td>
<td>2 pt</td>
<td>1.33 pt</td>
<td>1.25 lb</td>
<td>1.1 lb</td>
</tr>
</tbody>
</table>

**STINGER, BITE, CLEAN SLATE, SPUR, or STIGMATA** (clopyralid) Site of Action: 4  
($4.40-13.25)

0.25-0.66 pt Stinger, Bite, Clean Slate, Spur or Stigmata 3L (0.094-0.25 lb ae)

0.15-0.4 pt Stinger HL 5L (0.094-0.25 lb ae)

Stinger is especially effective where Canada thistle is a major part of the weed problem. Lower rate provides seasonal suppression; 0.5-0.66 pt/A (0.2-0.4 pt/A Stinger HL) has been more effective and provides thistle stand reduction. It also controls ragweed, sunflower, and cocklebur. Crop tolerance is excellent. Apply in a minimum of 10 gpa carrier for ground equipment. Do not apply by aircraft.

Barley, canola, corn, flax, oats, turnip, and wheat can be planted anytime. Rotation interval is 10.5 months for alfalfa, safflower, and grain sorghum; 10.5 months for dry beans, soybeans, and sunflower for soil with greater than 2% O.M. and more than 15 inches precipitation in the preceding 12-month period; and 18 months for most other crops. Avoid drift to sensitive crops. Do not allow livestock to graze treated fields or harvest grain or silage within 40 days after treatment.

POST. Apply from crop emergence to 24 inches. Use drop nozzles to direct spray in larger corn. Thistles should be at least 4 inches but not at bud stage.

**COMMANDO** (clopyralid + 2,4-D) Site of Action: 4 + 4

2 pt Commando 2.38L (0.095 + 0.25 lb ai)

POST. Premix containing 0.38 lb clopyralid (Stinger) plus 2 lb 2,4-D amine per gal. The 2 pt rate provides the equivalent of 4 oz Stinger and 1 pt 2,4-D 4L per acre. Apply until the 5-leaf collar is visible or up to 8 inches. Do not apply late. Effective for Canada thistle and general broadleaves.

**STARANE ULTRA, COMET, FANCY, FLAGSTAFF or OBTAIN EC** (fluroxypyr) Site of Action: 4  
($7.15-12.40)

0.66 pt Comet 1.5L (0.12 lb ae)

0.66 pt Fancy 1.6L (0.13 lb ae)

0.4 pt Starane Ultra, Flagstaff or Obtain EC 2.8L (0.14 lb ae)

Starane Ultra is a translocated postemergence herbicide used to control certain broadleaf weeds. Fluroxypyr provides an alternative mode of action to control ALS resistant kochia biotypes. Labeling also includes cocklebur, sunflower, common ragweed, and Venice mallow. Mustard, Russian thistle, pennycress, wild buckwheat, and other broadleaves require combination treatments.
Weeds should be actively growing. Temperature below 45º and above 85º may result in reduced activity. Minimum carrier is 8 gpa for ground equipment. May also be applied by air. Do not graze or harvest forage for 47 days or harvest grain or stover for 90 days after application.

**BURNDOWN.** For no-till, may be tank-mixed with other herbicides for use prior to planting. Adjuvants are not usually used but may be added under dry conditions.

**POST.** Apply from emergence through 5-leaf collar stage.

**TANK-MIXES.** Starane Ultra or Comet may be applied in tank-mix combination with other herbicides registered for postemergence application in field corn.

### PREMIXES

**WIDEMATCH, COLT AS, FAR REACH or TRUSLATE** *(clopyralid + fluroxypyr)* Site of Action: 4 + 4 ($15.45)

1.33 pt Widematch, Colt AS, Far Reach or Truslate 1.5L (0.125 + 0.125 lb ai)

**POST.** WideMatch contains 0.75 lb clopyralid (Stinger) plus 0.75 lb fluroxypyr (Starane) per gal. The 1.33 pt rate provides the equivalent of 0.33 pt Stinger plus 0.66 pt Starane. Apply from crop emergence through 5-collar stage. Refer to Stinger and Starane sections for application information and restrictions.

**TRUMP CARD** *(fluroxypyr + 2,4-D)* Site of Action: 4 + 4

1-3 pt Trump Card 3.31L (0.083-0.248 + 0.33-1 lb ai)

Premix containing 0.66 lb ae fluroxypyr (Starane) and 2.65 lb ae 2,4-D per gallon. Use 1.5-3 pt/A preplant or preemergence depending on soil texture and organic matter. Apply 1-2 pt/A postemergence. NIS at 0.25% v/v may be used if required by post emergence tank mix partner. Adjuvants increase risk of crop injury.

Do not apply with liquid fertilizer. Use a minimum 3 gpa spray solution for aerial and 10-40 gpa for ground application. Allow a minimum of 3 weeks between a preplant or preemergence and a postemergence application of Trump Card. Do not graze or forage for 47 days. Do not harvest for 90 days after application.

**PPS.** Apply 14 days before planting to control small broadleaves or cover crops.

**PRE.** Apply 3-5 days after planting, but prior to crop or weed emergence.

**POST.** Apply 1-2 pt when weeds are small and to corn up to the V5 stage. After the V-5 crop stage, use drop nozzles and keep spray off corn foliage.

**KOCHIAVORE** *(2,4-D + bromoxynil + fluroxypyr)* Site of Action: 4 + 6 + 4 ($11.50-17.25)

1-1.5 pt Kochiavore 4L (0.21-0.31 + 0.21-0.31 + 0.084-0.126 lb ai)

Premix containing 1.67 lb 2,4-D, 1.67 lb bromoxynil, and 0.67 lb fluroxypyr per gallon. Provides control of several broadleaf weeds. Minimum carrier is 8 gpa for ground application.

Make only one preplant or preemergence application and only one postemergence application per season. Do not apply more than 1.5 pt/A per application or more than 3 pt/A per season. Do not apply on sandy soils. Do not harvest for 90 days following application. Do not graze or forage for 47 days.

**PPS.** Apply at least 7 days before planting. Do not till for at least 7 days.

**PRE.** Apply after planting but before corn emergence. Ensure seed furrow is closed.

**POST.** Apply from the V3 to V5 growth stage. Do not tank-mix with atrazine, crop oil or other adjuvants.

**STARANE NXT** *(fluroxypyr + bromoxynil)* Site of Action: 4 + 6 ($12.15-23.80)

14-27.4 oz Starane NXT 2.9L (0.063-0.125 + 0.25-0.5 lb ai)

Premix containing 0.58 lb fluroxypyr (Starane) and 2.33 lb bromoxynil per gallon. Apply from preplant to the V5 growth stage. The addition of additives may result in excessive crop response. Do not apply more than 0.5 lb bromoxynil or more than 0.25 lb fluroxypyr per season; which is equivalent to the full labelled rate. Do not graze or cut for feed or fodder for 45 days. Do not rotate to labeled crops for 1 month or other crops for 4 months.

**PPS or PRE.** Apply 14-21 oz from before planting to before emergence.

**POST.** Apply 14 oz from emergence up to and including V5 or 21-27.4 oz from V4-V5.

**VIDA** *(pyraflufen)* Site of Action: 14 ($2.20-8.90)

0.5-2 oz Vida 0.2L (0.0008-0.0032 lb ai)

Vida is a non-residual treatment for emerged weeds prior to planting corn or epost as a tank-mix partner. It has activity on broadleaf weeds including cocklebur, sunflower, lambsquarters, pigweed, Russian thistle, wild buckwheat, and wild mustard. Vida is used primarily in a tank-mix with glyphosate. Results used alone have been variable; especially for kochia. Minimum carrier is 10 gpa for ground or 5 gpa for air. Labeled crops (corn, wheat, soybeans) may be planted immediately; allow 30 days for other food crops. Do not harvest for silage for 50 days or harvest for grain or stover for 90 days after application.

**BURNDOWN.** Apply 0.5-2 oz/A. Tank-mix with other labeled herbicides for larger weeds.
EPOST. Apply 0.5-1 oz from VE-V4 corn. Do not use COC. Do not apply more than 1 oz/A per crop season. May cause some initial crop response.

PARAQUAT PRODUCTS *(paraquat)* Site of Action: 22 Restricted Use Pesticide

2-4 pt Gramoxone SL 2.0 (0.5-1 lb ai) ($7.40-20.80)
1.3-2.7 pt Bonedry, Devour, Gramoxone SL 3.0, Helmaquat, Paraquat, Para-Shot 3.0 or Parazone 3L (0.5-1 lb ai)

**BURNDOWN.** Paraquat is a non-selective, non-residual, contact herbicide used at plantings to control emerged grasses and broadleaves and topgrowth of perennials. Rates of 2-2.5 pt/A (2L) or 1.3-1.7 pt/A (3L) are adequate for most small weeds; high rate is for larger weeds (over 6 inches) or dense stands. Apply in a minimum of 10 gpa for ground or 5 gpa for air. NIS is important. Most mixtures with atrazine require surfactant at 1 pt/100 gal. Use 2 pt/100 gal with most combinations if nitrogen fertilizer carrier is used. Liquid fertilizer containing phosphorus will reduce paraquat activity. Paraquat is highly toxic when ingested; follow handling and safety precautions.

**TANK-MIXES.** Gramoxone may be tank-mixed in burndown treatments with postemergence and preemergence residual herbicides labeled for corn.

1-2 pt Gramoxone SL 2.0 (0.25-0.5 lb ai) ($4.00-10.05)
0.7-1.3 pt Bonedry, Devour, Gramoxone SL 3.0, Helmaquat, Paraquat, Para-Shot 3.0 or Parazone 3L (0.25-0.5 lb ai)

**POST DIRECTED.** Use paraquat as a directed spray. Provides a salvage option when weeds cannot be controlled with cultivation. Apply when corn is at least 10 inches. Arrange nozzles to spray no higher than the lower three inches of the corn stalk. Coverage is especially important for dense or tall weeds.

GLYPHOSATE PRODUCTS *(CONVENTIONAL CORN)* Site of Action: 9 ($3.90-14.50)

Glyphosate is available in several products having different formulations and different amounts (lb) of acid equivalent (ae) and active ingredients (ai).

<table>
<thead>
<tr>
<th>Glyphosate Concentration</th>
<th>Rate for 0.38-3.75 lb ae/A</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 lb ae</td>
<td>16 oz-5 qt</td>
</tr>
<tr>
<td>4 lb ae</td>
<td>12 oz-3.75 qt</td>
</tr>
<tr>
<td>4.5 lb ae</td>
<td>11 oz-3.3 qt</td>
</tr>
</tbody>
</table>

Glyphosate is a non-selective translocated herbicide with no soil residual weed activity. It controls both grasses and broadleaf species. Some products contain adequate surfactant, others require NIS. AMS at 8.5-17 lb/100 gal is required, especially if poor water quality, cool weather, or moisture stress may reduce control. Check crop use and application directions on the product being used. Refer to section for Herbicide Resistant Corn for in-crop use.

Glyphosate rates in this section are listed for products having 3 lb acid equivalent (4 lb ai). Use the chart below to adjust for other concentrations.

| Glyphosate Products-Equivalent Rates Amount of product (oz) for equivalent lb ae |
|--------------------------------------|-------------------------------|
| Formulation                        | 0.38 ae | 0.75 ae | 1.5 ae | 3 ae |
| 3 lb ae (4 lb ai)                  | 16      | 32      | 64     | 128  |
| 4 lb ae (5.4 lb ai)                | 12      | 24      | 48     | 96   |
| 4.5 lb ae (5.5 lb ai)              | 11      | 21      | 43     | 85   |
| 4.8 lb ae (5.88 lb ai)             | 10      | 20      | 40     | 80   |

**BURNDOWN.** Weeds should be growing actively. Water having more than 500 ppm combined calcium, magnesium, or iron may reduce activity: especially at high carrier volumes. Daytime temperatures below 55ºF may also reduce activity. Avoid tillage for one day after treating annuals: 3-7 days for perennials. Carrier is 3-40 gpa for ground and 3-15 gpa for air. Maximum rate for air is 1 qt of 3 lb product. Use caution to avoid droplet drift to non-target crops. Follow cleanup procedures to avoid crop damage from equipment contamination.

The amount required varies according to weed species and size. Green foxtail, mustard, sandbur seedlings, and volunteer wheat seedlings are more susceptible than many other species. Suggested rate for glyphosate 3 lb ae product is 16 oz for most small annuals; 12 oz per acre may be adequate for some situations. Use 20-24 oz per acre for larger or more tolerant annuals. Rates of 32-48 oz is for perennials.

**SPOT TREATMENT.** Use 2-4 qt of 3 lb ae per acre to control small patches of perennial weeds such as quackgrass or Canada thistle. It is usually applied with hand-held equipment. Crop contacted by spray or drift will be damaged or killed.

**PREHARVEST.** Several glyphosate products are labeled for preharvest use. Applications must be made 7 days prior to harvest and when grain moisture is 35% or less or corn has reached physiological maturity and maximum kernel fill is complete.

Ground or aerial applications. Do not apply preharvest to corn grown for seed.

**TANK-MIXES** Glyphosate products are frequently used in tank-mix or premix combinations as preemergence soil-applied burndown treatments in no-till systems. Refer to specific glyphosate or tank-mix partner product label for approved herbicide combinations. For improved burndown, glyphosate may be tank-mixed with 2,4-D or dicamba and applied at least 7 days prior to planting.
HERBICIDE RESISTANT CORN

Herbicides for use only on herbicide resistant corn hybrids are listed in this section. Herbicides listed for standard corn may also be used in weed control programs for herbicide resistant corn.

GLYPHOSATE TOLERANT CORN

GLYPHOSATE PRODUCTS Site of Action: 9 ($7.80-14.50)

ROUNDUP READY, ROUNDUP READY 2, or GLYPHOSATE TOLERANT CORN

Glyphosate is a non-selective, translocated herbicide with no soil residual weed activity. Glyphosate controls most annual grasses and broadleaves; it is especially useful for perennial weeds. Control of Canada thistle, field bindweed, and milkweed has been very good. Weed control in SDSU tests has been very good. Crop canopy and crop residue help reduce late weed flushes. Programs should provide early grass control and adequate control of late emerging weeds. Consider using residual planting-time herbicide, split postemergence, or cultivation. Heavy foxtail densities should be controlled early (3-4 weeks after planting).

Only glyphosate products licensed and labeled for use with Roundup Ready (RR/GT) or Roundup Ready 2 (RR2) hybrids may be used. Check labels to ensure the corn you are planting and the postemergence glyphosate product you are using can be used together. Some glyphosate products are only labeled for use on RR2 corn. RR2 hybrids allow for higher use rates not labeled for RR corn which may cause injury. Products having different formulations and different amounts (lb) of acid equivalent (ae) and active ingredient (ai) are listed below.

<table>
<thead>
<tr>
<th>Glyphosate Concentration</th>
<th>Trade Names</th>
<th>Rate for (0.5-0.75 lb ae/A)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 ae, 4 ai</td>
<td>Buccaneer (Plus), Cornerstone Plus, Credit 41 Extra, Eraser A/P, Four Power Plus, Glyphogan (Plus), Glyphosate 4 Plus, Gly Star Original, GlySupreme Plus, Honcho Plus, Mad Dog (Plus), Makaze (Yield Pro), Showdown, Slam 41 Plus, Sunphosate 41%, Tomahawk 4, Top Dog Glycel 41% Plus</td>
<td>24-32 oz</td>
</tr>
<tr>
<td>4 ae</td>
<td>Buccaneer 5 Extra, Cinco, Cornerstone 5 Plus, Credit 5.4 Extra, Duramax, Durango DMA, Glyphosate 5.4, Gly Star 5 Extra, Mad Dog 5.4, Slam 54 extra, Tomahawk 5</td>
<td>18-24 oz</td>
</tr>
<tr>
<td>4.5 ae, 5.5 ai</td>
<td>Abundit Edge, Bullzeye, Gly Star K-Plus, Honcho K6, Mad Dog K6, Roundup PowerMax, Roundup WeatherMax, RT 3</td>
<td>16-21 oz</td>
</tr>
<tr>
<td>4.5 ae, 5.8 ai</td>
<td>Credit Xtreme</td>
<td>16-21 oz</td>
</tr>
<tr>
<td>4.8 ae, 5.88 ai</td>
<td>Roundup PowerMax 3</td>
<td>13.3-20 oz</td>
</tr>
</tbody>
</table>

POST. Apply to Roundup Ready (RR) or Roundup Ready 2 (RR2) corn from emergence through the V8 stage (8 leaves with collars) or until corn height reaches 30 inches, whichever comes first. The “event” used in developing RR2 hybrids provides a resistance level that allows higher glyphosate rates if required. Avoid drift. Extreme care must be taken to prevent injury to desirable and non-target plants and crops that do not contain genetic tolerance to glyphosate. Follow cleanup procedures to avoid crop damage from equipment contamination.

For Roundup Ready 2 (RR2) only. Drop nozzles suggested when corn height is 24-30 inches. Drop nozzles required when corn is 30-48 inches. Do not make a preharvest application if a combined total of 1.5 lb ae has previously been applied over the top or with drop nozzles.

Carrier is 5-20 gpa for ground and 3-15 gpa for air. Add 8.5-17 lb AMS/100 gal. Allow at least 50 days between application and harvest of corn forage and 7 days between application and harvest of corn grain. Allow a minimum of 10 days between in-crop applications.

Sequential in-crop application of glyphosate can be applied according to the maximum rates shown below.

<table>
<thead>
<tr>
<th>Maximum Glyphosate Rates – Roundup Ready Corn Use the chart below to adjust for concentrations.</th>
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<tbody>
<tr>
<td>Formulation</td>
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<td></td>
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<tr>
<td>3 lb ae products</td>
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<td>4 lb ae products</td>
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<tr>
<td>4.5 lb ae products</td>
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<tr>
<td>4.8 lb ae products</td>
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</table>

TANK-MIXES – RR/RR2
PRE. Glyphosate products list several preemergence tank-mixes. Labeling for many preemergence residual or postemergence burndown products used prior to crop emergence includes tank-mixes with glyphosate.

POST. Glyphosate products and potential tank-mix partners include labeling for several postemergence tank-mixes. Product
(labels vary considerably. Labeling may be on the glyphosate product or the tank-mix partner. Tank-mixes listed include herbicides that provide preemergence residual or postemergence activity in tank-mixes with glyphosate, acetochlor (Harness, Surpass, Keystone etc.) products, metolachlor (Dual, Cinch etc) products, Aim, Armezon, Basis, Cadet, Callisto, Capreno, Clarity, dicamba, Horned, Impact, Instigate, Laudis, Lumax EZ, Outlook, Permit, Realm Q, Resource, Status, Stinger, and 2,4-D. Consult your product label or supplemental labels that may apply.

LIBERTY LINK CORN

**GLUCOSINATE PRODUCTS** *(glucosinate) (LibertyLink Corn)* Site of Action: 10 ($17.60-28.80)

29-43 oz Autonomy, Cheetah, Fever, Forfeit 280, Glufosinate 280SL, Interline, Liberty, Noventa, Nullify A/P, Reckon 280SL, Refer 280, Total SL or Surmise 2.34L (0.53-0.79 lb ai)

Liberty 280 (glufosinate) may only be applied postemergence to Liberty Link corn. Glufosinate product use directions may vary. Follow directions for product used. Provides broad spectrum grass and broadleaf weed control. Use higher rates or tank-mix partners to control field sandbur, marestail, common waterhemp and Russian thistle. Weed control from Liberty may be reduced by adverse weather conditions, such as drought or cool temperatures. Coverage is important for Liberty. Minimum carrier rate is 15 gpa for ground or 10 gpa for aerial applications. For heavy weed or crop canopies increase carrier to 20 gpa. Do not use nitrogen solutions as spray carriers. Do not use nozzles or pressures that result in coarse spray droplets. Add AMS at 3 lb/A (17 lb/100 gallons). Reduce AMS rate to 1.5 lb/A (8.5 lb/100 gallons) when temperatures exceed 85°F. Additional surfactants or crop oils may increase the chance of corn injury.

Applying a preemergence herbicide is recommended to reduce weed competition. For Liberty and most other glucosinate products, 1 burndown and 2 in-crop applications can be made per growing season up to a maximum of 87 oz/A. Do not apply to corn stressed from weather conditions, such as drought, excessive rainfall, etc. For best results, apply when weeds are actively growing to small weeds (≤3 inches). Heavy dew or fog may reduce efficacy. Rainfast within 4 hours after application. Apply between dawn and 2 hours before sunset to avoid reduced control of common lambsquarters and velvetleaf. Do not apply within 60 days of harvesting corn for forage or within 70 days of harvesting for grain. Corn, soybeans and canola may be planted anytime. Rotational interval is 70 days for barley, oats, rye, triticale and wheat, and 180 days for most other crops.

Several tank-mix options, such as atrazine, residual grass herbicides (pendimethalin, acetochlor, metolachlor), growth regulator herbicides (2,4-D, Status), HPPD-inhibiting or “bleacher” herbicides (Laudis, Impact, Callisto), ALS-inhibiting herbicides (nicosulfuron, Python, Permit, Yukon), and others (see label).

**PPS**. May be applied prior to planting conventional or transgenic corn. Apply 29-43 oz/A (Autonomy, Glufosinate 280, Liberty, Noventa 32-43 oz/A).

**POST**. Apply 29-43 oz/A (Interline 22-43 oz) from emergence up to V6 corn. Can apply most products with drop nozzles to corn up to 36 inches. May apply a second application of 29 oz/A for Cheetah, Forfeit 280, Nullify, Reckon 280, Total SL, Surmise; 32 oz/A for Liberty, Autonomy, Glufosinate 280, Noventa; 29-43 oz/A for Fever, Refer 280; or 22-43 oz/A for Interline. Wait 7 days (10 days Cheetah) between applications. Use 29-43 oz/A (22 oz/A for Liberty, Autonomy, Glufosinate 280, Noventa) with tank-mix partners. No additional surfactant is required for tank-mixes. Do not apply more than 87 oz/A per year.

**PREMIX**

**SINATE** *(glucosinate + topramezone)* Site of Action: 10 + 27 ($30.85-41.15)

21-28 oz Sinate 2.48L (0.41-0.54 + 0.016-0.022 lb ai)

Premix containing 2.47 lb glucosinate and 0.1 lb topramezone per gallon. Minimum carrier is 15 gpa for ground and 10 gpa for aerial application. Add MSO (1%) and AMS (3 lb/A). COC (1%) may be used in place of MSO.

Do not apply more than 28 oz/A per year. Do not harvest forage for 60 days. Do not harvest grain or fodder for 70 days. Rotation interval for 28 oz/A is 3 months for small grains (wheat, barley, oats, rye); 9 months for alfalfa, sorghum, soybean and sunflower; and 18 months for canola, dry bean, flax, pea and most other crops.

**POST**. Apply 21-28 oz from emergence up to 24 inches tall or V7 growth stage (whichever occurs first). Recommended rate is 24-28 oz. Tank mix with atrazine for enhanced control. Apply to small weeds (<3-4”).
ENLIST DUO *(glyphosate + 2,4-D choline)* Site of Action: 9 + 4  ($23.75-32.25)

3.5-4.75 pt Enlist Duo 3.3L (0.75-1 + 0.7-0.95 lb ai)

Premix of glyphosate (DMA salt) and 2,4-D choline. Enlist Duo may be applied preplant or preemergence to Enlist corn and to corn that does not contain the Enlist trait. Only apply postemergence to corn that has the Enlist trait. Provides control of emerged grass and broadleaf weeds. Apply 3.5-4.75 pt for weeds that are 3-6 inches tall. Check label for recommendations on specific weeds.

Follow nozzle and buffer zone requirements to minimize off-target movement. Make applications a minimum of 48 hours before predicted rainfall that may result in runoff. Follow the directions in the “Mitigation Measures” table of the label to reduce runoff potential. Check [epa.gov/espp/](http://epa.gov/espp/) less than 6 months before application for endangered species bulletins that may have additional directions for product use.

Use a minimum of 10 gpa for ground application. Not labeled for aerial application. Burndown treatments in non-Enlist corn not recommended for light sandy soils. Do not apply more than 4.75 pt/A per application or more than 9.5 pt/A per season (for burndown in non-Enlist corn) or 14.25 pt/A per season (Enlist corn). Only tank-mix with products listed on Enlist.com/TankMix.

**PPS.** (Enlist corn) Apply any time before planting.

(Non-Enlist corn) Apply 7-14 days before planting.

**PRE.** (Enlist corn) Apply any time after planting but before emergence.

(Non-Enlist corn) Apply 3-5 days after planting but before corn emergence.

**POST.** Apply 4.75 pt to Enlist corn up to the V8 growth stage or 30 inches tall. May apply with drop nozzles to 30-48-inch corn. Do not make more than 2 postemergence applications with at least 12 days between applications.

ENLIST ONE (2,4-D choline) Site of Action: 4  ($12.80-17.05)

1.5-2 pt Enlist One 3.8L (0.71-0.95 lb ai)

Provides flexible tank mix options with glyphosate or glufosinate products (see EnlistTankMix.com for complete list of approved tank mix partners) for applications in Enlist corn. Contains “Colex-D Technology” to reduce drift.

Follow nozzle and buffer zone requirements to minimize off-target movement. Make applications a minimum of 48 hours before predicted rainfall that may result in runoff. Follow the directions in the “Mitigation Measures” table of the label to reduce runoff potential. Check [epa.gov/espp/](http://epa.gov/espp/) less than 6 months before application for endangered species bulletins that may have additional directions for product use.

Apply with water carrier at 10-15 gallons per acre. Not labeled for aerial applications. Only tank-mix with products listed on Enlist.com/TankMix.

**PPS.** (Non-Enlist/Enlist corn). Apply 1.5-2 pt/A prior to corn emergence. Do not apply more than one PPS application per season. For best results, do not apply to light sandy soils in non-Enlist corn.

**POST.** (Enlist corn). Apply 2 pt/A when weeds are small (less than 6 inches) and not after the V8 corn growth stage or 30-inch-tall corn (whichever comes first). Later applications in 30-48 inches tall corn require drop nozzles. Do not apply more than 2 POST applications per season with at least 12 days between applications. Do not apply more than 2 pt/A per application. See label for additional restrictions.

ASSURE II *(quizalofop)* Site of Action: 1  ($4.15-9.90)

5-12 oz Assure II 0.88L (0.03-0.08 lb ai)

For use in Enlist corn only. Provides control of annual and perennial grasses. Also controls volunteer corn without the Enlist trait. Add COC (1%) or NIS (0.25%). May be tank mixed with other herbicides; consult website (EnlistTankMix.com/ ASSUREII) for approved options.

Maintain a 36 foot downwind buffer. Do not apply more than 2 applications or 12 oz/A per year. Do not graze for 30 days. Do not harvest forage for 30 days. Do not harvest grain or stover for 79 days. May rotate to Enlist corn and other labeled crops anytime. Do not rotate to unlabeled crops for 120 days.

**POST.** Apply to Enlist corn from the V2 to V6 stage. Apply to actively growing weeds.
CLEARFIELD CORN

THUNDER (*imazethapyr*) (**CLEARFIELD** CORN) Site of Action: 2

4 oz Thunder 2L (0.06 lb ai)

For use only on Clearfield corn hybrids. Thunder provides very good to excellent control of emerged weeds and has extended soil residual. Controls foxtail, sunflower, velvetleaf, cocklebur, non-ALS kochia, wild buckwheat, nightshade, and other annuals. Dicamba, atrazine, or other broadleaf herbicide is required for more consistent lambsquarters, common waterhemp, ALS resistant kochia or common ragweed control.

Minimum carrier is 10 gpa for ground or 5 gpa for air. Add MSO at 1% v/v or COC at 1.25% v/v or NIS at 0.25% v/v. Add 28% N at 1.25-2.5% v/v or AMS at 12-15 lbs/100 gal. Refer to additive limitations that apply to tank-mix partners. Do not use liquid fertilizer as the carrier. See label for precautions and restrictions when using corn insecticides. Do not make more than one application per year.

Rotation restrictions are 4 months for alfalfa, edible beans, peas, rye and wheat; 8.5 months for non-Clearfield corn; 9.5 months for barley; 18 months for oats, sorghum, safflower, sunflower, sweet corn; 26 months for flax and potatoes; and 40 months for crops not listed on the label.

**EPP, PPI or PRE.** Apply 4 oz/A.

**POST.** Results are best on small weeds, usually 2-3 inches. Allow 45 days before grazing or harvesting silage, forage or grain.

**TANK-MIX/SEQUENTIAL.** For heavy grass pressure, Thunder may be used following soil applied herbicides such as Harness, Prowl, Dual, or Outlook. Thunder may be tank-mixed with other herbicides, including 2,4-D, Accent, atrazine, Banvel, Basagran, bromoxynil, Clarity, Outlook, or Prowl. Consult the label or section for each product.
### WEED RESPONSE to CORN HERBICIDES

Weed control percentages are intended as a guide for comparing alternatives. Percentages are estimated based on favorable conditions.

<table>
<thead>
<tr>
<th>Herbicide</th>
<th>Green foxtail</th>
<th>Yellow foxtail</th>
<th>Barnyardgrass</th>
<th>Field sandbur</th>
<th>Wooly cupgrass</th>
<th>Wild mustard</th>
<th>Wild buckwheat</th>
<th>Kochia (ALS)</th>
<th>C. papaya</th>
<th>Lambsquarters</th>
<th>Pigweed</th>
<th>Water hemp</th>
<th>Smartweed</th>
<th>Nightshade</th>
<th>Cocklebur</th>
<th>Sunflower</th>
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<td>Zidua</td>
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</table>

**PP/PRE:**

- Acetochlor
- Acuron
- Atrazine
- Balance Flexx
- Calisto
- Corvus
- Calibracoyote
- Instigal
- Lumax
- Maverick
- Metolachlor
- Outlook
- Python
- Resicore
- Rimsulfuron
- Sharpen
- Surestart II
- Verdict
- Zidua

**POST:**

- Accent Q
- Aim
- Atrazine+oil
- Basagran
- Basis
- Bromoxylin
- Cadet
- Callisto
- Capreno
- Clarity/Digloxx
- Glyphosate
- Horset
- Impact/Armezon
- Laudis
- Liberty/Cheetah
- Maverick
- Permit
- Realm Q
- Resicore
- Resolve Q
- Resource
- Starane
- Status
- Steadfast Q
- Stinger
- WideMatch
- 2,4-D

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<th>Weed</th>
<th>Excellent</th>
<th>Good</th>
<th>Fair</th>
<th>Marginal</th>
<th>Poor</th>
<th>None</th>
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<tbody>
<tr>
<td>10-9</td>
<td>90-99%</td>
<td>80-90%</td>
<td>70-80%</td>
<td>50-70%</td>
<td>&lt;50%</td>
<td>No control</td>
</tr>
<tr>
<td>8-7</td>
<td>Usually over 90%</td>
<td>Usually satisfactory</td>
<td>Sometimes under 70%</td>
<td>Seldom over 70%</td>
<td>Usually under 50%</td>
<td>Not effective</td>
</tr>
<tr>
<td>6</td>
<td>Best choice for weed control</td>
<td>Usually satisfactory</td>
<td>Sometimes unsatisfactory</td>
<td>Seldom satisfactory</td>
<td>Not effective</td>
<td>No control</td>
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</table>
In South Dakota, several insects can reduce corn yields. For the most part, Bt-corn hybrids are an effective form of management. However, some minor or sporadic pests occasionally require additional treatment. As for all insect pests, base insecticide application decisions on scouting and the economic thresholds established for individual pests.

A major concern associated with applying insecticides is the development of insecticide resistance by the targeted insect population. To reduce the probability of resistance development, insect management plans should include insecticides with different modes of action. This can involve using multiple insecticides with different modes of action or using a single insecticide that has two or more active ingredients that vary in their modes of action. In addition to rotating insecticides, rotate crops periodically to a non-host crop for the targeted insect population. Crop rotation can reduce the need for insecticides to manage insect pests. The goal of these strategies is to reduce the selection pressure on the targeted insect populations and prevent the development of insecticide resistance.

The insecticides presented in this chapter are restricted use, which means that applicators must have a license issued by the state of South Dakota to purchase and apply these products. When applying insecticides, be sure to follow insecticide labels carefully and always wear the appropriate personal protective equipment to reduce personal exposure. Remember, the label is law and any deviation from the label is considered unlawful. Do not apply insecticides for insects that are not listed on the label.

When choosing an insecticide, refer to labels for precise rates based on observed pest insects. The rates in this book are general and may not directly reflect the rate required for management. Always follow the labeled recommended rates for a crop and insect pest, and never go under or over the recommended rates listed on a label.

On August 21, 2021, the U.S. Environmental Protection Agency (EPA) published a final rule revoking all food tolerances for the active ingredient chlorpyrifos. The tolerances for any chlorpyrifos residues present on products expired February 28, 2022. No applications of chlorpyrifos should occur on crop fields.

The products in this chapter are presented as follows:

<table>
<thead>
<tr>
<th>Trade name(s)</th>
<th>Chemical common name</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mode of action: Group code (chemical class)</td>
</tr>
</tbody>
</table>

Additional resources regarding insecticide safety include:
- IRAC Insecticide Resistance Action Committee (http://www.irac-online.org/modes-of-action/)
- EPA United States Environmental Protection Agency (https://www.epa.gov/pesticide-worker-safety)
- South Dakota Department of Agriculture (https://sdda.sd.gov/ag-services/pesticide-program/)

### Insecticide Modes of Action

<table>
<thead>
<tr>
<th>Mode of Action Group Number</th>
<th>Insecticide Class</th>
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<tbody>
<tr>
<td>1A</td>
<td>carbamate</td>
</tr>
<tr>
<td>1B</td>
<td>organophosphate</td>
</tr>
<tr>
<td>3A</td>
<td>pyrethroid, pyrethrin</td>
</tr>
<tr>
<td>4A</td>
<td>neonicotinoid</td>
</tr>
<tr>
<td>4D</td>
<td>butenolides</td>
</tr>
<tr>
<td>5</td>
<td>spinosyn</td>
</tr>
<tr>
<td>8D</td>
<td>borates</td>
</tr>
<tr>
<td>10A</td>
<td>hexythiazox</td>
</tr>
<tr>
<td>10B</td>
<td>etoxazole</td>
</tr>
<tr>
<td>18</td>
<td>diacylhydrazine</td>
</tr>
<tr>
<td>23</td>
<td>tetroic and tetramic acid derivatives</td>
</tr>
<tr>
<td>28</td>
<td>diamide</td>
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</table>
Check list of insects managed by each foliar-applied insecticide

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Fall armyworm</th>
<th>True armyworm</th>
<th>Yellow striped armyworm</th>
<th>Black cutworm</th>
<th>Western bean cutworm</th>
<th>Corn earworm</th>
<th>Common stalk borer</th>
<th>Corn rootworm</th>
<th>European corn rootworm</th>
<th>Western corn rootworm</th>
<th>Flea beetle</th>
<th>Japanese beetle</th>
<th>Grasshopper</th>
<th>Corn leaf blotter</th>
<th>Stink bug</th>
<th>Two-spotted spider mite</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alpha-cypermethrin (Fastac CS, Fastac EC)</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
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<tr>
<td>Beta-cyfluthrin (Baythroid XL)</td>
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<tr>
<td>Bifenthrin (Alpine, Batallion 2EC, Batallion LFC, Bifen 2 AG Gold, Bifen 2EC Select, Bifender FC, Bifenithrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture LFR, COMA RTU, Discipline 2EC, Ethox XB, Fanfare EC, Fanfare ES, Lancer 2EC, Reveal, Reveal Endurx, Sniper, Sniper Helios, Sniper LFR, Strict, Tigris Bifenthrin LFC, Tundra EC, Willowood Bifenthrin 2EC, Xpedient Plus V)</td>
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<tr>
<td>Carbaryl (Carbaryl 4L, Sevin 4F, Sevin XLR Plus)</td>
<td>+</td>
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<tr>
<td>Chlorantraniliprole (Coragen, Lumivia, Prevathon)</td>
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<tr>
<td>Chlorantraniliprole + Bifenthrin (Elevest)</td>
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<tr>
<td>Cinnamaldehyde (Seicain)</td>
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<tr>
<td>Cyfluthrin (Sultrus, Tombstone, Tombstone Helios)</td>
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<td>Deltamethrin (Delta Gold)</td>
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<td>Dimethoate (Dimate 4E, Dimethoate 4E, Dimethoate 400, Dimethoate 400 EC, Dimethoate 4EC, Dimethoate LV-4)</td>
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<td>Etoxazole (Zeal Miticide-1, Zeal SC)</td>
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<td>Flupyridifurone (Sivanto HL, Sivanto 200 SL, Sivanto Prime)</td>
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<tr>
<td>Gamma-cyhalothrin (Declare, Proaxis)</td>
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<td>Hexythiazox (Hexy 1E, Onager, Onager Optek)</td>
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<td>Lambda-cyhalothrin + Chlorantraniliprole (Besiege)</td>
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<tr>
<td>Malathion (Fyfanon ULV AG, Fyfanon, Fyfanon 57% EC, Malathion 5, Malathion 5EC, Malathion 8 Aqualmul, Malathion 57%, Malathion ULV)</td>
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<td>Methomyl (Corida 29 SL, Corida 90 WSP, Lannate LV, Lannate SP, Lannve LV Nudrin LV, Nudrin SP)</td>
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<td>Methoxyfenozide (Inspirato 2F, Intrepid 2F, Invertid 2F, TurnStyle, Vexor, Zylo)</td>
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<td>Sodium Tetraborohydrate Decahydrate (Prev-Am)</td>
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<td>Spinetoram (Radiant SC)</td>
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<td>Spiromesifen (Oberon 2SC)</td>
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<tr>
<td>Spinosad (Blackhawk, Entrust, Entrust SC, Tracer)</td>
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<tr>
<td>Spinosad + Gamma-cyhalothrin (Conservo)</td>
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<tr>
<td>Zeta-cypermethrin (Mustang, Mustang Maxx)</td>
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<tr>
<td>Zeta-cypermethrin + Bifenthrin (Hero, Hero EW, Steed)</td>
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</tr>
</tbody>
</table>

* = provides protection  
- = Does not provide protection
Check list of insects managed by each soil-applied insecticide

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Northern corn rootworm</th>
<th>Western corn rootworm</th>
<th>Grubs</th>
<th>Seedcorn beetle</th>
<th>Seedcorn maggot</th>
<th>Wireworm</th>
<th>True armyworm</th>
<th>Cutworm</th>
<th>Common stalk borer</th>
<th>Soybean gall midge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Alpha-cypermethrin (Fastac CS, Fastac EC)</strong></td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td><strong>Beta-cyfluthrin (Baythroid XL)</strong></td>
<td>-</td>
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<td><strong>Bifenthrin (Alpine, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture 3RIVE 3D, Capture LFR, COMA RTU, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare ES, Lancer 2EC, Manticor LFR, Nirvana RTU, Reveal, Revealex, Ruckus LFR, Seguro, Sniper, Sniper Helios, Sniper LFR, Strict, Temtril LFR, Tepera Plus, Tigris Bifenthrin LFC, Tundra EC, Xpedient Plus V)</strong></td>
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<td><strong>Cyfluthrin (Sultrus, Tombstone, Tombstone Helios)</strong></td>
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<td><strong>Lambda-cyhalothrin (Cavalry II, Crusader 1EC, Crusader 2ME, Grizzly Too, Kendo, L-C Insecticide, Lambda Select, Lambda T, Lambda T-2, Lambda-Cy AG, Lambda-Cy 1EC, Lambda-Cy EC, Lambda-Cyhalothrin 1EC, LambdaStar 1CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm VC, Province II, Ravage, Ravage 2.0, Roundhouse 1 EC, Warrior II, Willowood Lambda 1EC)</strong></td>
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<td><strong>Tefluthrin (Force 3G, Force 6.5G, Force 10G HL, Force Evo, Precept)</strong></td>
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<td><strong>Zeta-cypermethrin + Bifenthrin (Hero, Hero EW)</strong></td>
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*+ = provides protection
- = Does not provide protection
(+)= early season suppression only
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Alpine, Batallion 2EC, Batallion LFC, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC,
Bifenture EC, Bifenture LFC, Brigade 2EC, Capture LFR, COMA RTU, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare
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**Application Rate:** 2.1-8.5 fl oz/A or 0.033-0.10 lb ai/A  
**Re-Entry Interval (REI):** 12 hours  
**Pre-Harvest Interval (PHI):** 30 days

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, earworm caterpillars, European corn borer caterpillars, corn leaf aphid nymphs and adults, bird cherry oat aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, two-spotted spider mite nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.3 lb ai/A in a single season. Do not graze livestock in treated areas or cut treated crops for feed within 30 days of the last insecticide application. Do not apply if rainfall is imminent.

**Empower 2 Restrictions:** This is a granular insecticide that may be applied as a foliar broadcast. Do not apply where there is greater than 30% cover of crop residue remaining in the field. Do not apply more than 0.3 lb ai/A in a single season. Do not graze livestock in treated areas or cut treated crops for feed within 30 days of the last insecticide application. Do not apply to corn if rainfall is imminent. When applying this insecticide direct the granule to the whorl.

**European corn borer:** Apply at or shortly before egg hatch.

**Two-spotted spider mite:** To manage colonies, apply when colonies first form, and prior to leaf damage. Higher rates of insecticide may be required for large initial spider mite populations, or if the crop is under heat or drought stress.

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Arctic 3.2 EC, Permethrin, Perm-UP 3.2 EC, Perm-UP 25 DF, PermaStar AG, Pounce 1.5G *(permethrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 2-12.8 fl oz/A or 0.05-0.2 lb ai/A  
**REI:** 12 hours  
**PHI:** 30 days for grain or fodder

**Targeted Insects:** True armyworm caterpillars, fall armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, corn rootworm adults, and flea beetle adults.

**Restrictions:** Do not apply more than 0.6 lb ai/A in a single season. Forage may be harvested on the day of insecticide application. The retreatment interval is seven days.

**Common stalk borer:** Insecticides must be applied when or shortly before the stalk borer caterpillars begin moving into corn from surrounding weeds and grasses.

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Asana XL, S-FenvaloStar, Zyrate *(esfenvalerate)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 2.9-9.6 fl oz/A or 0.015-0.05 lb ai/A  
**REI:** 12 hours  
**PHI:** 21 days

**Targeted Insects:** True armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.25 lb ai/A in a single season.

**Common stalk borer and flea beetle:** Insecticides should be applied when or shortly before the caterpillars and beetles begin moving into corn from surrounding weeds and grasses. Insecticide must be applied before common stalk borer caterpillars enter the plant.

**European corn borer:** Apply insecticides when the eggs are in the blackhead stage, or before larvae enter the whorl.

**Grasshoppers:** An increased rate is required to manage grasshoppers larger than second instar.
Baythroid XL *(beta-cyfluthrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 0.8-2.8 fl oz/A or 0.007-0.022 lb ai/A

**REI:** 12 hours

**PHI:** 21 days for grain or fodder

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, grasshopper nymphs and adults, stink bug nymphs and adults, corn rootworm adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.088 lb ai/A in a single season. Do not make more than 4 applications per season. Forage may be harvested on the day of insecticide application. The retreatment interval is 7 days.

Besiege *(lambda-cyhalothrin + chlorantraniliprole)* Modes of Action: 3A (pyrethroids) and 28 (diamides)

**Application Rate:** 5.0-10.0 fl oz/A or 0.019-0.039 lb ai/A (lambda-cyhalothrin)

**Application Rate:** 0.03-0.06 lb ai/A (chlorantraniliprole)

**REI:** 24 hours

**PHI:** 21 days for grain or fodder, 1 day for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, corn earworm caterpillars, European corn borer caterpillars, corn leaf aphid nymphs and adults, bird cherry oat aphid nymphs and adults, grasshopper nymphs and adults, stink bug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not exceed 31.0 fl oz/A of Besiege in a single season or 0.12 lb ai/A of lambda-cyhalothrin or 0.2 lb ai/A of chlorantraniliprole.

Blackhawk, Entrust, Entrust SC, Spintor 2SC, Tracer *(spinosad)* Mode of Action: 5 (spinosyns)

**Application Rate:** 1.67-3.3 fl oz/A or 0.38-0.074 lb ai/A

**REI:** 4 hours

**PHI:** 28 days for grain or fodder, 7 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, western bean cutworm caterpillars, and European corn borer caterpillars.

**Restrictions:** Do not apply more than 0.189 lb ai/A of Blackhawk per year. Do not make more than three applications per calendar year.

**European corn borers and armyworm species:** Scout regularly and apply insecticide during peak egg hatch.

Carbaryl 4L, Sevin 4F, Sevin XLR Plus *(carbaryl)* Mode of Action: 1A (carbamates)

**Application Rate:** 1-2 quarts/A

**REI:** 24 hours, 21 days for detasseling corn

**PHI:** 48 days for grain or fodder, 14 days for forage or silage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, corn earworm caterpillars, European corn borer caterpillars, corn rootworm adults, Japanese beetle adults, and flea beetle adults.

**Restrictions:** Do not apply more than 8.0 quarts per acre in a single season. Avoid applying the product when crop or weeds are in bloom.

**Application Rate:** 0.92-3.84 fl oz/A or 0.015-0.03 lb ai/A

**Crossover Pro Application Rate:** 2-4 fl oz/A

**REI:** 24 hours  
**PHI:** 21 days

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.12 lb ai/A in a single season. Do not apply more than 0.06 lb ai/A after silk initiation or 0.03 lb ai/A after corn reaches the milk stage.

**Common stalk borer, corn earworm, European corn borer, Western bean cutworm:** This insecticide is intended for management prior to the larvae boring into the stalk or ear.

**Fall armyworm, true armyworm, yellowstriped armyworm:** This insecticide is intended for management of only the first and second instar.

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**Conserso (spinosad + gamma-cyhalothrin) Modes of Action: 5 (spinosyns) and 3A (pyrethroids)**

**Application Rate:** 42-64 acres treated/container

**REI:** 24 hours  
**PHI:** 28 days

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, corn leaf aphid nymphs and adults, bird cherry oat aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 6 fl oz/A for spinosad and 6 fl oz/A for gamma-cyhalothrin in a single season.

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**Coragen, Lumivia, Prevathon (chlorantraniliprole) Mode of Action: 28 (diamides)**

**Application Rate:** 2.0-7.5 fl oz/A (chlorantraniliprole)

**REI:** 4 hours  
**PHI:** 14 days for grain or fodder

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, western bean cutworm caterpillars, corn earworm caterpillars, European corn borer caterpillars, and grasshopper nymphs and adults.

**Restrictions:** Do not exceed 15.4 fl oz/A in a single season. Do not reapply within seven days. Do not make more than four applications per crop per season.

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**Corrida 29 SL, Corrida 90 WSP, Lannate LV, Lannate SP, Lanveer LV, Nudrin LV, Nudrin SP (methomyl) Mode of Action: 1A (carbamates)**

**Corrida 29 SL, Corrida 90 WSP, Lanveer LV, Nudrin LV, Nudrin SP Application Rate:** 0.75-1.5 pts/A

**Lannate SP Application Rate:** 0.25-0.50 lb ai/A

**Lannate LV Application Rate:** 12-24 fl oz/A or 0.225-0.45 lb ai/A

**REI:** 48 hours  
**PHI:** 21 days, 3 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, corn rootworm adults and flea beetle adults.

**Restrictions:** Do not apply more than 5 lb ai/A in a single season. Do not make more than five applications/crop in a single season.
**Delta Gold** *(deltamethrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 1.0-2.4 fl oz/A or 0.012-0.028 lb ai/A

**REI:** 12 hours  
**PHI:** 21 days, 12 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.095 lb ai/A in a single season. Do not make more than five applications in a single season. Allow 21 days between successive applications.

**Corn earworm and European corn borer:** Apply to early instar larvae prior to them boring into the ear or stalk.

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**Dimate 4E, Dimethoate 4 E, Dimethoate 400, Dimethoate 400 EC, Dimethoate 4EC, Dimethoate LV-4** *(dimethoate)* Mode of Action: 1B (organophosphates)

**Application Rate:** 0.67-1 pint/A

**REI:** 48 hours  
**PHI:** 28 days for grain, 14 days for forage

**Targeted Insects:** Corn leaf aphid nymphs and adults, bird cherry oat aphid nymphs and adults, northern corn rootworm adults, western corn rootworm adults, and two-spotted spider mite nymphs and adults.

**Restrictions:** Do not apply more than 1 pint/A in a single season. Do not apply this product to corn during the pollen shed period if pollinators are active.

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**Elevest** *(chlorantraniliprole + bifenthrin)* Modes of Action: 3A (pyrethroids) and 28 (diamides)

**Application Rate:** 4.8-9.6 fl oz/A

**REI:** 12 hours  
**PHI:** 30 days

**Targeted Insects:** Fall armyworm, true armyworm, yellow stripped armyworm, western bean cutworm, common stalk borer, European corn borer, flea beetle, Japanese beetle, grasshoppers, bird cherry oat aphid, corn leaf aphid, stink bug, two-spot spider mite

**Restrictions:** Do not apply more than 0.2 lb ai/A of chlorantraniliprole and 0.3 lb ai/A of bifenthrin per year. Do not reapply within seven days. Do not make more than three applications per acre per year.

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**Fastac CS, Fastac EC** *(alpha-cypermethrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 1.3-3.8 fl oz/A or 0.008-0.025 lb ai/A

**REI:** 12 hours  
**PHI:** 30 days, 60 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.075 lb ai/A in a single season.

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**Fyfanon ULV AG, Fyfanon, Fyfanon 57% EC, Malathion 5, Malathion 5EC, Malathion 8 Aquamul, Malathion 57%, Malathion ULV** *(malathion)* Mode of Action: 1B (organophosphates)

**Application Rate:** 16.0-25.6 fl oz/A or 0.63-1.0 lb ai/A

**REI:** 12 hours  
**PHI:** 7 days

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, and corn earworm caterpillars.

**Restrictions:** Do not apply more than 1 lb ai/A during a single application. Do not apply more than 2 lb ai/A in a single season. Wait a minimum of seven days between applications.
Insecticides

**Hero, Hero EW, Steed (zeta-cypermethrin + bifenthrin) Mode of Action: 3A (pyrethroids)**

**Application Rate:** 2.6-11.2 fl oz/A or 0.025-0.10 lb ai/A

**REI:** 12 hours  
**PHI:** 30 days, 60 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, two-spotted spider mite nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.4 lb ai/A in a single season. Use of ultra-low volume application is prohibited. Do not apply this insecticide if rain is imminent.

**Two-spotted spider mite:** Apply when colonies first begin to form prior to leaf damage.

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**Hexy 1E, Onager, Onager Optek (hexythiazox) Mode of Action: 10A (hexythiazox)**

**Application Rate:** 10.0-24 fl oz/A

**REI:** 12 hours  
**PHI:** 30 days

**Targeted Insects:** Banks grass mite nymphs and adults and two-spotted spider mite nymphs and adults. Restrictions: Do not apply more than 24 fl oz/A in a single season. Do not make more than one application per year.

**Two-spotted spider mite:** Apply when colonies first begin to form prior to leaf damage.

---


**Application Rate:** 4-16 fl oz/A or 0.06-0.25 lb ai/A

**REI:** 4 hours  
**PHI:** 21 days

**Targeted Insects:** True armyworm caterpillars, western bean cutworm caterpillars, and European corn borer caterpillars.

**Restrictions:** Do not apply more than 1.0 lb ai/A in a single season.

**European corn borer:** Apply at infestation levels after egg hatch. Direct application to the whorl of the plant.

---

**Prev-Am (sodium tetraborohydrate decahydrate) Mode of Action: 8D (borates)**

**Application Rate:** 50-100 fl oz/100 gal.

**REI:** 24 hours  
**PHI:** None

**Targeted Insects:** Beet armyworm, corn earworm, and mites.

**Restrictions:** Do not use between V10 and VT growth stages. Do not tank mix with other surfactant based adjuvants. Do not mix Prev-Am with a chemical containing copper in season. Do not apply Prev-Am in midday sun or during periods of drought when plants are subject to heat and moisture stress. Apply Prev-Am every 7-10 days for best results. The minimum retreatment interval is 7 days.

---

**Mustang, Mustang Maxx (zeta-cypermethrin) Mode of Action: 3A (pyrethroids)**

**Application Rate:** 1.28-4.0 fl oz/A or 0.008-0.025 lb ai/A

**REI:** 12 hours  
**PHI:** 30 days, 60 days for forage

**Targeted Insects:** Fall armyworm caterpillars, true armyworm caterpillars, yellowstriped armyworm caterpillars, black cutworm caterpillars, western bean cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, bird cherry oat aphid nymphs and adults, corn leaf aphid nymphs and adults, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.

**Restrictions:** Do not apply more than 0.20 lb ai/A of Mustang or 0.10 lb ai/A of Mustang Maxx in a single season.

**Common stalk borer, European corn borer:** These pests should be managed prior to them boring into the stalk or ear.
Oberon 2SC (*spiromesifen*) Mode of Action: 23 (tetronic and tetramic acid derivatives)

- **Application Rate:** 5.7-16 fl oz/A
- **REI:** 12 hours  **PHI:** 30 days
- **Targeted Insects:** Banks grass mite nymphs and adults and two-spotted spider mite nymphs and adults.
- **Restrictions:** Do not apply more than 16.0 fl oz/A in a single application. Do not apply more than 17.0 fl oz/A in a single season. Do not make more than two applications per year.
- **Two-spotted spider mite:** Apply when colonies first begin to form prior to leaf damage.

Radiant SC (*spinetoram*) Mode of Action: 5 (spinosyns)

- **Rate:** 3.0-6.0 fl oz/A or 0.02-0.047 lb ai/A
- **REI:** 4 hours  **PHI:** 28 days, 3 days for forage
- **Targeted Insects:** Fall armyworm, true armyworm, western bean cutworm, corn earworm, and European corn borer caterpillars.
- **Restrictions:** Do not apply more than 0.125 lb ai/A in a single season. Do not make more than three applications in a single season.
- **European corn borer:** Management of this pest should occur during periods of peak egg hatch.

Seican (*cinnamaldehyde*) Mode of Action: Unknown

- **Application Rate:** 16-56 fl oz/A or 1-3.5 pints/A
- **REI:** 4 hours  **PHI:** None
- **Targeted Insects:** Fall armyworm, true armyworm, yellow striped armyworm, black cutworm, western bean cutworm, European corn borer caterpillars, bird cherry oat aphid, corn leaf aphid, and mites.
- **Restrictions:** Apply Seican every 5-10 days for best results. The minimum retreatment interval is 5 days.

Sivanto HL, Sivanto 200 SL, Sivanto Prime (*flupyradifurone*) Mode of Action: 4D (butenolides)

- **Application Rate:** 7.0-14 fl oz/A
- **REI:** 4 hours  **PHI:** 21 days
- **Targeted Insects:** Bird cherry oat aphid nymphs and adults, English grain aphid nymphs and adults, and corn leaf aphid nymphs and adults.
- **Restrictions:** Do not apply more than 28 fl oz/A in a single season. Do not reapply within 7 days.

Sultrus, Tombstone, Tombstone Helios (*cyfluthrin*) Mode of Action: 3A (pyrethroids)

- **Application Rate:** 0.8-2.8 fl oz/A or 0.013-0.044 lb ai/A
- **REI:** 12 hours  **PHI:** 21 days
- **Targeted Insects:** Black cutworm caterpillars, common stalk borer caterpillars, corn earworm caterpillars, European corn borer caterpillars, fall armyworm caterpillars, true armyworm caterpillars, western bean cutworm caterpillars, yellowstriped armyworm caterpillars, grasshopper nymphs and adults, stinkbug nymphs and adults, corn rootworm adults, and Japanese beetle adults.
- **Restrictions:** Do not apply more than 0.044 lb ai/A in a single application. Do not reapply within seven days. Do not apply more than 0.175 lb ai/A in a single season.

Zeal Miticide-1, Zeal SC (*etoxazole*) Mode of Action: 10B (etoxazole)

- **Application Rate:** 1.0-3.0 fl oz/A
- **REI:** 12 hours  **PHI:** 21 days
- **Targeted Insects:** Banks grass mite nymphs and adults and two-spotted spider mite nymphs and adults.
- **Restrictions:** Do not apply more than 6 fl oz/A in a single season. Do not reapply within 14 days.
- **Two-spotted spider mite:** Apply when colonies first begin to form prior to leaf damage.
Soil-Applied Insecticides

Alpine, Bi-Dash 2E, Bifen 2 AG Gold, Bifen EC Select, Bifender FC, Bifenthrin EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture 3RIVE 3D, Capture LFR, COMA RTU, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare ES, Lancer 2EC, Manticor LFR, Nirvana RTU, Reveal, Reveal Endurx, Ruckus LFR, Seguro, Sniper, Sniper Helios, Sniper LFR, Strict, Temitry LFR, Tepera Plus, Tigris Bifenthrin LFC, Tundra EC, Xpedient Plus V (bifenthrin) Mode of Action: 3A (pyrethroids)

**Application Rate:** 0.15-17.0 fl oz/A or 0.0023-0.20 lb ai/A or 0.15-0.98 fl oz/1000 feet of row

**REI:** 12 hours

**Targeted Insects:** Northern corn rootworm larvae, western corn rootworm larvae, white grub larvae, seed corn beetle larvae, seed corn maggot larvae, wireworm larvae, fall armyworm caterpillars, true armyworm caterpillars, black cutworm caterpillars, and common stalk borer caterpillars.

**Restrictions:** Do not apply more than 0.2 lb ai/A in a single season for plant applications, and no more than 0.3 lb ai/A per season including other applications of these insecticides.

Arctic 3.2 EC, Permethrin, Perm-UP 3.2 EC, Perm-UP 25 DF, PermaStar AG, Pounce 1.5G (permethrin) Mode of Action: 3A (pyrethroids)

**Artic 3.2 EC Application Rate:** 0.3 oz/1000 feet of row

**Permethrin Application Rate:** 0.3-0.45 oz/1000 feet of row

**Permethrin 3.2 AG, Perm-UP 3.2 EC Application Rate:** 0.3-0.6 oz/1000 feet of row

**Perm-UP 25 DF Application Rate:** 0.5-1.0 oz/1000 feet of row

**PermaStar AG Application Rate:** 0.3-0.5 oz/1000 feet of row

**Pounce 1.5G Application Rate:** 8.0-16.0 oz/1000 feet of row

**REI:** 12 hours

**Targeted Insects:** Black cutworm caterpillars, dingy cutworm caterpillars, fall armyworm caterpillars, and true armyworm caterpillars. Artic 3.2 EC also targets wireworms and seed corn maggots.

**Restrictions:** Do not apply more than 2 lb ai/A in a single season. Corn may be replanted any time after application. All other crops may be planted 60 days after application.

Asana XL (esfenvalerate) Mode of Action: 3A (pyrethroids)

**Application Rate:** 0.45 fl oz/1000 feet of row

**REI:** 12 hours

**Targeted Insects:** Black cutworm caterpillars, and dingy cutworm caterpillars.

**Restrictions:** Do not apply more than 0.25 lb ai/A in a single season.

Aztec 4.67G, Aztec HC, Defcon 4.67G (tebupirimfos + cyfluthrin/tebupirimfos + cyfluthrin) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

**Application Rate:** 1.5-3.0 oz/1000 feet of row

**Application Rates for 30-inch row spacing:**

- **Aztec 4.67G:** 3.27 lb/A
- **Aztec HC:** 1.63 lb/A
- **Defcon 4.67G:** 3.27 lb/A

**REI:** 48 hours, 72 hours in areas where average rainfall is less than 25 inches/year

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn beetle larvae, seed corn maggot larvae, wireworm larvae, and black cutworm caterpillars.

**Restrictions:** Do not apply more than 0.15 lb ai/A in a single season. Corn may be replanted any time after application. All other crops may be planted 30 days after application. Cover or incorporate spills including end row spillage.

Aztec 4.67G available in bags and SmartBox; Aztec HC in SmartBox and SmartCartridge closed containers.
**Baythroid XL** *(beta-cyfluthrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 0.12-0.16 fl oz/1000 feet of row

**REI:** 12 hours

**Targeted Insects:** White grub larvae, seed corn maggot larvae, and wireworm larvae.

**Restrictions:** Do not apply more than 0.088 lb ai/A in a single season.

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**Application Rate:**
- 0.33 fl oz/1000 feet of row
- 0.66 fl oz/1000 feet of row

**Application Rate for 30-inch row spacing:**
- 5.75 fl oz/A

- 11.5 fl oz/A

**Crusader 2ME:** 5.53 fl oz/A

**REI:** 24 hours

**PHI:** 21 days

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn maggot larvae, wireworm larvae, and seed corn beetle larvae.

**Restrictions:** Do not apply more than 0.48 lb ai/A (30.72 fl oz/A) of lambda-cyhalothrin combined between at-plant and foliar applications. Do not apply more than 0.09 lb ai/A (5.76 fl oz/A) at-plant.

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**Counter 20G** *(terbufos)* Mode of Action: 1B (organophosphates)

**Application Rate:**
- 4.5-6 oz/1000 feet of row
- 3.3-6.5 lb/A

**REI:** 48 hours, 72 hours in areas where average rainfall is less than 25 inches/year

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn maggot larvae, and wireworm larvae.

**Restrictions:** Do not exceed 6.5 lb/A during a single season.

**Corn rootworm larvae:** For management use a rate of 6.5 lb/A unless used in combination with a corn hybrid containing an effective Bt trait.

**Counter 20G** available in Lock’N Load, SmartBox and SmartCartridge closed containers.

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**Fastac CS, Fastac EC** *(alpha-cypermethrin)* Mode of Action: 3A (pyrethroids)

**Application Rate:** 0.15 fl oz/1000 feet of row

**REI:** 12 hours

**Targeted Insects:** Cutworm caterpillars.

**Restrictions:** Do not apply more than 11.4 fl oz/A in a single season.
**Force 3G, Force 6.5G, Force 10G HL, Force Evo, Precept** *(tefluthrin)* Mode of Action: 3A (pyrethroids)

- **Application Rate:** 0.46-5 fl oz/1000 feet of row
- **Application Rates for 30-inch row spacing:**
  - **Force 3G:** 3.3-5.5 lb/A
  - **Force 6.5G:** 1.5-2.5 lb/A
  - **Force 10G HL:** 1.1-1.6 lb/A
  - **Force CS and Evo:** 8-10 fl oz/A
  - **Precept:** NA

- **REI:** 48 hours

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn beetle larvae, seed corn maggot larvae, wireworm larvae, and black cutworm caterpillars.

**Restrictions:** Do not use more than 5.5 lb/A for Force 3G, 5.0 lb/A for Force 6.5G, 3.27 lb/A for Force 10G HL in SmartBox and SmartCartridge containers, and 10 fl oz/A of Force CS and Evo in a season.

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**Hero, Hero EW** *(zeta-cypermethrin + bifenthrin)* Mode of Action: 3A (pyrethroids)

- **Application Rate:** 4.5-11.2 fl oz/A

- **REI:** 12 hours

**Targeted Insects:** True armyworm caterpillars, fall armyworm caterpillars, common stalk borer caterpillars, cutworm caterpillars, seed corn maggots, root aphids, white grub larvae, and wireworm larvae.

**Restrictions:** Do not apply more than 0.4 lb ai/A in a single season.

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**Index, SmartChoice HC** *(chlorethoxyfos + bifenthrin)* Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

- **Index Application Rate:** 0.44-0.72 fl oz/1000 feet of row
- **SmartChoice HC Application Rate:** 1.0-1.67 oz/1000 feet of row

**Application Rates for 30-inch row spacing:**
  - **Index:** 7.7-12.5 fl oz/A
  - **SmartChoice HC:** 1.1-1.8 lb/A

- **REI:** 48 hours, 72 hours in areas where average rainfall is less than 25 inches/year

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn maggot larvae, seed corn beetle larvae, wireworm larvae, black cutworm caterpillars, and true armyworm caterpillars.

**Restrictions:** Do not make more than one application in a season. Do not apply more than 0.1 lb ai/A in a single season.

SmartChoice HC available in SmartBox and SmartCartridge closed containers.

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**Sultrus, Tombstone, Tombstone Helios** *(cyfluthrin)* Mode of Action: 3A (pyrethroids)

- **Application Rate:** 0.12-0.16 fl oz/1000 ft of row or 2.0-2.8 fl oz/A

- **REI:** 12 hours

**Targeted Insects:** Seed corn maggot larvae, wireworm larvae, and white grub larvae.

**Restrictions:** Do not apply more than 2.8 fl oz/A or 0.044 lb ai/A in a single application. Do not reapply within seven days. Do not apply more than 11.2 fl oz/A or 0.175 lb ai/A in a single season.

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**Thimet 20-G** *(phorate)* Mode of Action: 1B (organophosphates)

- **Application Rate:** 4.5-6.0 fl oz/1000 feet of row

**Application Rate for 30-inch row spacing:**

- **4.9-6.5 lb/A**

- **REI:** 48 hours, 72 hours in areas where average rainfall is less than 25 inches/year

**Targeted Insects:** Corn rootworm larvae, white grub larvae, seed corn beetle larvae, seed corn maggot larvae, and wireworm larvae. Early season suppression of soybean gall midge.

**Restrictions:** Do not use an in-furrow application technique. Do not apply more than 6.5 lb/A in a single application. Do not make more than one application in a single season. Crops on the label may be replanted immediately; all other crops may be replanted after 30 days.

Thimet 20-G only available in Lock’N Load, SmartBox and SmartCartridge closed containers.
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Corn seed treatments promote good stand establishment and seedling vigor. Seed treatments may also help preserve yield potential and prevent quality loss in grain by preventing development of seed- and soil-borne diseases. Insecticide and nematicide seed treatments protect against feeding by nematodes and insects. The seed treatments addressed in this guide consist of fungicides, nematicides, insecticides or a combination of these products.

When deciding if seed treatments are necessary, consider on these factors: field history of seedling diseases/plant stand establishment problems, whether the crop is for seed production, if the field has poor drainage and if planting will be earlier than normal, if the field is no-till, non-rotated; the germination rate of the seed lot, and desired planting population (low planting population may require seed treatments to prevent any further loss of stand).

**Integrated Disease Management**

Pest management requires a multi-faceted approach as part of an integrated disease management program in agriculture. Effective components of an integrated plant disease management program include: crop rotation, residue management to reduce residue-borne and overwintering pathogens, use of high quality disease free seed, careful hybrid selection for host resistance and adaptation to the growing region, proper plant health management (fertility program, planting population etc.) and judicious use of pesticides only when they are warranted.

Effectiveness of seed treatments varies with product, rate, environmental conditions, and pests present. Seed treatments may provide some level of control for early season diseases and insects as well as control seedling blights but will not last the entire season.

**Newly Opened Land – a Special Consideration**

Newly opened land, such as conservation reserve program (CRP) being returned to crop production, may present a special consideration and most certainly will be a situation where seed treatments should be considered. Diseases such as root rots, as well as seedling blights, can often be more severe when certain crops such as cereal grains are planted into these high-residue fields. Also, insect pressure on newly cultivated lands may differ from land that has been under cultivation with the potential for increased pressure from insect pests such as white grubs and wireworms.

**Classification of Seed Treatments**

Seed treatment fungicides are either contact or systemic. Fungicides used as protectants (contacts) are effective only on the seed surface, providing protection against seed surface-borne pathogens and providing some level of control of soil- borne pathogens. Generally, these products have a relatively short residual. Protectant fungicides such as captan, thiram or fludioxonil help control most types of soil-borne pathogens, with the exception of the root rotting organisms. Systemic seed treatment fungicides are absorbed into the emerging seedling and inhibit or kill the fungus inside host plant tissues. Systemic fungicides used for seed treatment include the following: azoxystrobin, carboxin, mefenoxam, metalaxyl, and various triazole fungicides. Mefenoxam and metalaxyl are primarily used to target the water mold fungi-like pathogens such as Pythium.

Insecticide seed treatments are systemic; however, they are most effective against insect pests that are feeding on plant tissue early in the season. Biological agents as seed treatments are also available and may provide some level of protectant activity. Not all fungicides are available as seed treatments for every crop, and not all fungicides have activity against the same range of organisms. Refer to the specific crop-pest combinations listed in the text for product-use recommendations. Always read and follow label directions.

**Proper Application and Use Precautions**

Seed treatments can be poisonous, and many are irritants, so proper handling precautions must be followed when treating seed and handling treated seed. Producers or applicators must strictly adhere to all label directions regarding safe handling, mixing, storage, and disposal. Using personal protection equipment, including an approved chemical respirator, goggles, and pesticide resistant gloves, is recommended even when not specifically required by the fungicide label. Follow label rates, as over-application may result in unintentional damage to the seed, and under-application may reduce the effectiveness of products. Properly calibrate all application equipment to ensure uniform coverage. Uniform coverage of the seed is critical to optimize effectiveness of the seed treatment.

Always read and follow label directions. Understand the product-specific guidelines for proper application: how and when to apply, feeding or grazing restrictions, as well as important safety precautions. Always dispose of pesticide containers as per label directions. For more details on handling seed treatments, refer to the American Seed Trade Association guide on seed treatment stewardship www.seed-treatment-guide.com. Do not use treated seed for food or feed.

This section includes the seed treatment fungicides or fungicide/insecticide/nematicide combinations currently labeled for use on corn in South Dakota. The list is dynamic, so always check the list of products currently registered with the South Dakota Department of Agriculture for legality of use in the state.
Insecticide/Fungicide/Nematicide products
Avicta Complete Corn 250 (thiamethoxam + abamectin + thiabendazole + fludioxonil + mefenoxam + azoxystrobin) ........................................... 58
Avicta Duo 250 Corn (abamectin + thiamethoxam) ........................................... 58
Poncho/Votivo (clothianidin + Bacillus firmus I-1582) .................................................... 58

Fungicide products
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Metalaxyl 4.0 ST, Metastar 2E, Sebring 318 FS, Sebring 480 FS (metalaxyl) ........................................... 58
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Dithane M-45 (mancozeb) ..................................................................... 59
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Dynasty (azoxystrobin) .......................................................................... 59
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Evergol Prime (penflufen) ....................................................................... 59
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Metlock CT (metconazole + metalaxyl) .......................................................... 60
Rancona V 100 Pro FS (ipiconazole + carboxin) ................................................. 60
Serenade Soil (Bacillus subtilis strain QST 713) ................................................. 60
Signet 480 FS, 42-S Thiram (thiram) .............................................................. 60
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Vibrance (sedaxane) .................................................................................. 61
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Xanthion (Bacillus subtilis, Strain MBI 600 + pyraclostrobin) ........................ 61

Insecticide products
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Acceleron IX-409, Attendant 600 FS, Axcess, Dyna-Shield Imidacloprid 5, Gaugo 480, Gaugo 600, Nitro Shield IV,
Resonate 480 ST, Resonate 680 ST, Revize IMIDA ST, Senator 600 FS, Sharda Imidacloprid 5SC, STartUP IMIDA
(imidacloprid) ............................................................................................ 61
BioST Insecticide 100 (heat-killed Burkholderia spp. strain A396) ...................... 62
Cruiser 5FS (thiamethoxam) ..................................................................... 62
Lumivia (chlorantraniliprole) ...................................................................... 62

Nematicide products
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BioST Nematicide 100 (Burkholderia spp strain A396) ........................................ 62

Fungicide FRAC Codes and Group Names

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<td>1</td>
<td>Methyl benzimidazole carbamate (MBC)</td>
</tr>
<tr>
<td>3</td>
<td>Demethylation inhibitor (DMI)</td>
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<tr>
<td>4</td>
<td>Phenyldiamide (PA)</td>
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<tr>
<td>7</td>
<td>Succinate dehydrogenase inhibitor (SDHI)</td>
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<td>11</td>
<td>Quinone outside inhibitor (Qoi)</td>
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<td>12</td>
<td>Phenylpyrrole (PP)</td>
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<td>Dithiocarbamate</td>
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<td>Phthalimide</td>
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Insecticide Modes of Action

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<td>4A</td>
<td>Neonicotinoids</td>
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<td>6</td>
<td>Avermectins</td>
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<td>Diamides</td>
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Check list of pests controlled by seed treatment products

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<tr>
<th>Product Name</th>
<th>Seed &amp; seedling rots</th>
<th>Fusarium root rot</th>
<th>Pythium root rot</th>
<th>Rhizoctonia root rot</th>
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<th>Corn nematodes</th>
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<td><strong>Combo products</strong></td>
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<td>Avicta Complete Corn 250</td>
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<td>Acquire, Metalaxyl etc</td>
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+ = product provides control
(+)= product provides early season suppression only
- = product does not provide control
NA = Not Applicable
Insecticide/Fungicide/Nematicide products

**AVICTA COMPLETE CORN 250 (Thiamethoxam + Abamectin + Thiabendazole + Fludioxonil + Mefenoxam + Azoxystrobin)** Insecticide Mode of Action: 4A (neonicotinoids) and 6 (avermectins), Fungicide Mode of Action: 1 (MBC), 12 (PP), 4 (PA), 11 (QoI)

**Application Rate:** 11.61 fl oz/100 lb of seed

**REI:** 48 hours

**Targeted diseases:** Seed and seedling rots, damping off and corn nematodes.

**Targeted insects:** Black cutworm caterpillars, corn leaf aphid nymphs and adults, corn rootworm larvae, flea beetle larvae, seedcorn beetle larvae, seedcorn maggot larvae, white grub larvae, and wireworm larvae.

**Restrictions:** Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigor and poor quality may result in reduced germination and/or reduction of seed and seedling vigor. Seed treated with this product must be visually identifiable from untreated seed by the use of an approved colorant or dye to prevent accidental use of treated seed as food for humans or feed for animals.

**AVICTA DUO 250 CORN (Abamectin + Thiamethoxam)** Insecticide Mode of Action: 6 (avermectins) and 4A (neonicotinoids)

**Application Rate:** 0.2-0.25 mg /seed (5.4 fl oz/80,000 seeds)

**REI:** N/A

**Targeted diseases:** corn nematode

**Targeted insects:** Black cutworm caterpillars, corn leaf aphid nymphs and adults, corn rootworm larvae, flea beetle larvae, seedcorn beetle larvae, seedcorn maggot larvae, white grub larvae, and wireworm larvae.

**Restrictions:** Treatment of highly mechanically scarred or damaged seed or seed known to be of low vigor and poor quality may result in reduced germination and/or reduction of seed and seedling vigor. Seed treated with this product must be visually identifiable from untreated seed by the use of an approved colorant or dye to prevent accidental use of treated seed as food for humans or feed for animals.

**PONCHO, VOTIVO (Clothianidin + Bacillus firmus strain l-1582)** Insecticide Mode of Action: 4A (neonicotinoids)

**Application Rate:** 2.7 fl oz/80,000 seed unit

**REI:** 12 hours

**Targeted diseases:** corn nematode

**Targeted insects:** Black cutworm caterpillars, corn leaf aphid nymphs and adults, flea beetle larvae, seedcorn maggot larvae, white grub larvae, wireworm larvae, and corn rootworm larvae.

**Restrictions:** Do not apply more than 0.5 mg ai of clothianidin per seed through the application of PONCHO/VOTIVO. It is recommended that seed with existing populations of storage pests be fumigated prior to treating and bagging seed.

Fungicide products

**ACQUIRE, ALLEGIANCE FL, BELMONT 2.7 FS, DYNA-SHIELD METALAXYL, DYNA-SHIELD METALAXYL 318 FS, METALAXYL 265 ST, METALAXYL 4.0 ST, METASTAR 2E, SEBRING 318 FS, SEBRING 480 FS (Metalaxyl)** Mode of Action: 4 (PA)

**Application Rates:**
- Acquire: 0.75 fl oz/cwt
- Allegiance FL: 075 fl oz/cwt
- Belmont 2.7 FS: 0.75 fl oz/cwt
- Dyna-Shield Metalaxyl: 0.75 fl oz/cwt
- Dyna-Shield Metalaxyl 318 FS: 0.10-0.375 fl oz/cwt
- Metalaxyl 265 ST: 0.75 fl oz
- Metalaxyl 4.0 ST: 0.5 fl oz/cwt
- MetaStar 2E: 0.75 fl oz/cwt
- Sebring 318 FS: 0.75 oz/cwt
- Sebring 480 FS: 0.50 fl oz/cwt

**REI:** 24 hours

**Targeted diseases:** Seed and seedling rots.

**Restrictions:** Do not use treated seed for food, feed or oil purposes. Store away from feed and foodstuffs. Do not apply this product though any type of irrigation system. Do not use treated seed for food or feed purposes or process for oil. Treat only
those seeds needed for immediate use, minimizing the interval between treatment and planting. Do not store excess treated seeds beyond planting time.

**APRON XL** *(Mefonoxam)* Mode of Action: 4 (PA)
- **Application Rate:** 0.0425 - 0.085 fl oz/cwt
- **REI:** 48 hours.
- **Targeted diseases:** Seed rot and dampening-off caused by Pythium.

**CAPTAN 4L ST** *(Captan)* Mode of Action: M4 (multi-site)
- **Application Rate:** 2.2 fl oz/cwt
- **REI:** 48 hours.
- **Targeted diseases:** Seed and seedling rots.

**DITHANE F-45, MANZATE MAX, MANZATE PRO-STICK** *(Mancozeb + surfactant)* Mode of Action: M3 (multi-site)
- **Application Rates:**
  - Dithane F-45: 4.3 - 8.6 fl oz/cwt
  - Manzate Max: 4.3 - 8.6 fl oz/cwt
  - Manzate Pro-Stick: 2.7 - 5.4 fl oz/cwt
- **REI:** 24 hours
- **Targeted diseases:** Seed and seedling rots.
- **Restrictions:** Do not use for food, feed or oil purposes.

**DYNA-SHIELD FLUDIOXONIL** *(Fludioxonil)* Mode of Action: 12 (PP)
- **Application Rate:** 0.08 - 0.16 fl oz/cwt
- **REI:** 12 Hours
- **Targeted diseases:** Decay, damping-off and seedling blight caused by seed-borne and soil-borne fungi.

**DYNASTY** *(Azoxystrobin)* Mode of Action: 11 (QoI)
- **Application Rate:** 0.153 fl oz/cwt (0.0688 fl oz/80,000 seeds)
- **REI:** 4 hours
- **Targeted diseases:** Seed and seedling rots and damping-off caused by Rhizoctonia spp, Penicillium spp.

**EVERGOL ENERGY** *(Penflufen + Prothioconazole + Metalaxyl)* Mode of Action: 7, 3, 4
- **Application Rate:** 0.5 - 2.0 fl oz/cwt
- **REI:** N/A
- **Targeted diseases:** Seed rot and damping-off caused by Rhizoctonia, Fusarium and Pythium, seed decay.
- **Restrictions:** Do not exceed 0.0078 lb penflufen /A (3.5 g ai/A) per crop season.

**EVERGOL PRIME** *(Penflufen)* Mode of Action: 7 (SDHI)
- **Application Rate:** 0.16 - 0.64 fl oz/cwt
- **REI:** 12 hours
- **Targeted diseases:** Seed rots and damping caused Rhizoctonia solani.

**MAXIM 4FS, SPIRATO 480 FS** *(Fludioxonil)* Mode of Action: 12 (PP)
- **Application Rate:** 0.08 - 0.16 fl oz/cwt
- **REI:** 12 hours
- **Targeted diseases:** Seed and seedling rots, Head smut, Fusarium and Rhizoctonia root rots.
- **Restrictions:** Green forage may not be grazed until 30 days after planting.
MAXIM QUATTRO (*Fludioxonil* + *Azoxystrobin* + *Mefenoxam* + *Thiabendazole*) Mode of Action: 12 (PP), 11 (QoI), 4 (PA), 1 (MBC)

**Application Rate:** 0.39 - 0.53 fl oz/80,000 kernel count  
**REI:** N/A  
**Targeted diseases:** Seed-borne and soil-borne fungi causing decay, damping off, and seedling blight. Seed-borne head smut (*Sporisorium reilianum*). Seedling damping-off (*Rhizoctonia spp.*, *Penicillium spp.*, *Pythium spp.*, *Fusarium spp.*).  
**Restrictions:** Treated sweet corn should be planted and not carried over to the following year.

METLOCK CT (*Metconazole* + *Metalaxyl*) Mode of Action: 3 (DMI), 4 (PA)

**Application Rate:** 1 – 1.5 fl oz/cwt  
**REI:** 24 hours  
**Targeted diseases:** Loose smuts, Pythium seed rot and seedling dieback, Fusarium root rot diseases including seed/seedling dieback, *Rhizoctonia* root rot diseases.

RANCONA V 100 PRO FS (*Ipiconazole* + *Carboxin*) Mode of Action: 3 (DMI), 7 (SDHI)

**Application Rate:** 1.5 fl oz/cwt  
**REI:** 12 hours  
**Targeted diseases:** Seedborne seed rots caused by *Aspergillus sp.*, *Penicillium sp.*, *Fusarium sp.*, *Cladosporium sp.*, *Rhizopus sp.* Seedling blight caused by *Fusarium sp.*, and seed rot, and early-season root rot caused by *Rhizoctonia solani*.

**Restrictions:** Do not use treated seed for food, feed or oil purposes.

SERENADE SOIL (*Bacillus subtilis strain QST 713*) Mode of Action: 44 (microbial)

**Application Rate:** 2 - 6 qt/acre  
**REI:** 4 hours  
**Targeted diseases:** *Rhizoctonia spp.*, *Pythium spp.*, *Fusarium spp.*  
**All soil surface (drench), shanked-in, injected and in-furrow applications:** Mix 2 qt to 6 qt of Serenade Soil in the appropriate amount of water per acre. Use the stated higher application rates when the weather conditions are expected to be conducive of disease problems, or if minimum/low till programs are in place. Serenade soil can be mixed with chemical fungicides registered for soil applications.  
**Drench applications at planting:** Use at planting, seeding, or transplant. Apply finished spray mixture, at a rate to thoroughly soak the growing media through the root zone, as a drench or directed spray using hand-held, mechanical or motorized spray equipment, or as a chemigation drench or directed spray using applicable sprinkler or drip irrigation systems.  
**Shanked-in and injected applications:** Serenade Soil can be shanked-in or injected into the soil prior to, at, or post planting/transplanting of crops alone or with most types of liquid nutrients.  
**In-furrow applications:** For in-furrow applications, apply Serenade Soil as an in-furrow spray in the appropriate amount of water per acre for the crop at planting. Mount the spray nozzle so the spray is directed in the furrow just before the seeds are covered.

SIGNET 480 FS, 42-S THIRAM (*Thiram*) Mode of Action: M3 (multi-site)

**Application Rate:** 1.5 fl oz/bu  
**REI:** 24 hours  
**Targeted diseases:** Seed and seedling rots.

STAMINA (*Pyraclostrobin*) Mode of Action: 11 (QoI)

**Application Rate:** 0.4 - 0.8 fl oz/cwt  
**REI:** N/A  
**Targeted diseases:** Seed and seedling diseases caused by *Rhizoctonia solani*, *Penicillium oxalicum*. Suppression only: *Aspergillus sp.*, *Fusarium sp.*, *Pythium sp.*
**TRILEX 2000** (*Tryfloxytrobin + Metalaxyl*) Mode of Action: 11 (QoI), 4 (PA)

- **Application Rate:** 0.5 fl oz/cwt
- **REI:** 24 hours
- **Targeted diseases:** Seed and seedling rots caused by *Fusarium*, *Pythium* and *Rhizoctonia* root rots.

**VIBRANCE** (*Sedaxane*) Mode of Action: 7 (SDHI)

- **Application Rate:** 2.5 - 5 grams ai/100 kg; 20 - 40 grams ai/100 kg for control of head smut
- **REI:** 12 hours
- **Targeted diseases:** Seed decay, seedling blight and dumping off caused by *Rhizoctonia solani* and head smut (*Sphacelotheca reiliana*)
- **Restrictions:** Do not exceed two applications per year.

**VITAVAX-34** (*Carboxin*) Mode of Action: M7 (multi-site)

- **Application Rate:** 2 - 4 fl oz/cwt
- **REI:** 12 hours
- **Targeted diseases:** Seedborne head smut (*Sphacelotheca reiliana*) and root rot caused by *Rhizoctonia solani*.
- **Restriction:** Do not graze or feed livestock on treated areas for six weeks after planting.

**XANTHION** (*Bacillus subtilis strain MBI 600 (A) + Pyraclostrobin (B]*) Mode of Action: 44 (microbial), 11 (QoI)

- **Application Rate, Component A:** 0.6 - 2.4 fl oz/acre
- **Application Rate, Component B:** 3.0 – 12.0 fl oz/acre
- **REI:** 12 hours
- **Targeted diseases:** *Rhizoctonia* seed and seedling rot (*Rhizoctonia solani*), *Fusarium* seed rot, seedling blight (*Fusarium spp.*), Suppression of *Pythium* damping off (*Pythium spp.*).
- **Restrictions:** If tank mixing with other products, conduct a jar test to determine compatibility. Always use constant tank agitation when using tank mixes with Xanthion. BASF has not tested all possible tank mix combinations and rates of additives or adjuvants.

**Insecticide products**

**ACCELERON IC-609, NIPSIT INSIDE, PONCHO 600** (*Clothianidin*) Mode of Action: 4A (neonicotinoids)

- **Application Rate:** 5.64 fl oz/80,000 seed unit
- **REI:** 12 hours
- **Targeted insects:** Black cutworm caterpillars, corn leaf aphid nymphs and adults, corn rootworm larvae, flea beetle larvae, thrips, seedcorn maggot larvae, white grub larvae, and wireworm larvae.
- **Restrictions:** It is recommended that seed with existing populations of storage pests be fumigated prior to treating and bagging seed.

**ACCELERON IX-409, ATTENDANT 600 FS, AXCESS, DYNA-SHIELD IMIDACLOPRID 5, GAUCHO 480, GAUCHO 600, NITRO SHIELD IV, REZONATE 480 ST, REVIZE IMIDA ST, SENATOR 600 FS, SHARDA IMIDACLOPRID 5SC, STARTUP IMIDA** (*Imidacloprid*) Mode of Action: 4A (neonicotinoids)

- **Application Rates:**
  - Acceleron IX-409: 1.6 - 3.2 fl oz/ cwt
  - Axcess: 6 fl oz/80,000 seeds
  - Attendant 600 FS: 6 fl oz/80,000 seeds
  - Dyna-shield Imidacloprid 5: 13.5 fl oz/cwt
  - Gaucho 480: 7.6 fl oz/80,000 seeds
  - Gauch 600: 6 fl oz/80,000 seeds
  - Nitro shield IV: 7.5 fl oz/80,000 seeds
  - Senator 600 FS: 13.5 fl oz/cwt
  - Sharda Imidacloprid 5sc: 6 fl oz/80,000 seeds
  - Resonate 480 ST: 80,000 fl oz/80,000 seeds
  - Renzive Imida: 16.9 fl oz/cwt
  - Startup Imida: 6 fl oz/80,000 seeds
REI: 12 hours

Targeted insects: Black cutworm caterpillars, corn leaf aphid nymphs and adults, corn rootworm larvae, flea beetle larvae, seed corn maggot larvae, white grub larvae, and wireworm larvae.

BIOST INSECTICIDE 100 (Heat-killed Burkholderia spp. strain A396) Mode of Action: Unknown (Biological agent)

Application Rate: 8 fl oz/cwt

REI: 4 hours

Targeted nematodes: cutworms, root and seed maggots, wireworms, seed corn beetle, corn rootworm larvae

CRUISER 5FS (Thiamethoxam) Mode of Action: 4A (neonicotinoids)

Application Rate: 0.25 - 1.25 milligrams/kernel

REI: 12 hours

Targeted insects: Black cutworm caterpillars, corn aphid nymphs and adults, corn rootworm larvae, flea beetle larvae, seedcorn beetle larvae, seedcorn maggot larvae, white grub larvae, and wireworm larvae.

Restrictions: For field, pop, seed and sweet corn, do not use a Cruiser rate that will result in more than 0.21 lb thiamethoxam per acre (93.75 grams ai/A). Do not apply more than 215 gallons per 8-hour day for seed treatments utilizing a closed system. Do not apply more than 38 gallons of Cruiser per 8-hour day for seed treatments utilizing an open system. If it is necessary to apply more than 38 gallons of Cruiser per 8-hour day, a closed system must be used.

LUMIVIA (Chlorantraniliprole) Mode of Action: 28 (diamides)

Application Rate: 0.25 - 0.75 mg/kernel

REI: N/A

Targeted insects: Black cutworm caterpillars, seed corn maggot larvae, white grub larvae, and wireworm larvae.

Restrictions: Do not exceed a maximum of 0.054 lb chlorantraniliprole per acre (25 grams ai/acre) regardless of field corn seeding density. Do not apply more than 0.2 lb ai of chlorantraniliprole-containing products per acre per year.

Nematicide products

AVEO EZ NEMATICIDE (Bacillus amyloliquefaciens strain PTA-4838) Mode of Action: Unknown (Biological agent)

Application Rate: 0.1 fl oz/80,000 seed unit

REI: 4 hours

Targeted nematodes: Dagger nematode, Lance nematode, needle nematode, pin nematode, ring nematode, root knot nematode, root lesion Nematode, Spiral nematode, Sting nematode, Stubby Root nematode, Stunt nematode

BIOST NEMATICIDE 100 (Heat-killed Burkholderia spp. strain A396) Mode of Action: Unknown (Biological agent)

Application Rate: 1 - 8 fl oz/cwt

REI: 4 hours

Targeted nematodes: Nematodes
Foliar Fungicides in Corn

Madalyn Shires, Assistant Professor and SDSU Extension Plant Pathologist
Dalitso Yabwalo, Research Associate, SDSU Extension Plant Pathology Program
Connie Strunk, SDSU Extension Plant Pathology Field Specialist

There are several fungal pathogens infect corn and cause significant yield loss in South Dakota. Common fungal diseases found on corn include common rust, northern corn leaf blight, gray leaf spot, eye spot, anthracnose leaf blight, southern rust, and Physoderma brown spot. Apart from rusts, which are spread by wind from the southern states to South Dakota, the rest of the fungal pathogens are residue-borne. Therefore, residue management through crop rotation, bailing, and tillage (incorporated in the soil) can significantly reduce inoculum amounts for these pathogens, particularly early in the season. Fortunately, diseases such as gray leaf spot, northern corn leaf blight and others rarely reach economic injury levels in South Dakota, except under no-till corn-on-corn and irrigated corn conditions. However, where recommended cultural practices are not followed coupled with suitable conditions for disease proliferation foliar fungal diseases can reach yield reducing levels. Under such circumstances, foliar fungicide application is necessary to protect corn against yield loss.

When deciding on foliar fungicide treatment, consider the level of disease developing on lower leaves, cultural practices (such as corn following corn), current and forecast weather conditions, corn growth stage (diseases appearing after corn is dented are likely not going to cause significant yield loss), susceptibility of the hybrids, and potential yield (low yield potential corn crop may not benefit from fungicide application).

Is it beneficial to apply a fungicide in the absence of disease or when disease pressure is minimal?

Results from years of research at South Dakota State University and other research institutions in the region show that when a fungicide is applied in the absence of significant disease severity (>5% disease severity on ear leaf and above leaves), the probability of breaking even decreases.

Although some plant health benefits have been reported as a result of applying strobilurins, such as, keeping plants green longer, these benefits do not result into a significant increase in yield from untreated plots in the absence of fungal pathogens. If a corn plant remains greener after black layer, no additional photosynthates can go into the kernel. Keeping plants green is only helpful until black layer. This would be the case where fungicides help keep diseases in check to ensure leaves (ear leaf and above) remain green until physiological maturity (black layer). Growers should always scout the fields to determine if there is a need for fungicide application to avoid unnecessary fungicide application which can lead to loss of sensitivity (development of resistance) and added expenses.

Fungicide resistance

Fungicide resistance is when a fungicide that used to control a fungal pathogen no longer offers any control on the same fungus. Fungicide resistance arises because of several factors including: using the same class of a fungicide more than recommended times in a season or every season, high variability within the pathogen, high reproduction capacity of the pathogen, and using low fungicide rates or off-label products.

To avoid the development of fungicide resistance, growers should monitor the performance of fungicides used in their fields. One way to do this, is to leave a strip of an untreated area and use this to compare with where spraying was done. If the two areas have comparable disease level, this would mean that the fungicide did not work as it is supposed to and one of the reasons could be fungicide resistance. Leaving untreated strips can also help the producer to determine if it was profitable to apply a fungicide (more yield from treated area) or not (yield similar between treated and untreated areas). Some ways to reduce chances of fungicide resistance from developing are:

- Rotate between the different classes of fungicides within a season and also between seasons.
- Use a mixture of fungicide classes. Several fungicide products are marketed as combos.
- Practice integrated disease management to reduce the disease pressure.
- Scout to determine the need for fungicide and avoid applying fungicide when it is not necessary or when it is too late.
- Always follow the label to determine the rates, the growth stage of the crop, compatibility with other pesticides, and safe handling.

Once a fungicide application is determined to be necessary, growers should ensure the sprayer is calibrated to deliver the recommended rates (as per the fungicide label), and that the weather conditions are not too windy (>10 mph) or too hot or it is likely to rain in the next two hours.

The best fungicide timing in corn is between tasseling and silking as several corn fungal diseases start to develop during this period. Care should be taken when using certain adjuvants and tank-mix partners during late vegetative stages prior to tasseling as these can cause injury to developing ears. The following is a list of fungicides labeled for use in South Dakota at the time of this publication. The list is dynamic and should not be considered as a substitute for label information.
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+ = product provides protection
- = product does not provide protection
**ABSOLUTE MAXX** *(tebuconazole + trifloxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 5.0-6.0 fl oz/acre

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, common rust, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, southern corn leaf blight, and southern rust.

**Restrictions:** Apply when disease first appears and continue on a 10-14 day interval if favorable conditions for disease development persist. Use of shorter spray intervals and higher rates are recommended when disease pressure is severe. Absolute Maxx may be applied by ground, air or chemigation. Absolute Maxx should be applied in a minimum of 10 gallons of spray solution by ground sprayer or in a minimum of 2 gallons per acre by aircraft spray equipment. For optimal disease control, the lowest labeled rate of a spray surfactant may be tank mixed. Do not apply more than 12 fl oz/acre/season. Do not apply more than 2 applications per use season. Absolute Maxx may be applied up to 36 days before the harvest of grain and fodder. Do not apply within 21 days of harvest for forage. Do not apply more than two sequential applications. Limit the number of all Group-11 fungicide applications to no more than two per acre/season.

**AFFIANCE** *(tetraconazole + azoxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 10.0-17.0 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Gray leaf spot, common rust, southern rust, Anthracnose leaf blight, eye spot, northern corn leaf blight, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Early applications can be made at stages V4-V8. A second application can be made at VT-R3 if disease pressure develops to provide season-long disease control. Use as part of an integrated pest management program. Apply as a foliar spray or via chemigation in sufficient water to obtain thorough coverage of plants. To limit the potential for resistance development, do not apply more than 17.06 fl oz/acre per year. Apply prior to disease onset when conditions are favorable to disease development. A second application may be made no fewer than 7 days later as long as the maximum per acre per year rate (17.06 fl oz) is not exceeded. Curative applications are most effective when disease incidence does not exceed 5% of the plants at the time of application.

The azoxystrobin component of Affiance is extremely phytotoxic to certain apple cultivars. Do not spray Affiance where spray drift may reach apple trees. Do not spray Affiance where spray drift may reach apple trees. Do not spray when environmental conditions may result in drift to areas beyond the intended application area. Do not use spray equipment that has previously been used to apply Affiance to spray apple trees. Even trace residual amounts may lead to unacceptable phytotoxicity to certain apple and crabapple cultivars.

**AFRAME PLUS, COVER XL** *(propiconazole + azoxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rates:** 10.5 fl oz/A for early application (V4 to V8), 10.5 - 14 fl oz/A for later season application

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, Physoderma brown spot, rusts, southern corn leaf blight, Helminthosporium leaf blights, and suppression only for Diplodia ear rot.

**Restrictions:** Early application (V4-V8) for Anthracnose leaf blight, eye spot and gray leaf spot may be applied for early season disease control and plant performance benefits. If mixing with herbicides other than solo glyphosate products, Callisto or Callisto Xtra, consult your local Syngenta representative. Later season application for gray leaf spot, rusts, anthracnose, and eye spot, apply 10.5-14 fl oz/A of Aframe Plus when disease first appears. If conditions favorable for disease persist, continue to apply on a 14-day schedule. For leaf blights apply 10.5-14 fl oz/A Aframe plus when disease first appears. Continue on a 7-14 day schedule. Use the low rate when disease pressure is low. Under heavy disease pressure or if conditions are favorable for disease, apply the high rate. Do not use adjuvants or other additives after the V8 growth stage and prior to the VT growth stage, as use during these development times may impose stress on the plant that could inhibit proper kernel development. VT is defined as when the last branch of the tassel is completely visible, but silks have not yet emerged from the ear shoot. Apply no more than 2 applications of Aframe Plus or any other Group 11 fungicide per year. Use of an adjuvant such as COC may provide additional disease control. Do not spray Aframe Plus where spray drift may reach apple trees. Do not spray when conditions favor drift beyond area intended for application. Conditions which may contribute to drift include thermal inversion, wind speed and direction, sprayer nozzle/pressure combinations, spray droplet size, etc. Do not use spray equipment which has been previously used to apply Aframe Plus to spray apple trees. Even trace amounts can cause unacceptable phytotoxicity to certain apple and crabapple varieties.
APROACH (picoxystrobin) Mode of Action: 11 (QoI)

**Application rate:** 3 - 12 fl oz/A for V4 to V7, 6 - 12 fl oz/A for VT to R3

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, southern corn leaf blight, common rust, southern rust, leaf spots, Physoderma brown spot, eye spot, and yellow leaf blight.

**Restrictions:** Apply between VT and R3 for best results. Apply before disease occurs and repeat on a 7-14 day intervals. Use the higher rate and shorter interval when disease pressure is high. Apply a single 3-4 fl oz/A application between V4-V7 for early season disease control/suppression. Do not apply within 7 days of harvest for grain. Do not apply more than 36 fl oz/A per acre per year. Aproach may be applied by ground, air or chemigation. Do not use an adjuvant or crop oil when spraying corn between the V8 and VT growth stages. Make no more than 2 sequential applications of Aproach before switching to a fungicide with a different mode of action.

APROACH PRIMA (cyproconazole + picoxystrobin) Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 3.4 - 6.8 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, southern corn leaf blight, Physoderma brown spot, and yellow leaf blight.

**Restrictions:** Apply before disease occurs. The minimum retreatment interval is 7 days. Use the higher rate and shorter interval when disease pressure is high. Apply the 3.4 fl oz/A application for preventive early season disease control/suppression. Do not apply within 30 days of harvest for grain or 21 days for silage. Do not apply more than two sequential applications of Aproach Prima without alternating with another fungicide chemistry. Do not exceed 6.8 fl oz/A per crop. Aproach Prima may be applied by ground, air or chemigation. Do not use an adjuvant or crop oil when spraying corn between the V8 and VT growth stages.

AVARIS 2XS (propiconazole + azoxystrobin) Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 10.5 - 14 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, southern corn leaf blight, and suppression only for Diplodia ear rot.

**Restrictions:** Do not apply more than 56 fl oz/A/season of Avaris 2XS. Do not apply more than 28 fl oz/A for field corn harvested for forage. Do not apply within 30 days of harvest for forage, grain or stover. Apply when disease first appears. If conditions favorable for disease persist, reapply every 14 days.

AZURE XTRA, RUSTEASE (azoxystrobin + cyproconazole) Mode of Action: 11, 3 (QoI, DMI)

**Application rate:** 3.5 - 6.8 fl oz/A

**REI:** 12 hours

**Target diseases:** Eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, and southern corn leaf blight.

**Restrictions:** Apply this product when disease first appears. Use low rate when disease pressure is low. Under heavy disease pressure or if conditions are favorable for disease to develop, apply a high rate. A second application may be made 7-14 days later. Do not apply more than 2 applications per year. Do not harvest wheat within 30 days of application. Do not harvest for silage within 21 days of application. Do not alternate or tank mix with fungicides to which the pathogen population has developed resistance.
**BRAVO WEATHER STIK** *(chlorothalonil + surfactant)* Mode of Action: M5 (multi-site)

- **Application rate:** 0.75-2 pints/A
- **REI:** 12 Hours
- **Targeted diseases:** Northern corn leaf blight, common rust, and southern rust.
- **Restrictions:** Begin applications when conditions favor disease and repeat every 7 days. Do not apply within 14 days of harvest. Do not apply to sweet corn to be processed. Do not allow livestock to graze treated fields. Do not ensile treated corn or use as livestock forage. Bravo Weather Stik may be applied by ground, air or through chemigation. Use sufficient water to obtain adequate coverage, 5-10 gal/A for concentrated ground and aerial application. Do not apply within 14 days of harvest. Do not allow livestock to graze in treated fields. Do not ensile treated corn or use as livestock forage.

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**BRAVO ULTEX, ECHO 720, ECHO 90DF, ECHO ZN, EQUUS 720 SST, EQUUS DF, INITIATE 720** *(chlorothalonil)*

Mode of Action: M5 (multi-site)

- **Application rates:**
  - Bravo Ultrex: 0.7 - 1.8 lbs/A
  - Echo 720, Equus 720 SST: 0.75 - 2 pints/A
  - Equus DF: 0.7 - 1.8 lbs/A
  - Echo 90 DF: 1.25 – 1.625 lbs/A
  - Echo ZN: 1.125 – 2.75 pints/A
- **REI:** 12 hours
- **Targeted diseases:** Northern corn leaf blight, common rust, and southern rust.
- **Restrictions:** Begin applications when conditions favor disease and repeat every 7 days. Do not apply more than 10.9 lbs (Bravo Ultrex, Equus DF), 9.0 lbs a.i. (Echo 720, Echo 90 DF, Echo ZN), 12 pints (Equus 720 SST) of product per acre per season. Under severe disease conditions, use 1.4-1.8 lbs/A (Bravo Ultrex, Equus DF), and 1.5-2 pints/A (Echo 720, Equus 720 SST). Do not apply within 14 days of harvest. Do not apply to sweet corn to be processed. Do not allow livestock to graze treated fields. Do not ensile treated corn or use as livestock forage. Apply by ground, air or chemigation. Use sufficient water to obtain adequate coverage, 5-10 gal/A for concentrated ground and aerial application.

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**BUMPER 41.8 EC, FITNESS, PROPICURE 3.6F, TIDE PROPICONAZOLE 41.8% EC, PROPICON 3.6 EC, PROPIMAX EC, PROPI-STAR EC, TILT, TOPAZ, SHAR-SHIELD PPZ** *(propiconazole)* Mode of Action: 3 (DMI)

- **Application rate:** 4 fl oz/A
- **REI:** 24 hours
- **Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, common rust, southern rust, eye spot, and northern corn leaf spot.
- **Restrictions:** Apply when disease first appears. If conditions favorable for disease persist, reapply every 7-14 days. Do not apply within 30 days of harvest for forage, grain and stover. Do not apply more than 16 fl oz/A/season. Do not apply more than 8 fl oz/A/season on field corn harvested for forage. Do not apply more than 0.45 lb a.i. propiconazole per acre per season. Bumper 41.8 EC, Fitness, Propicon 3.6 EC, Propicure 3.6 F, PropiMax EC, Propi-Star EC, Tilt, and Shar-Shield PPZ may be applied by ground, air or chemigation. Apply a minimum of 2 gal/A by air or 10 gal/A ground.

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**DELARO 325 SC** *(prothioconazole + trifloxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

- **Application rates:** 8 - 12 floz/A
- **REI:** 12 hours
- **Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, northern corn leaf spot, southern corn leaf blight, Physoderma brown spot, and tar spot.
- **Restrictions:** Do not apply more than 24 fl oz of Delaro 325 SC per acre per year. Preharvest interval for grain and fodder 14 day. Forage may be harvested the same day after application. Application of Delaro 325 SC is not recommended at times when corn is under severe environmental stress conditions. The inclusion of an adjuvant in the spray tank, for applications made through V8 and after VT is recommended. Apply when disease first appears and at 7-14 day intervals thereafter if conditions continue to favor disease. Use higher rates and shorter intervals when disease pressure is high.
**DELARO COMPLETE** *(prothioconazole + trifloxystrobin + fluopyram)* Mode of Action: 3, 11, 7 (DMI, QoI, SDHI)

- **Application rate:** 4.0 - 8.0 fl oz/A (early season, V4 to V7)
- **Application rate:** 8.0-12.0 fl oz/A (after V8)
- **REI:** 12 hours
- **Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, southern corn leaf blight, Physoderma brown spot, and tar spot.
- **Restrictions:** Application of Delaro Complete is not recommended at times when corn is under severe environmental stress conditions. Do not apply within 14 days of grain or fodder harvest. Do not apply Delaro Complete more than twice (24 fl oz/A) per year. To diminish the potential for pathogen resistance development to this fungicide, do not make more than 2 sequential applications of Delaro Complete or any Group 11 or Group 7 containing fungicides before rotating with a fungicide from a different Group. For early season control of anthracnose, eyespot, and gray leaf spot, apply Delaro Complete as broadcast foliar spray at V4 to V7. For season-long control of diseases, apply a sequential treatment of Delaro Complete at 8.0-12.0 fl oz/A from VT to R2.

**DITHANE F-45 RAINSHIELD, MANZATE PRO STICK, PENNCOZEB 75 DF, PENNCOZEB 80 WP** *(mancozeb)* Mode of Action: M3 (multi-site)

- **Application rates:**
  - Dithane F-45: 1.2 qt/acre
  - Manzate Pro Stick: 1.5 lb/acre
  - Penncozeb 75 DF, Penncozeb 80 WP: 1 - 1.5 lbs/A (repeat as needed)
- **REI:** 24 hours
- **Targeted diseases:** Gray leaf spot, northern corn leaf blight, common rust.
- **Restrictions:** Do not apply more than 12 qts (Dithane F-45), 15 lbs (Penncozeb 80WP, Manzate Pro Stick), or 16 lbs (Penncozeb 75 DF) of product per acre per season. Do not apply within 40 days of harvest. Use Latron CS-7 surfactant to improve product performance. Dithane F-45 is not labeled for gray leaf spot. Do not feed treated forage to livestock. Start applications at disease onset and repeat at 4 to 14-day intervals.

**DOMARK 230 ME** *(tetraconazole)* Mode of Action: 3 (DMI)

- **Application rate:** 4 - 6 fl oz/A
- **REI:** 12 hours
- **Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, Physoderma brown spot, northern corn leaf spot, and southern corn leaf blight.
- **Restrictions:** Do not make more than 1 application per acre per year. Do not apply Domark after the R3 (milk) growth stage. Do not use adjuvants after the V8 (8 leaf collar) stage and prior to the VT (tassel) stage. If disease pressure develops later in the season, an application of an alternative corn fungicide should be made at VT - R3 to provide extended disease control. Begin preventative applications when conditions favor disease development.

**EVITO 480 SC, AFTERSHOCK** *(fluxastrobin)* Mode of Action: 11(QoI)

- **Application rate:** 2.0 - 5.7 fl oz/A
- **REI:** 12 hours
- **Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, and southern corn leaf blight.
- **Restrictions:** Do not apply more than 2 applications. Do not apply within 30 days of harvest. Do not apply after the R4 growth stage. Do not apply more than 11.4 fl oz/A per season. Evito 480SC, Aftershock may be applied by ground, air or chemigation. Apply before disease occurs and at a 7-10 day interval. Use the higher rate and shorter interval when disease pressure is high.
EVITO T *(fluxastrobin + tebuconazole)* Mode of Action: 11, 3

**Application rate:** 4 - 9 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, and southern corn leaf blight.

**Restrictions:** Do not apply more than twice. Do not apply after the R4 growth stage. Do not apply more than 18 fl oz/A per acre per season. Apply before disease occurs and at 7 day intervals. Evito T may be applied by ground, air or chemigation. Apply in a minimum of 3 gal/A water by air or 10 gal/A water ground. Evito T may be applied up to 36 days before harvest of grain or fodder.

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FORTIX *(flutriafol + fluoxastrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 4 - 6 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, and southern corn leaf blight.

**Restrictions:** Do not apply within 30 days of harvest for forage, stover or grain. Do not apply more than 2 applications per season. Do not apply more than 12 fl oz/A per season. Do not apply after the R4 growth stage. Do not use adjuvants when spraying corn after the V8 growth stage and prior to the VT growth stage. Begin applications when disease occurs and repeat on a 7-10 day interval, as needed. Use the higher rate when disease pressure is high and if conditions are favorable for disease development. Fortix may be applied by ground or air. Apply a minimum of 5 gal/A air or 10 gal/A ground.

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HEADLINE, HEADLINE SC *(pyraclostrobin)* Mode of Action: 11 (QoI)

**Application rate:** 6 - 12 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, Physoderma brown spot, southern corn leaf blight, and yellow leaf blight.

**Restrictions:** Do not apply within 7 days of harvest. Do not apply more than two applications of Headline, Headline SC without alternating with a fungicide that has a different mode of action for at least one application. Do not apply more than 72 fl oz/A per season. Adjuvant or crop oil damage can occur when applied after the V8 (8 leaf collar) stage and prior to the VT (tassel) stage. Apply before diseases occur. If conditions favorable for disease persist, reapply every 7–14 days. Use the higher rate and shorter intervals when disease pressure is high. Adjuvants may be used with Headline and Headline SC.

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HEADLINE AMP *(metconazole + pyraclostrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 10 - 14.4 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, northern corn leaf spot, Physoderma brown spot, and yellow leaf blight.

**Restrictions:** Do not apply within 7 days of harvest for field corn forage/silage. Do not apply within 20 days of harvest for grain. Do not apply more than two applications of Headline AMP without alternating with a fungicide that has a different mode of action for at least one application. Do not apply more than 57.6 fl oz/A per season. Do not make more than 4 applications per acre per year. Adjuvant or crop oil damage can occur when applied after the V8 (8 leaf collar) stage and prior to the VT (tassel) stage. Apply before disease occurs. If conditions favorable for disease persist, reapply every 7–14 days. Use the higher rate and shorter intervals when disease pressure is high.
LUCENTO (bixafen + flutriafol) Mode of Action: 7, 3 (SDHI, DMI)

Application rate: 3 - 5.5 fl oz/A

REI: 12 hours

Targeted diseases: Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, northern corn leaf spot, and suppression only for Fusarium ear rot and Diplodia ear rot.

Restrictions: Do not apply more than two applications per season, thus not more than 11 fl oz per acre per year. Preharvest interval is 10 days for forage and 30 days for grain or stover. Apply from onset of diseases up to R4 growth stage. Repeat applications at 7–14 day intervals. When disease pressure is high, use the higher rate and shorter interval. Do not use an adjuvant after the V8 growth stage and prior to the VT. An adjuvant may be used at any other growth stage.

MIRAVIS NEO (pydiflumetofen + azoxystrobin + propiconazole) Mode of action: 7, 11, 3 (SDHI, QoI, DMI)

Application rate: 13.7 fl oz/A

REI: 12 hours

Targeted diseases: Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, northern corn leaf spot, tar spot, and suppression only for Fusarium ear rot and Diplodia ear rot.

Restrictions: Do not apply more than two applications per acre per season. Do not make more than two consecutive applications of Miravis Neo or other Group 7, 3, and 11 fungicides before alternation with a fungicide that from a different group. Pre-harvest interval is 30 days. Apply at V4-V8 for early season disease control. Late season application at VT or R1. If conditions favorable for disease persist, apply again 7-14 days later.

MONSOON, ONSET 3.6L, TEBUCONAZOLE 3.6F, ORIUS 3.6F, TEB 3.6SC, TEBUCON 3.6SC, TEBU-CROP 3.6F, TEBUCURE 3.6, TEBUSTAR 3.6L, TEBUZOL 3.6F, TOLEDO 3.6 (tebuconazole) Mode of Action: 3 (DMI)

Application rate: 4 - 6 fl oz/A

REI: 12 Hours

Targeted diseases: Gray leaf spot, northern corn leaf blight, northern corn leaf spot, common rust, southern rust, and southern corn leaf blight.

Restrictions: Do not apply more than 24 fl oz/A/season. Do not apply within 36 days of harvest of grain for fodder or 21 days for forage. Apply a minimum of 5 gal/A by air or 10 gal/A ground. For optimum disease control, use a spray surfactant at the lowest specified rate. Begin preventative applications when conditions favor disease development and repeat at a 7-14 day interval if conditions remain favorable for disease development.

PRIAXOR XEMIUM (fluxapyroxad + pyraclostrobin) Mode of Action: 7, 11 (SDHI, QoI)

Application rate: 4 - 8 fl oz/A

REI: 12 hours

Targeted diseases: Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, northern corn leaf spot, Physoderma brown spot, common rust, southern rust, southern corn leaf blight, and yellow leaf blight.

Restrictions: Do not apply more than 2 applications of Priaxor per acre per year. Do not apply within 21 days of harvest or within 7 days when harvesting for forage. Do not apply more than two applications of Priaxor without alternating with a fungicide that has a different mode of action for at least one application. Do not apply more than 16 fl ozs of product/A per season. Adjuvant or crop oil damage can occur when applied after the V8 (8 leaf collar) stage and prior to the VT (tassel) stage. Apply before disease occurs and repeat on a 7-14 day interval, if conditions continue to favor disease proliferation.
PROLINE 480 SC (prothioconazole) Mode of Action: 3 (DMI)

**Application rate:** 5.7 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust. Will also suppress Fusarium, Gibberella, and Aspergillus ear rots.

**Restrictions:** Do not apply more than 22.8 fl oz/A of Proline/year. Do not apply within 14 days of harvest for grain and fodder. Forage may be harvested on the same day as the application. Proline may be applied by ground, air or chemigation. Apply a minimum of 3 gal/A by air or 10 gal/A ground. Do not use adjuvants with Proline between the V8 and the VT growth stages. For optimum suppression of ear rots, apply Proline from the R1 (initial silk emergence) to the R2 (brown silk) corn growth stages. Apply when disease first appears and at 7-14 day intervals, thereafter if conditions continue to favor disease.

PROSARO 421 SC (tebuconazole + prothioconazole) Mode of Action: 3 (DMI)

**Application rate:** 6.5 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Prosaro may be applied by ground, air or chemigation. Apply a minimum of 2 gal/A by air or 10 gal/A ground. Do not use adjuvants with Prosaro between the V8 and the VT growth stages. Apply when disease first appears and at 7-14 day intervals, if conditions continue to favor disease. Do not apply more than 26 fl oz/A/ season. Do not apply within 21 days of harvest for forage or 36 days of harvest for grain or fodder.

QUADRIS, SATORI, AFRAME, AZOXY 2SC, AZOXYSTAR, TETRABAN (azoxystrobin) Mode of Action: 11 (QoI)

**Application rate:** 6 - 15.5 fl oz/A

**REI:** 4 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, southern rust, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Apply at the first sign of gray leaf spot symptoms. A second application may be required 14 days later. Do not apply within 7 days of harvest. Do not apply more than two sequential applications without alternating with another fungicide chemistry. Do not apply more than 2 applications of Quadris or Satori or Aframe or other strobilurin fungicides per acre per year. Use only in an integrated disease management approach with resistant hybrids, proper fertility, residue management and crop rotation. Quadris, Satori and Aframe may be applied by ground, air or through chemigation. Do not apply more than 120 fl oz of product/A per year. Do not apply within 7 days of harvest.

QUILT XCEL, AVARIS (propiconazole + azoxystrobin) Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 7 - 14 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, and northern corn leaf spot.

**Restrictions:** Do not make more than 2 applications of Quilt, Quilt Xcel, Avaris or other strobilurin fungicides per year. Do not apply more than 28 fl oz/A for field corn harvested for forage. Do not apply within 30 days of harvest for forage, grain or stover. Apply when disease first appears. If conditions favorable for disease persist, reapply every 14 days.

REVYTEK (mefentrifluconazole + fluxapyroxad + pyraclostrobin) Mode of Action: 3, 7, 11 (DMI, SDHI, QoI)

**Application rate:** 8 - 15 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, northern corn leaf spot, southern corn leaf blight, tar spot, and yellow leaf blight.

**Restrictions:** Do not apply more than 15 fl oz per acre per application. Do not apply more than 2 applications per year. Post-harvest interval: 21 days.
Foliar Fungicides

**SERENADE ASO, SERENADE MAX** *(Bacillus subtilis strain QST 713)* Mode of Action: 44

**Application rates:**
- **Serenade ASO:** 0.5 - 2 quarts/A
- **Serenade MAX:** 1 - 3 lbs/A

**REI:** 4 hours

**Targeted diseases:** Common rust, and southern corn leaf blight.

**Restrictions:** Begin applications when conditions favor disease development and repeat at a 7-10 day interval if conditions remain favorable for disease development. Use the higher rates and shorter intervals when disease pressure is high. Serenade ASO and Serenade MAX have a 0 day preharvest interval. Serenade ASO, Serenade MAX may be applied by ground, air or chemigation.

**STRATEGO** *(propiconazole + trifloxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rates:** 10 - 12 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Do not apply more than 24 fl oz/A/year. Do not apply within 30 days of harvest for forage, grain and stover. Do not apply more than 2 sequential applications of Stratego. Stratego may be applied by ground, air or chemigation. Do not apply more than 2 sequential applications of Stratego or other strobilurin fungicides. Apply when disease first appears and at 7-14 day intervals, thereafter if conditions continue to favor disease. Use higher rates and shorter intervals when disease pressure is high.

**STRATEGO YLD** *(prothioconazole + trifloxystrobin)* Mode of Action: 3, 11 (DMI, QoI)

**Application rate:** 2 - 5 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, Physoderma brown spot, northern corn leaf spot, Diplodia ear rot, and southern corn leaf blight.

**Restrictions:** Do not apply more than 10 fl oz/A/season. Do not apply within 14 days of harvest for grain or fodder. Forage may be harvested the day of application. Stratego YLD may be applied by ground, air or chemigation. An adjuvant may be added at the lowest recommended rate to enhance disease control. Do not use adjuvants along with Stratego YLD when spraying corn between the V8 (8 leaf collar) and VT (tassel) growth stages. Apply when disease first appears and at 7-14 day intervals, if conditions continue to favor disease. Use higher rates and shorter intervals when disease pressure is severe. For early season disease control use 2-5 fl oz/A. Apply at V4 to V7 growth stages when conditions are favorable for disease development.

**TOPGUARD** *(flutriafol)* Mode of Action: 3 (DMI)

**Application rate:** 7 - 14 fl oz/A

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, southern rust, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Do not apply within 7 days of harvest for, stover and grain. There is a zero-day restriction for forage. Do not apply more than 2 applications per season. Do not apply more than 14 fl oz/A per application. Do not apply more than 28 fl oz/A per season. TopGuard may be applied by ground or air. Apply a minimum of 5 gal/A air or 10 gal/A ground. A surfactant may be used with TopGuard but do not use surfactants when spraying corn prior to the V8 growth stage and after the VT growth stage. Use the higher rate when disease pressure is high and if conditions are favorable for disease development. Minimum retreatment interval is 7 days.
TOPGUARD EQ (flutriafol + azoxystrobin) Mode of Action: 3, 11 (DMI, QoI)

- Application rate: 5 - 7 fl oz/A
- REI: 12 hours
- Targeted diseases: Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, southern rust, northern corn leaf spot, and southern corn leaf blight.
- Restrictions: Do not exceed 7 fl oz/A for a single application. Do not exceed 14 fl oz/A of product per year. An adjuvant may be used prior to V8 and after VT growth stage. Do not apply within 7 days of harvest. Apply preventatively or when conditions are favorable for disease development. Apply no later than growth R4 (early dough stage).

TRIVAPRO (benzovindiflupyr + azoxystrobin + propiconazole) Mode of Action: 7, 11, 3 (SDHI, QoI, DMI)

- Application rate: 13.7 fl oz/A
- REI: 12 hours
- Targeted diseases: Anthracnose leaf blight, eye spot, gray leaf spot, northern corn leaf blight, common rust, Physoderma brown spot, southern rust, northern corn leaf spot, southern corn leaf blight, tar spot, and suppression only for Diplodia ear rot.
- Restrictions: Do not apply more than 41.1 fl oz/A/season. Do not make more than two applications of Trivapro Fungicide or other Group 7 or 11 fungicides before changing to a fungicide that is not in Group 7 or 11. Do not apply within 30 days of harvest for forage, grain, or stover. An early application (V4-V8) may be applied for early season disease control and plant performance benefits. For later season applications, apply when disease first appears. If conditions favorable for disease persist, continue to apply on a 14-day schedule.

VELTYMA (mefentrifluconazole + pyraclostrobin) Mode of Action: 3, 11 (DMI, QoI)

- Application rate: 7 - 10 fl oz/A
- REI: 12 hours
- Targeted diseases: Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, eye spot, common rust, southern rust, tar spot, northern corn leaf spot, southern corn leaf blight, and yellow leaf blight.
- Restrictions: Do not apply more than 10 fl oz per acre per application. Do not apply more than 2 applications per year. Do not apply more than 20 fl oz per acre per year. Do not apply within 21 days of harvest.

VERTISAN (penthiopyrad) Mode of Action: 7 (SDHI)

- Application rate: 10 - 24 fl oz/A
- Targeted diseases: Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, common rust, southern rust, Physoderma brown spot, northern corn leaf spot, southern corn leaf blight, and leaf spots.
- Restrictions: Do not exceed 48 fl oz/acre per year. Do not apply more than two sequential applications of Vertisan without alternating with another fungicide chemistry. Apply a minimum of 2 gal/A by air or 15 gal/A ground. Do not apply within 7 days of grain and stover harvest. Corn may be grazed or used for forage right after application. Apply before disease occurs and repeat on a 7-14 day interval. Use the higher rate and shorter interval when disease pressure is high. For Physoderma brown spot apply 16-24 fl oz/A.

XYWAY LFR (flutriafol) Mode of Action: 3 (DMI)

- Application rate: 7.6 - 15.2 fl oz/A
- REI: 12 hours
- Targeted diseases: Gray leaf spot, northern corn leaf blight, common rust, southern corn leaf blight, common smut, and head smut.
- Restrictions: Do not use this product as a foliar application. Do not apply this product by air. Do not apply more than 15.2 fl oz/A per year including at foliar applications of other flutriafol products. Xyway may be applied in-furrow at planting or post-emergence directed to the soil at the base of the plant. Xyway can be mixed directly with the fertilizer. Do not use chemigation when conditions are favorable for drift to non-target areas.
ZOLERA FX (*tetraconazole + fluoxastrobin*) Mode of action 3, 11 (DMI, QoI)

**Application rate:** 4.4 - 6.8 fl oz/acre

**REI:** 12 hours

**Targeted diseases:** Anthracnose leaf blight, gray leaf spot, northern corn leaf blight, common rust, southern rust, eye spot, northern corn leaf spot, and southern corn leaf blight.

**Restrictions:** Do not apply more than 6.8 fl oz per acre per application. Do not apply more than 6.8 fl oz per acre per year. Do not make more than 1 application of Zolera FX fungicide per year. Do not use adjuvants in sprays made between V8 (8 leaf collar) and VT (lowest branch of the tassel visible but silks have not emerged) growth stages. An adjuvant may be used at any other growth stage. Do not apply Zolera FX fungicide within 30 days of harvest. If tank mixing or sequentially applying another product containing fluoxastrobin, do not apply more than 0.36 lb ai fluoxastrobin per acre per year. Do not apply more than 0.09 lb ai tetraconazole per acre per year. Do not apply after corn growth stage R3 (brown silk/milk).