

2020

South Dakota Pest Management Guide

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.

This book was published by SDSU Extension. For more information in the fields of agriculture, farming and rural living available in print, electronically, or on-line, visit extension.sdstate.edu.

This publication was developed through funding from SDSU Extension and the National Institute of Food and Agriculture, Crop Protection and Pest Management, Applied Research and Development Program support through grant 2017-04417.

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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Contents

South Dakota 2020 Pest Management Guide – Corn

Weed Control in Corn	3
<i>Paul O. Johnson, SDSU Extension Weed Science Coordinator</i> <i>David Vos, SDSU Ag Research Manager</i> <i>Jill Alms, SDSU Ag Research Manager</i> <i>Leon J. Wrage, SDSU Distinguished Professor Emeritus</i>	
Foliar Insecticides in Corn	41
<i>Philip Rozeboom, SDSU Extension IPM Coordinator</i> <i>Patrick M. Wagner, SDSU Extension Entomology Field Specialist</i> <i>Adam J. Varenhorst, Assistant Professor & SDSU Extension Field Crop Entomologist</i>	
Corn Seed Treatments	57
<i>Emmanuel Byamukama, Assistant Professor & SDSU Extension Plant Pathologist</i> <i>Dalitso Yabwalo, Postdoctoral Research Associate, SDSU Extension Plant Pathology Program</i> <i>Philip Rozeboom, SDSU Extension IPM Coordinator</i> <i>Patrick M. Wagner, SDSU Extension Entomology Field Specialist</i> <i>Adam J. Varenhorst, Assistant Professor & SDSU Extension Field Crop Entomologist</i>	
Foliar Fungicides in Corn	65
<i>Emmanuel Byamukama, Assistant Professor & SDSU Extension Plant Pathologist</i> <i>Dalitso Yabwalo, Postdoctoral Research Associate, SDSU Extension Plant Pathology Program</i> <i>Connie Strunk, SDSU Extension Plant Pathology Field Specialist</i>	

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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 products 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 post-emergence, 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 (marestalk)

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 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, 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

EPPS	EARLY PREPLANT SURFACE: Usually applied 2 to 6 weeks before planting in no-till.
PPS	PREPLANT SURFACE: Prior to planting.
PPI	PREPLANT INCORPORATED: Before the crop is planted, incorporate as directed.
SPPI	SHALLOW PREPLANT INCORPORATED: Preplant incorporated, but herbicide usually restricted to the top 2 inches of soil with single-pass incorporation.
PRE	PREEMERGENCE: After planting, but before crop or weeds emerge.
EPOST	EARLY POSTEMERGENCE: After initial emergence or crop and weeds.
POST	POSTEMERGENCE: After the crop or weeds have emerged.

ae = acid equivalent

ai = active ingredient

gal = gallon

gpa = gallon per acre

in = inch

lb = pound

lb/gal = pound per gallon

mo = month

oz = ounce

psi = pounds per square inch pressure

pt = pint

qt = quart

%v/v = percent volume per volume

AMS = ammonium sulfate

CF = Clearfield corn

COC = crop oil concentrate

G = granule

L = liquid, flowable or EC

LL = Liberty Link corn

MSO = methylated seed oil

N = liquid nitrogen fertilizer

NIS = non-ionic surfactant

OM = organic matter

RR = Roundup Ready corn

SG, DF, WDG = dry flowable, water dispersible granule (spray)

UAN = urea+ammonium nitrate liquid fertilizer

WSP = water soluble packet

Group Numbers Associated with Herbicide Sites or Modes of Action

WSSA Group Number	Site or Mode of Action	Examples
2	ALS inhibitor	nicosulfuron, rimsulfuron, flumetsulam
3	Microtubule inhibitor	pendimethalin, trifluralin
4	Growth regulator	2,4-D, dicamba, clopyralid
5	Photosynthesis inhibitor (triazine, triazinone)	atrazine, metribuzin
6	Photosynthesis inhibitor (contact)	bentazon, bromoxynil
8	Lipid synthesis inhibitor (thiocarbamates)	EPTC
9	EPSP inhibitor	glyphosate
10	Glutamine synthase inhibitor	glufosinate
14	Cell membrane disrupter (PPO inhibitor)	carfentrazone, flumiclorac, saflufenacil
15	Seedling shoot inhibitor	acetochlor, metolachlor
19	Auxin transport inhibitor	diflufenzopyr
22	Cell membrane disrupter (PSI inhibitor)	paraquat
27	Bleacher (HPPD)	mesotrione, tembotrione, topramezone

Product Table of Contents

Accent Q (<i>nicosulfuron</i>)	25	Diablo (<i>dicamba</i>)	27
Accolade (<i>flumetsulam</i>)	21	DiFlexx (<i>dicamba</i>)	27
Acumen (<i>pendimethalin</i>)	22	DiFlexx Duo (<i>dicamba + tembotrione</i>)	28
Acuron (<i>s-metolachlor + atrazine + mesotrione + bicyclopyrone</i>)	18	Dimetric (<i>metribuzin</i>)	7
Acuron Flexi (<i>s-metolachlor + mesotrione + bicyclopyrone</i>)	18	Distinct (<i>dicamba + diflufenzopyr</i>)	28
Aim (<i>carfentrazone</i>)	29	Double Header (<i>acetochlor + mesotrione</i>)	13
Alluvex (<i>rimsulfuron + thifensulfuron</i>)	24	Dual II Magnum (<i>s-metolachlor</i>)	11
Anthem ATZ (<i>fluthiacet + pyroxasulfone + atrazine</i>)	10	Engenia (<i>dicamba</i>)	27
Anthem Flex (<i>pyroxasulfone + carfentrazone</i>)	11	Enlist Duo (<i>glyphosate + 2,4-D</i>)	37
Anthem Maxx (<i>fluthiacet + pyroxasulfone</i>)	10	Enlist One (<i>2,4-D</i>)	37
Argos (<i>mesotrione</i>)	16	EverpreX (<i>s-metolachlor</i>)	11
Armezon (<i>topramezone</i>)	20	Expert (<i>s-metolachlor + glyphosate + atrazine</i>)	12
Armezon Pro (<i>topramezone + dimethenamid</i>)	20	Explorer (<i>mesotrione</i>)	16
Arrest CS (<i>acetochlor</i>)	13	FeXapan (<i>dicamba</i>)	27
Atrazine (<i>atrazine</i>)	7	Fierce, Fierce EZ (<i>flumioxazin + pyroxasulfone</i>)	8
Autumn Super (<i>iodosulfuron + thien carbazono</i>)	26	Fierce MTZ (<i>flumioxazin+pyroxasulfone+metribuzin</i>)	9
Balance Flexx (<i>isoxaflutole</i>)	15	Firestorm (<i>paraquat</i>)	35
Banvel (<i>dicamba</i>)	27	Forfeit 280 (<i>glufosinate</i>)	36
Basagran (<i>bentazon</i>)	30	Framework (<i>pendimethalin</i>)	22
BashAzon (<i>bentazon</i>)	30	Fultime NXT (<i>acetochlor + atrazine</i>)	13
Basis (<i>rimsulfuron + thifensulfuron</i>)	24	Glory (<i>metribuzin</i>)	7
Beacon (<i>primisulfuron</i>)	31	Glufosinate 280 (<i>glufosinate</i>)	36
Bentazon 4 (<i>bentazon</i>)	30	Glyphosate products (<i>glyphosate</i>)	35, 37
Bicep II Magnum (<i>s-metolachlor + atrazine</i>)	12	G-Max Lite (<i>dimethenamid + atrazine</i>)	15
Bite (<i>clopyralid</i>)	33	Gramoxone (<i>paraquat</i>)	35
BL4 (<i>mesotrione</i>)	16	Grappe (<i>rimsulfuron</i>)	23
Blanco (<i>paraquat</i>)	35	Halex GT (<i>s-metolachlor+glyphosate+mesotrione</i>)	18
Bonedry (<i>paraquat</i>)	35	Halomax (<i>halosulfuron</i>)	32
Brawl (<i>s-metolachlor</i>)	11	Harmony SG (<i>thifensulfuron</i>)	23
Breakfree NXT (<i>acetochlor</i>)	12	Harness (<i>acetochlor</i>)	12
Bridger (<i>acetochlor</i>)	12	Harness Max (<i>acetochlor + mesotrione</i>)	13
Bridle (<i>mesotrione</i>)	16	Harness Xtra (<i>acetochlor + atrazine</i>)	13
Broadloom (<i>bentazon</i>)	30	Helmet (<i>metolachlor</i>)	11
Broclean (<i>bromoxynil</i>)	30	Helmquat (<i>paraquat</i>)	35
Brox (<i>bromoxynil</i>)	30	Herbivore (<i>halosulfuron</i>)	32
Brozine (<i>bromoxynil + atrazine</i>)	30	Hinge (<i>rimsulfuron</i>)	23
Cadence NXT (<i>acetochlor</i>)	12	Hornet WDG (<i>flumetsulam + clopyralid</i>)	22
Cadet (<i>fluthiacet-methyl</i>)	29	Impact (<i>topramezone</i>)	20
Calleron (<i>mesotrione</i>)	16	ImpactZ (<i>topramezone + atrazine</i>)	20
Callisto (<i>mesotrione</i>)	16	Incinerate (<i>mesotrione</i>)	16
Callisto GT (<i>glyphosate + mesotrione</i>)	17	Instigate (<i>rimsulfuron + mesotrione</i>)	25
Callisto Xtra (<i>mesotrione + atrazine</i>)	17	Interline (<i>glufosinate</i>)	36
Capreno (<i>thien carbazono + tembotrione</i>)	21	Keystone NXT (<i>acetochlor + atrazine</i>)	13
Cavallo (<i>mesotrione</i>)	16	Kochiavore (<i>2,4-D + bromoxynil + fluroxypyr</i>)	34
Charger Basic (<i>s-metolachlor</i>)	11	Ladem (<i>s-metolachlor</i>)	11
Charger Max ATZ Lite (<i>s-metolachlor + atrazine</i>)	12	Laudis (<i>tembotrione</i>)	20
Cheetah (<i>glufosinate</i>)	36	Liberty (<i>glufosinate</i>)	36
Cinch (<i>s-metolachlor</i>)	11	Lightning (<i>imazethapyr + imazapyr</i>)	36
Clarifier (<i>dicamba</i>)	27	Lumax EZ (<i>s-metolachlor + mesotrione + atrazine</i>)	19
Clarity (<i>dicamba</i>)	27	Maestro (<i>bromoxynil</i>)	30
Clash (<i>dicamba</i>)	27	Medal II (<i>s-metolachlor</i>)	11
Clean Slate (<i>clopyralid</i>)	33	Mes-O-Sate (<i>metolachlor+glyphosate+mesotrione</i>)	18
Colt AS (<i>clopyralid + fluroxypyr</i>)	33	Meso (<i>mesotrione</i>)	16
Comet (<i>fluroxypyr</i>)	33	MesoCore (<i>mesotrione + clopyralid</i>)	17
Commando (<i>clopyralid + 2,4-D</i>)	33	Meso Star (<i>mesotrione</i>)	16
Confidence (<i>acetochlor</i>)	12	Mesotrione (<i>mesotrione</i>)	16
Confidence Xtra (<i>acetochlor + atrazine</i>)	13	MesoTryONE (<i>mesotrione</i>)	16
Corvus (<i>isoxaflutole + thien carbazono</i>)	16	Metalica (<i>metolachlor</i>)	11
Curtail (<i>clopyralid + 2,4-D</i>)	33	Me-Too-Lachlor II (<i>metolachlor</i>)	11
Deadbolt (<i>bromoxynil + 2,4-D</i>)	31	Metribuzin (<i>metribuzin</i>)	7
Detonate (<i>dicamba</i>)	27	MetriCor (<i>metribuzin</i>)	7
Devour (<i>paraquat</i>)	35	Metrixx (<i>metribuzin</i>)	7
		Moccasin II Plus (<i>s-metolachlor</i>)	11
		Motif (<i>mesotrione</i>)	16

Moxy (<i>bromoxynil</i>)	30	Surmise (<i>glufosinate</i>)	36
NorthStar (<i>primisulfuron + dicamba</i>)	31	Surpass NXT (<i>acetochlor</i>)	12
Nullify A/P (<i>glufosinate</i>)	36	Tetris (<i>rimsulfuron</i>)	23
Obtain EC (<i>fluroxypyr</i>)	33	Threesidual (<i>acetochlor + flumetsulam + clopyralid</i>)	14
Outflank (<i>flumioxazin</i>)	8	Total (<i>glufosinate</i>)	36
Outlook (<i>dimethenamid</i>)	15	Treaty (<i>thifensulfuron</i>)	23
OverTime NXT (<i>acetochlor</i>)	12	Treflan (<i>trifluralin</i>)	23
Palace (<i>s-metolachlor + mesotrione</i>)	19	Tremor NXT (<i>acetochlor</i>)	12
Panther, Panther SC (<i>flumioxazin</i>)	8	TriCor (<i>metribuzin</i>)	7
Parallel (<i>metolachlor</i>)	11	Trifluralin (<i>trifluralin</i>)	23
Paraquat (<i>paraquat</i>)	35	Triflurex (<i>trifluralin</i>)	23
Para-Shot 3.0 (<i>paraquat</i>)	35	TripleFlex II (<i>acetochlor + flumetsulam + clopyralid</i>)	14
Parazone (<i>paraquat</i>)	35	TrizMax (<i>metolachlor+mesotrione+atrazine</i>)	19
Pendimethalin (<i>pendimethalin</i>)	22	Trump Card (<i>fluroxypyr + 2,4-D</i>)	33
PendiPro (<i>pendimethalin</i>)	22	Truslate (<i>clopyralid + fluroxypyr</i>)	33
Permit (<i>halosulfuron</i>)	32	Trust (<i>trifluralin</i>)	23
Phenomenon (<i>metolachlor</i>)	11	Valor SX, Valor EZ (<i>flumioxazin</i>)	8
Pin-Dee (<i>pendimethalin</i>)	22	Verdict (<i>saflufenacil + dimethenamid</i>)	8
Prequel (<i>rimsulfuron + isoxaflutole</i>)	16	Vida (<i>pyraflufen</i>)	34
Primero (<i>nicosulfuron</i>)	25	Villain (<i>metolachlor+mesotrione</i>)	19
Profine 75 (<i>halosulfuron</i>)	32	Vision (<i>dicamba</i>)	27
Promote (<i>halosulfuron</i>)	32	Visor S-Moc (<i>s-metolachlor</i>)	11
Prowl (<i>pendimethalin</i>)	22	Volley NXT (<i>acetochlor</i>)	12
Pruvin (<i>rimsulfuron</i>)	23	Volta (<i>thifensulfuron</i>)	23
Python (<i>flumetsulam</i>)	21	Warrant (<i>acetochlor</i>)	13
Quartz (<i>mesotrione</i>)	16	WideMatch (<i>clopyralid + fluroxypyr</i>)	33
Realm Q (<i>rimsulfuron + mesotrione</i>)	25	Xtendimax (<i>dicamba</i>)	27
Reckon 280SL (<i>glufosinate</i>)	36	Yukon (<i>halosulfuron + dicamba</i>)	32
Refer 280 (<i>glufosinate</i>)	36	Zemax (<i>s-metolachlor + mesotrione</i>)	19
Reptile (<i>flumetsulam</i>)	21	Zidua, Zidua SC (<i>pyroxasulfone</i>)	9
Resicore (<i>acetochlor + mesotrione + clopyralid</i>)	14	2,4-D (<i>amine or ester</i>)	32
Resolve Q (<i>rimsulfuron + thifensulfuron</i>)	24		
Resource (<i>flumiclorac</i>)	30	Mode of Action Table	4
Revulin Q (<i>nicosulfuron + mesotrione</i>)	26	Weed Response Table	39
Rifle (<i>dicamba</i>)	27		
Rifle-D (<i>dicamba + 2,4-D</i>)	29		
Rixa (<i>metolachlor+mesotrione+atrazine</i>)	19		
Sandea (<i>halosulfuron</i>)	32		
Satellite Flex, Satellite HydroCap (<i>pendimethalin</i>)	22		
Scorch (<i>dicamba + 2,4-D + fluroxypyr</i>)	28		
Scout (<i>glufosinate</i>)	36		
Sequence (<i>s-metolachlor + glyphosate</i>)	12		
Sharpen (<i>saflufenacil</i>)	7		
Shieldex 400SC (<i>tolpyralate</i>)	21		
Slider (<i>dimethenamid</i>)	15		
Smackdown (<i>acetochlor+flumetsulam+clopyralid</i>)	14		
Solida (<i>rimsulfuron</i>)	23		
Solstice (<i>fluthiacet+mesotrione</i>)	29		
Spirit (<i>prosulfuron + primisulfuron</i>)	31		
Spitfire (<i>dicamba + 2,4-D</i>)	29		
Spur (<i>clopyralid</i>)	33		
Stalwart 2W (<i>metolachlor+mesotrione</i>)	19		
Stalwart C (<i>metolachlor</i>)	11		
Stanza (<i>flumetsulam + clopyralid</i>)	22		
Starane NXT (<i>fluroxypyr + bromoxynil</i>)	34		
Starane Ultra (<i>fluroxypyr</i>)	33		
Status (<i>dicamba + diflufenzopyr</i>)	28		
Staunch II (<i>acetochlor+flumetsulam+clopyralid</i>)	14		
Steadfast Q (<i>nicosulfuron + rimsulfuron</i>)	26		
Stealth (<i>pendimethalin</i>)	22		
Sterling Blue (<i>dicamba</i>)	27		
Stigmata (<i>clopyralid</i>)	33		
Stinger (<i>clopyralid</i>)	33		
Strut (<i>dicamba</i>)	27		
SureStart II (<i>acetochlor + flumetsulam + clopyralid</i>)	14		

CORN HERBICIDES

ATRAZINE (atrazine) Site of Action: 5 Restricted Use Pesticide

(\$3.40-7.25)

1-2 qt atrazine 4L

1.1-2.2 lb atrazine 90DF (1.6-2 lb ai)

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) 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.

EPSS. 1.6-2 qt (4L) 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.

SPPI. 1.6-2 qt (4L) 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) 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) 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

(\$1.85-8.10)

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, Metrixx SC, 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 2-5.33 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

(\$6.85-24.00)

1-3.5 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 lambsquarters, waterhemp, pigweed, mustard species, Russian thistle, horseweed (marestail), cocklebur, 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. Crop rotation restriction is 7 months or less for most crops.

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.

PREMIX

VERDICT (saflufenacil + dimethenamid) Site of Action: 14 + 15

(\$19.60-35.30)

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 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.

VALOR, OUTFLANK or PANTHER (flumioxazin) Site of Action: 14

(\$8.60-21.00)

2-4 oz Valor SX, Outflank, or Panther 51WDG (0.06-0.125 lb ai)

2-4 oz Valor EZ or Panther 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 3-4 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 1-2 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.

PREMIX

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

(\$24.50-37.60)

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 3 oz/A rate of Fierce WDG, the rotation interval is 7 days for minimum or no-till corn, 1 month for wheat and conventional till corn; 4 months for sunflower and potatoes; 6 months for field pea and lentil; 10 months for alfalfa; 11 months for other small grains and edible beans; and 18 months for most other crops. Consult label for rates greater than 3 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 (flumioxazin + pyroxasulfone + metribuzin) Site of Action: 14 + 15 + 5 (\$29.20-43.85)

1-1.5 pt Fierce MTZ 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; 8 months for wheat or lentils; 10 months for alfalfa; 11 months for small grains (other than wheat) and edible peas and beans; 12 months for potatoes; 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, clopyralid, 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 (\$10.75-39.90)

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, 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. Rotation interval for sunflower depends on product used and soil texture. See supplemental label for Zidua 85WG use in sunflower.

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

ANTHEM MAXX (pyroxasulfone + fluthiacet methyl) Site of Action: 15 + 14

(\$13.10-42.60)

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, waterhemp, 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)

(\$21.10-56.30)

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 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 1.75-4 pt/acre when applied preplant or preemergence depending on soil texture and organic matter. Apply postemergence at 1.5-3 pt/acre depending on soil texture.

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. Not labeled 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 ATZ are used, do not exceed the maximum allowable use rates for pyroxasulfone and fluthiacet methyl. Do not apply more than 39 oz/acre of Anthem ATZ on coarse soils or 70.5 oz/acre on medium and fine soils per cropping season. Corn can be planted anytime. In eastern parts of South Dakota, soybeans may be planted the following year for rates less than 4 pt/A (2 lb ai atrazine); however, injury may occur on calcareous soils. Rotation interval for most other crops is 18 months.

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 1.5-3 pt from crop emergence through V4 stage of corn.

ANTHEM FLEX (pyroxasulfone + carfentrazone) Site of Action: 15 + 14**(\$14.65-38.75)****2.75-7.28 oz Anthem Flex 4L (0.08-0.21 + 0.006-0.015 lb ai)**

Premix containing 3.733 lb pyroxasulfone (Zidua) and 0.267 lb carfentrazone (Aim) per gallon. Controls annual grasses and some broadleaves; including waterhemp and pigweed species. Rates vary based on soil texture and organic matter. Use the higher recommended rate for early preplant, reduced tillage, or heavy weed pressure. Plant corn at least 1.5 inches deep to avoid risk of crop response. For burndown applications add NIS (0.25% v/v), or COC/MSO (1-2 pt/A). For control of emerged weeds include a tank-mix such as 2,4-D, dicamba, glyphosate or atrazine. Minimum carrier is 5 gpa for ground or 3 gpa for aerial applications.

Do not apply more than 5 oz/A on coarse soils or 9.12 oz/A on medium or fine soils per cropping season. Rotation intervals vary with the rate used. For the 7.28 oz rate rotation interval is 4 months for soybean and sunflowers; 6 months for wheat; 8 months for lentils and dry field peas; 10 months for alfalfa; 11 months for dry beans; 12 months for grain sorghum; and 18 months for canola, small grains other than wheat, and most other crops.

EPP. Apply 3.5-7.28 oz 15-45 days before planting.

PPS or PRE. Apply 2.75-7.28 oz.

METOLACHLOR PRODUCTS (s-metolachlor) Site of Action: 15**(\$7.10-31.55)****1-2 pt Dual II Magnum, Brawl II, Charger Max, Cinch, Ladem, Medal II, Moccasin II Plus 7.64L****1-2 pt Dual Magnum, Brawl, Charger Basic, EverpreX, Medal, or Visor S-Moc 7.62L****1.2-2.4 pt Dual Magnum SI 6.3L****6-12 lb Dual II G-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 lambsquarters. 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/A 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 55o 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 grass pressure is light to moderate.

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, PARALLEL or PHENOMENON 7.8L (0.98-2 lb ai) (metolachlor)

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 **Restricted Use Pesticides**

Herbicides	metolachlor + atrazine lb/gal	s-metolachlor + atrazine lb/gal	product/A qt	Equivalent atrazine/A lb ai	Rate qt/A			
					EPP	PPS, PPI, PRE		POST
						<3% O.M.	≥3% O.M.	
Bicep II Magnum 5.5L, Brawl II ATZ, Cinch ATZ, Ladem AT, Medal II ATZ	---	2.4+3.1	1.3-2.6	1-2	2.1-2.6	1.3-2.1	1.6-2.6	1.6-2.6
Bicep Lite II Magnum 6L, Charger Max ATZ Lite, Cinch ATZ Lite 6L	---	3.3+2.7	0.9-2.2	0.6-1.5	1.5-2.2	0.9-1.5	1.1-2.2	1.1-1.9
Stalwart Xtra 5.5L	2.4+3.1	---	1.3-2.6	1-2	2.1-2.6	1.3-2.1	1.6-2.6	1.6-2.6
Parallel Plus, Phenomenon Duo	2.7+2.8	---	1.4-2.83	1-2	1.9-2.83	1.4-2.29	1.48-2.83	1.9-2.83

EPP, PPS, PPI, PRE, or POST. Rates vary by soil texture. Maximum atrazine rate is 1.6 lb ai per acre on highly erodible land with less than 30% residue. Apply to corn up to 12 inches when tank-mixed with glyphosate.

PREMIXES

SEQUENCE (s-metolachlor + glyphosate) Site of Action: 15+9

(\$15.75-25.15)

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).

EXPERT (s-metolachlor+glyphosate+atrazine) Site of Action: 15 + 9 + 5 **Restricted Use Pesticide**

2.5-3.75 qt Expert

Rates vary based on soil texture and organic matter. Intended to provide control of emerged weeds and residual control of several broadleaf and grass weed species. Adding AMS (2% by weight or 17 lb per 100 gallons spray solution) may improve weed control during adverse conditions. Expert at 3 qt/A contains the equivalent active ingredient as 1.6 qt/A atrazine 4L, 1.4 pt/A Dual II Magnum, and 32 oz/A glyphosate 3 lb ae. Minimum carrier is 10 gpa (use 20 gpa in dense canopies) for ground applications. Do not apply with aerial equipment.

Do not mix or load within 50 feet of wells, sinkholes, streams, rivers, lakes, or reservoirs. Do not apply within 66 feet of areas where field surface runoff drains into streams or rivers. Do not apply within 200 feet of natural or impounded lakes or reservoirs.

PPS or PRE. Apply up to 30 days prior to corn planting or prior to corn emergence.

EPOST. Glyphosate-resistant corn only. Apply in corn from emergence up to 12 inches tall.

TANK-MIXES. Preemergence tank-mixes include Dual II Magnum (s-metolachlor), atrazine, glyphosate, Python, Hornet, Prowl (pendimethalin), dicamba, or 2,4-D. Refer to label restrictions for each herbicide.

ACETOCHLOR PRODUCTS Site of Action: 15

(\$9.60-46.30)

1.25-3 pt Breakfree NXT, Bridger, Cadence NXT, Confidence, 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.

WARRANT or ARREST CS (acetochlor) Site of Action: 15

(\$14.65-29.35)

1.5 – 3 qt Warrant or Arrest CS 3L (1.12 - 2.25 lb ai)

Encapsulated acetochlor products increase crop safety and improve the consistency of weed control. 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 Restricted Use Pesticides

Herbicides	Acetochlor + atrazine lb/gal	Encapsulated acetochlor + atrazine lb/gal	Rate (qt/A)		
			Coarse soil	Medium soil	Fine soil
Harness Xtra 5.6L, Breakfree NXT ATZ, Cadence ATZ NXT, Keystone NXT, Confidence Xtra 5.6L, OverTime ATZ NXT, Tremor ATZ NXT, Volley ATZ NXT	3.1 + 2.5	---	1.4-1.7	1.7-2.6	2.3-3
Harness Xtra 6L, Breakfree NXT Lite, Cadence LA NXT, Confidence Xtra, Keystone LA NXT, OverTime ATZ Lite NXT, Tremor ATZ Lite NXT, Volley ATZ Lite NXT	4.3 + 1.7	---	1.8	1.8-2.3	2.0-2.3
Degree Xtra, Fulltime NXT	---	2.7 + 1.34	1.5-2.9	1.5-3.7	1.5-3.7

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 (\$24.40-53.70)

**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 (acetochlor + mesotrione + clopyralid) Site of Action: 15 + 27 + 4**(\$25.65-61.55)****1.25-3 qt Resicore 3.29 SE (0.88-2.1 + 0.09-0.23 + 0.06-0.14 lb ai)**

Premix containing 2.8 lb acetochlor + 0.3 lb 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 1.8 qt/A may be applied if additional herbicides will be applied post-emergence, weed densities are low to moderate, and weeds are not herbicide resistant. May be applied post-emergence up to 11 in tall corn at rates as low as 1.25 qt/A. Resicore at 1.25 qt/A provides equivalent active ingredients as 0.5 qt/A Surpass NXT, 3 oz/A Callisto, and 2.5 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 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 11 inches 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**(\$11.45-36.80)****1.5-3 pt Surestart II, Smackdown, Staunch II, 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 mo for wheat, the spring following application for barley, oats, alfalfa, dry beans, and soybeans, 12 mo for sorghum, 18 mo for sunflowers, and 26 mo for canola. Rotation restrictions increase to 18 mo 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 150 feet of a well if the soil is a sand with less than 3% organic matter (OM), loamy sand with less than 2% OM, or sandy loam with less than 1% OM. 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 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**(\$9.85-25.80)****8-21 oz Outlook or Slider (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 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 55o F but before soil freezes. Use up to 21 oz per acre for medium- and fine-textured soil with >2.5% O.M.

EPSS. 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**G-MAX LITE or SLIDER ATZ LITE (dimethenamid-p + atrazine) Site of Action: 15 + 5****Restricted Use Pesticide****2-3.5 pt G-Max Lite or Slider ATZ Lite 5L (0.56-0.98 + 0.69-1.2 lb ai)**

EPSS, 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**(\$14.70-29.45)****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 safer cyprosulfamide that allows early postemergence applications. Controls annual broadleaf weed species such as pigweed, waterhemp, velvetleaf, lambsquarters, 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 triticale; 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 Flexx. 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 Flexx 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.

PREMIX

CORVUS (isoxaflutole + thiencazuron)

(\$25.50-43.25)

Site of Action: 27 + 2 **Restricted Use Pesticide**

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 thiencazuron may increase grass control relative to Balance Flexx. 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 triticale; 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.

PREQUEL (isoxaflutole + rimsulfuron)

(\$14.50-21.85)

Site of Action: 2 + 27 **Restricted Use Pesticide**

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 Flexx. 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

(\$3.45-20.15)

3-7.7 oz Callisto, Argos, Bridle, Calleron, Cavallo, Explorer, Incinerate, Meso, Meso Star, Mesotrione, MesoTryOne, Motif, or Quartz 4L (0.09-0.24 lb ai)
2.5-7.7 oz BL4 4L (0.08-0.24 lb ai)

Callisto is a systemic preemergence or postemergence HPPD inhibiting herbicide that can cause "bleaching" injury symptoms on weeds. Callisto gives very good to excellent control of annual broadleaves including pigweed, waterhemp, lambsquarters, ragweed, buffalobur, 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 anytime 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. May apply BL4 at 2.5-6 oz/A.

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 tankmixes are allowed including atrazine, glyphosate, glufosinate and others.

PREMIXES

CALLISTO XTRA (mesotrione + atrazine)

(\$8.35-10.00)

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

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

(\$12.90)

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 anytime after application. Rotation interval is 4 months for small grains; 10 months for alfalfa, canola, soybean, sunflower, or potatoes; 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)

(\$29.85-33.20)

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)

(\$49.85-59.80)

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

(\$47.80-53.75)

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.

LUMAX EZ, (s-metolachlor+mesotrione+atrazine)

(\$54.75-65.90)

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

Lumax EZ	Dual II Magnum	Callisto	Atrazine (ai)
2.7 qt	1.8 pt	5.4 oz	0.60 lb
3.25 qt	2.1 pt	6.5 oz	0.75 lb

Lumax EZ provides good to excellent control of foxtails and very good to excellent control of annual broadleaf weeds including velvetleaf, lambsquarters, 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.

EPP, PRE. Apply up to 14 days before planting to the soil surface. If weeds are emerged and foliar activity is desired, include COC (1% v/v).

EPOST. Lumax EZ may be applied to corn less than 12 inches tall. Does not control emerged grasses. A NIS (0.25% v/v) or COC (1% v/v) may be used, but avoid using nitrogen-based adjuvants (AMS or UAN). Temporary injury may occur if COC is used. AMS may be used with Liberty in Liberty Link corn, but then no other adjuvant may be used for that application.

RIXA or TRIZMAX (metolachlor + mesotrione + atrazine) 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 contains metolachlor as compared to s-metolachlor in Lumax EZ. Rixa contains 2.63 metolachlor + 0.263 mesotrione + 0.98 atrazine. TrizMax contains 2.68 lb metolachlor + 0.268 lb mesotrione + 1 lb atrazine per gallon.

ZEMAX or PALACE (s-metolachlor + mesotrione)

(\$41.10-49.30)

STALWART 2W OR VILLAIN (metolachlor + mesotrione) Site of Action: 15 + 27

2-2.4 qt Zemax or Palace (1.67-2.0 + 0.17-0.2 lb ai)

2-2.4 qt Stalwart 2W or Villain (1.63-1.96 + 0.17-0.2 lb ai)

Zemax and Palace are premixes containing 3.34 lb ai s-metolachlor (Dual II Magnum) and 0.33 lb ai mesotrione (Callisto) per gallon. Stalwart 2W 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) 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) 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.

EPP, PRE. Apply to soil surface up to 14 days 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**(\$10.25-16.90)****0.5-0.75 oz Impact or Armezon 2.8L (0.011-0.016 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. May be used after application of isoxaflutole (Balance) if the isoxaflutole rate is less than 0.063 lb ai/A (equivalent of 4 fl oz Balance Flexx).

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 10 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 or snap beans.

POST. May be applied up to V8 or 45 days prior to harvest (which ever 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****(\$19.00-32.55)****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 and 2 gpa for air. Use higher volume when dense vegetation is present. Add MSO or COC at 0.5-1% v/v when applied alone or NIS at 0.25-0.5% v/v is preferred when applied in a tank-mix. Also add UAN at 1.25-2.5% v/v or AMS at 8.5-17 lb per 100 gallons of water. Do not apply more than 28 oz/A per year. Do not exceed 0.022 lb ai topramezone or 1.125 lb ai dimethenamid-p per acre per season.

Rotation interval is 4 months for cereal grains; 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)**(\$11.95-16.00)****Site of Action: 27 + 5 Restricted Use Pesticide****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 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.

LAUDIS (tembotrione) Site of Action: 27**(\$14.20)****3 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.

PREMIX

CAPRENO (tembotrione + thiencazuron) Site of Action: 27 + 2

(\$17.15)

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

Capreno is a premix containing Laudis (tembotrione + safener) and thiencazuron, 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 in the same year as Lorsban, Counter, Dyfonate, or Thimet. Do not graze or harvest for forage within 45 days after application.

Rotation interval is 4 months for wheat and triticale; 10 months for barley, soybeans, sweet corn, and sorghum (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.

SHIELDDEX 400SC (toppyralate) 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.

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

(\$12.00-19.90)

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 marehail, ladythumb, 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% OM 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 50o 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

(\$9.95-24.85)

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

Hornet WDG 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 and 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 corn through 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 WDG 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

(\$8.10-31.45)

1.8-4.8 pt Prowl, Acumen, Framework, Pendimethalin, PendiPro, 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, 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

(\$2.40-8.70)

0.75-2 pt Treflan, Trifluralin, Triflurex, 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

(\$4.80-34.55)

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, 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, PRUVIN, SOLIDA, or TETRIS (rimsulfuron) Site of Action: 2

0.5-2 oz Grapple, Hinge, Pruvín, 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 lambsquarters, 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% or 32% 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.

PREMIX

RESOLVE Q (rimsulfuron + thifensulfuron) Site of Action: 2 + 2

(\$11.50-23.00)

1.25-2.5 oz Resolve Q 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.

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

(\$6.50-19.75)

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, lambsquarters, 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 a.i. 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 flax, peas, sorghum, dry beans, soybean, and sunflowers; and 18 months for alfalfa, canola, and most other crops. Do not apply more than 0.0625 lb a.i. 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**(\$18.55-24.70)****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.

REALM Q (rimsulfuron + mesotrione) Site of Action: 2 + 27**(\$20.10)****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 volume 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 or 32% 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 or Breakfree postemergence or leaf burn may result.

ACCENT Q or PRIMERO (nicosulfuron) Site of Action: 2**(\$18.50)****0.9 oz Accent Q 54.5 WDG (0.031 lb ai)****0.67 oz Primero 75WDG (0.31 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, Breakfree NXT, Callisto, Impact, Lumax, Cinch, Cinch ATZ, Prowl, Surpass, Dual, Outlook and others. Refer to labels for rates and restrictions.

PREMIXES

REVULIN Q (nicosulfuron + mesotrione) Site of Action: 2 + 2 **(\$19.65-23.10)**

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 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 **(\$18.70)**

1.5 oz Steadfast Q 37.7WDG (0.023 + 0.012 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 12 months. Rotational guidelines for sunflower and sorghum are based on soil pH. Sorghum may be planted after 10 months and sunflower after 11 months if pH is 7.5 or less. Higher pH requires an 18-month planting restriction for these crops.

POST. Apply to corn up to 20 inches or up to and 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 Breakfree NXT, 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 + thien carbazon) Site of Action: 2 + 2 **(\$7.20-12.00)**

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 thien carbazon

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

EPSS. 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

(\$3.15-27.85)

0.5-1 pt dicamba 4L (0.25-0.5 lb ae)
 0.5-1 pt DiFlexx 4L
 11-22 oz Fexapan or Xtendimax 2.9L
 6.4-12.8 oz Engenia 5L

Dicamba is available in several brandname products including **Banvel, Clarifier, Clarity, Clash, Cruise Control, Detonate, Diablo, Dicamba, DiFlexx, Disha DMA, Engenia, Fexapan, Opti-DGA, Oracle, Rifle, Sterling Blue (DGA), Strut, Topeka, Vision, Xtendimax 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 greensnap 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. Xtendimax and Fexapan are a diglycolamine salt with Vaporgrip technology and Engenia is a BAPMA salt for reduced volatility. 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 Xtendimax, Fexapan, and Engenia is 15 gpa ground. Do not apply Xtendimax, Fexapan or Engenia by 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 according to time of application.

Application guidelines for 4L products: 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 85o F. Slight wind moving away from sensitive crops is preferred to calm conditions. Use less than 20 psi pressure and at least 20 gpa. Use drop nozzles if corn is over 8 inches. Do not apply dicamba when soybeans are nearby if corn is over 24 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.

Application guidelines for 2.9L and 5L products: Apply when wind is 3-10 mph and not blowing toward sensitive crops or areas. Apply between 1 hour after sunrise to 2 hours before sunset. Do not use AMS. See label for tankmix options and other application requirements and restrictions.

DICAMBA PRODUCTS (excluding DiFlexx):

PPS, PRE. Apply 1 pt/A (4L), 22 oz/A (2.9L), or 12.8 oz/A (5L) 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 (4L), 11 oz (2.9L) or 6.4 oz (5L) 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 (4L), 22 oz/A (2.9L), or 12.8 oz/A (5L) when corn is spike to 5-leaf or up to 8 inches (whichever occurs first). For coarse soils, use 8 oz (4L), 11 oz (2.9L) or 6.4 oz (5L). 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 (4L), 11 oz/A (2.9L) or 6.4 oz/A (5L) 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**(\$10.55-15.80)****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**(\$11.20-44.90)****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**(\$19.20-32.00)****24-40 oz DiFlex Duo 1.53L (0.24-0.39 + 0.05-0.08)**

Diflex 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 lbs 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**(\$9.45-11.35)****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**(\$5.00-10.00)****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 (carfentrazone) Site of Action: 14**(\$3.05-6.05)****0.5-1.0 oz Aim EC 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. Velvetleaf 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 velvetleaf 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**(\$4.10-9.25)****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.

PRE-MIX**SOLSTICE (fluthiacet-methyl + mesotrione) Site of Action: 14 + 27****(\$12.90-16.25)****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 feed forage for 45 days or harvest grain or stover for 70 days.

Corn may be planted anytime 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**(\$7.75-15.50)****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 fl 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), Lightning (CF corn), NorthStar, Permit, Stinger and 2,4-D. Refer to label restrictions or the section for each herbicide.

BASAGRAN, BASHAZON, BENTAZON 4, or BROADLOOM (bentazon)**(\$7.35-15.90)**

Site of Action: 6

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 up to 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**(\$4.90-15.15)****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, Beacon, 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.

PREMIX**BROZINE (bromoxynil + atrazine) Site of Action: 6 + 5 Restricted Use Pesticide****1.5-3 pt Brozine 3L (0.188-0.38 + 0.38-0.75 lb ai)**

PRE or POST. Premix contains 1 lb bromoxynil + 2 lb ai atrazine per gallon. Apply before corn is 12 inches tall.

DEADBOLT (bromoxynil + 2,4-D) Site of Action: 6 + 4**0.6-1.6 pt Deadbolt 5.625L (0.188-0.5 + 0.23-0.625 lb ai)**

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.

PPS. Apply 0.8-1.6 pt/A 7-14 days before planting.

PRE. Apply 0.8-1.2 pt/A 3-5 days after planting but before crop emerges, plant corn as deep as practical.

POST. 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.

BEACON (primisulfuron) Site of Action: 2**0.38-0.76 oz Beacon 75DF (0.017-0.036 lb ai)**

Excellent control of 4 to 12-inch shattercane; good control of 4 to 8-inch quackgrass. Beacon also gives good to excellent control of cocklebur, black nightshade, kochia, pigweed, sunflower, lambsquarters, velvetleaf, and Russian thistle. The low rate controls cocklebur, ragweed, sunflower, and redroot pigweed. Use tank-mixes to improve control of other broadleaves. Annual grasses are not effectively controlled; however, there is fair activity for yellow foxtail. Most annual broadleaves should not exceed 4 inches; lambsquarters should be less than 1.5 inches. Use COC and 28% N for velvetleaf. Labeled for field and silage corn.

Beacon is packaged in 1.52 oz water-soluble packets. Corn has acceptable tolerance; temporary yellowing or stunting may occur if crop is stressed. Some corn hybrids are sensitive. Beacon should not be used if Counter insecticide is applied any time during the season. Other organophosphate insecticides used at planting may cause temporary injury if Beacon is used. Do not apply foliar organophosphate insecticides within 10 days before or after Beacon application. Do not graze or feed forage from treated fields within 30 days of application.

Field corn may be replanted after 14 days. Winter wheat may be planted after 3 months; alfalfa, soybeans, sorghum, dry beans, sunflower, and spring grain after 8 months; other crops require 18 months.

Effects on susceptible weeds develop slowly. Yellow and/or red coloration and death occur 7-30 days after treatment. Apply in minimum of 10 gpa water; increase to 20 gpa for heavy stands for ground application. Minimum carrier is 3 gpa for aerial application. Do not apply Beacon as a band directly over the row. Add NIS at 1 qt/100 gal or COC at 1-4 pt per acre. Liquid nitrogen fertilizer may be added at 1 gal per acre. Rainfall within 4 hours may reduce effectiveness.

POST. Apply when corn is 4-20 inches. Use as a directed spray or with drop nozzles if corn is 20 inches or up to 15 days before tassel. Corn less than 4 inches may be more susceptible to injury.

TANK-MIXES. Beacon may be tank-mixed with Accent, atrazine, dicamba, bromoxynil, and Resource. Do not use crop oil or liquid fertilizer additives with the mixtures unless labeled. Refer to label restrictions or the section for each herbicide.

PREMIX**NORTHSTAR (primisulfuron + dicamba) Site of Action: 2 + 4****(\$8.05)****5 oz Northstar 47.4WDG (0.023 + 0.125 lb ai)**

POST. Apply to corn between 4-20 inches tall (V2-V6). NorthStar is a premix containing 7.5% primisulfuron (Beacon) + 39.9% dicamba ae (Banvel). The 5-oz rate provides equivalent of 0.5 oz Beacon + 4 oz Banvel 4L per acre. Use NIS at 1 qt/100 gal. NorthStar tank-mixes include Accent, atrazine, Resource, Banvel, and Clarity.

SPIRIT (prosulfuron + primisulfuron) Site of Action: 2 + 2**(\$12.90)****1 oz Spirit 57WG (0.009 + 0.027 lb ai)**

Controls several broadleaf weed species, such as waterhemp, wild buckwheat, buffalobur, common cocklebur, kochia, common lambsquarters, redroot pigweed, velvetleaf, and ragweed. May also suppress perennials such as Canada thistle, field bindweed, and quackgrass. Annual grasses are not controlled. Results are best when applied to small weeds. Apply to small-seeded broadleaf weed species when 1-4 inches tall or large-seeded species when less than 8-12 inches tall. Control may decline in drought conditions.

Crop tolerance is good under normal conditions. Do not apply to corn stressed from drought, cold weather, hail, flooding, compacted soil, insect damage, disease, nutrient deficiency, or other causes. Do not apply if Counter 15G or Counter CR was applied in-furrow at the time of planting or over the row at cultivation. Do not apply organophosphate insecticides within 10 days before or 7 days after applying Spirit.

Apply in a minimum of 10 gpa for ground applications or 3 gpa for aerial applications. Add NIS at 1-2 qt or COC at 1-4 pt/100 gal. For improved velvetleaf control, add 28% N at 2-4 qt/A or AMS at 2-4 lb/A.

Corn may be planted 4 weeks after application. Crop rotations include wheat, barley, rye, triticale (3 months); sorghum, peas, forage grasses, proso millet (10 months); alfalfa, clover, lentils, sunflowers, canola, flax, soybeans, STS soybeans (18 months). Rotation periods may be longer in soils with pH >7.8.

POST. Apply to corn 4-24 inches tall. Use drop nozzles after corn exceeds 20 inches tall.

TANK-MIXES. Spirit may be tank-mixed with dicamba, atrazine, 2,4-D, Beacon, bromoxynil, or Accent. Refer to the label for specific rates and recommendations.

PERMIT, HALOMAX, HERBIVORE, PROFINE, PROMOTE or SANDEA (halosulfuron) (\$12.25-60.00)

Site of Action: 2

0.67-1.33 oz Permit, Halomax, Herbivore, Profine 75, Promote or Sandea 75WSG (0.032-0.063 lb ai)

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.

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.

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.

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.

PRE. Apply 1.33-2 oz/A as a soil application. Plant only IR hybrids.

POST. Apply 0.67-1.33 oz/A from spike through layby stage. Use drop nozzles for canopied corn.

TANK-MIXES. Can be tank-mixed with dicamba, bromoxynil, atrazine, Accent, Beacon and others. Refer to label restrictions or the section for each herbicide.

PREMIX

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

(\$16.50-31.90)

4-8 oz Yukon 67.5 WSG (0.031-0.063 + 0.138-0.275 lb ai)

Yukon contains 12.5% halosulfuron (Permit) plus 55% dicamba. Yukon can be tank-mixed with atrazine, Accent, Armezon, bromoxynil, Callisto, glyphosate, Impact, Laudis or Beacon. Minimum carrier is 10 gpa for ground or 5 gpa for air. Always add NIS at 0.25-0.5% v/v. COC or MSO at 1% v/v may be used instead of NIS however NIS is preferred to reduce crop response. AMS at 2-4 lb/A or UAN at 2-4 qt/A may also be added. Do not graze or harvest forage or silage for 30 days.

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

2,4-D Site of Action: 4

(\$0.40-4.90)

0.12- 1 lb ae 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.

Lb/A ae Required	Formulation			
	3.8L	5.7L	80% WSP	90% WSP
0.12	0.25 pt	0.17 pt	0.17 lb	0.15 lb
0.25	0.5 pt	0.33 pt	0.33 lb	0.3 lb
0.5	1 pt	0.66 pt	0.66 lb	0.6 lb
1	2 pt	1.33 pt	1.25 lb	1.1 lb

STINGER, BITE, CLEAN SLATE, SPUR or STIGMATA (clopyralid) Site of Action: 4 (\$4.60-45.15)
0.25-0.66 pt Stinger, Bite, Clean Slate, Spur or Stigmata 3L (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 per acre 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.

PREMIX
CURTAIL or COMMANDO (clopyralid + 2,4-D) Site of Action: 4 + 4 (\$16.15)
2 pt Curtail or 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 or OBTAIN EC (fluroxypyr) Site of Action: 4 (\$14.15)
0.66 pt Comet 1.5L (0.12 lb ae)
0.4 pt Starane Ultra 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, TRUSLATE (clopyralid + fluroxypyr) Site of Action: 4 + 4 (\$12.85)
1.33 pt Widematch, Colt AS, 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 (\$8.95-26.85)
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 apply more than 3 pt/A per growing season. 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

(\$8.05-12.10)

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

(\$9.90-19.40)

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

(\$2.05-8.15)

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)****(\$4.65-13.00)****1.3-2.7 pt Blanco, Bonedry, Devour, Firestorm, Gramoxone 3.0, Helmquat, 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 planting 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)**(\$2.50-6.50)****0.7-1.3 pt Blanco, Bonedry, Devour, Firestorm, Gramoxone 3.0, Helmquat, 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

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

Glyphosate Concentration	Rate for 0.38-3.75 lb ae/A	Cost (0.38-3.75 lb ae/A)
3 lb ae	16 oz-5 qt	\$1.65-20.65
4 lb ae	12 oz-3.75 qt	\$1.60-21.15
4.5 lb ae	11 oz-3.3 qt	\$2.25-25.90

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

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 55o F 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.

LIGHTNING (imazethapyr + imazapyr) (“CLEARFIELD” CORN) Site of Action: 2 + 2 (\$22.05)

1.28 oz Lightning 70DF (0.039-0.013 lb ai)

Premix containing 52.5% imazethapyr (Pursuit) + 17.5% imazapyr (Arsenal) active for postemergence control of many annual grass and broadleaved weeds. For use only on Clearfield corn hybrids. Lightning provides very good to excellent control of emerged weeds and has extended soil residual.

Results are best on small weeds, usually 2-3 inches. Lightning controls foxtail, lambsquarters, sunflower, velvetleaf, cocklebur, non-ALS kochia, wild buckwheat, nightshade, and other annuals. Early postemergence applications give fair to very good control of wild proso millet, woolly cupgrass, and sandbur (1 in); an additional herbicide such as a reduced rate of Harness, or other preemergence herbicides or Prowl at early postemergence will improve results in moderate or heavy infestations. Dicamba, atrazine, or other broadleaf herbicide is required for more consistent pigweed, common waterhemp, or common ragweed control.

Minimum carrier is 10 gpa for ground or 5 gpa for air. Apply at 1.28 oz per acre. Add NIS at 1 qt/100 gal and 28% N at 1-2 qt or AMS at 2.5 lb per acre. Refer to additive limitations that apply to tank-mix partners. Do not use liquid fertilizer as the carrier. Delay application for 48 hours if temperature remains below 40o F for 10 hours or more.

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

POST. Apply from spike to before corn is 18 inches.

TANK-MIX/SEQUENTIAL. For heavy grass pressure, Lightning may be used following soil applied herbicides such as Harness, Prowl, Dual, or Outlook. Lightning may be tank-mixed with other herbicides, including 2,4-D, atrazine, Banvel, Basagran, Bicep, bromoxynil, bromoxynil/Atrazine, Callisto, Clarity, Distinct, Dual, Outlook, Harness, Harness Xtra, Prowl, and Surpass. It may also be applied sequentially after several preemergence herbicides. Consult the label or section for each product. Do not tank-mix with Basis, Hornet, Python, or Steadfast.

GLUFOSINATE PRODUCTS (glufosinate) (Liberty Link Corn) Site of Action: 10 (\$8.85-22.95)

29-43 oz Cheetah, Interline, Liberty, Nullify A/P, Refer 280, Scout, or Total SL 2.34L (0.53-0.79 lb ai) 22-36 oz Forfeit 280, Glufosinate 280SL(OT), Reckon 280SL, or Surmise 2.34L (0.4-0.66 lb ai)

Liberty 280 (glufosinate) may only be applied postemergence to Liberty Link corn. Provides broad spectrum grass and broadleaf weed control. Use higher rates or tank-mix partners to control field sandbur, marestalk, 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 15-20 gpa. Do not use nitrogen solutions as spray carriers. Do not use nozzles or pressures that result in coarse spray droplets. Add only 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 85o 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 may make up to two applications per growing season totaling 87 oz/A and sequential applications should be made 7 days apart. If Liberty was applied as a burndown treatment, one postemergence application is allowed. Do not apply to corn stressed from weather conditions, such as drought, excessive rainfall, etc. For best results, apply when weeds are actively growing. 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, Spirit), and others (see label).

Cheetah, Interline, Liberty, Nullify A/P, Refer 280, Scout, Total SL:

PPS. May be applied prior to planting conventional or transgenic corn. Apply 29-43 oz/A (Liberty 32-43 oz/A).

POST. Apply 29-43 oz from emergence up to V6 corn. Can apply with drop nozzles to corn up to 36 inches. May apply a second application of 29 oz/A (Liberty 32 oz/A). Wait 7 days between applications. Use 29-43 oz/A (Liberty 22 oz/A) with tank-mix partners. No additional surfactant is required for tank-mixes. Do not apply more than 87 oz/A per year.

Forfeit 280, Glufosinate 280SL(OT), Reckon 280SL, Surmise:

PPS. May be applied prior to planting conventional or transgenic corn. Apply 29-36 oz/A. Postemergence applications are not allowed in fields treated with a preplant or preemergence application of glufosinate.

POST. Apply 22 oz from emergence up to 24 inches or V7 corn (7-leaf collars) whichever comes first. For 24-36 inch corn use drop nozzles. Generally, apply to weeds 3-8 inches tall, but check the label for specific species height restrictions. Do not apply more than two 22 oz/A applications per year. Wait 10-14 days between applications.

ENLIST DUO (glyphosate + 2,4-D choline) Site of Action: 9 + 4**(\$14.15-19.20)****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. Use the 4.75 pt rate for weeds that are greater than 6 inches, glyphosate-resistant weeds, or during stressful conditions. Check label for recommendations on specific weeds.

Follow nozzle and buffer zone requirements to minimize off-target movement. 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 EnlistTankMix.com.

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

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

POST. Apply only 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**(\$9.50-12.65)****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. Apply with water carrier at 10-15 gallons per acre. Not labeled for aerial applications.

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 at 1.5-2 pt/A when weeds are small and not after the V8 corn growth stage or 30-inch-tall corn (whichever comes first). Later applications in 30-48 inch 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.

GLYPHOSATE PRODUCTS Site of Action: 9**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) 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. For example, Roundup Powermax is 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.

Glyphosate Concentration	Trade Names	Rate for (0.5-0.75 lb ae/A)	Cost (0.5-0.75 lb ae/A)
3 ae, 4 ai	Abundit Extra, Buccaneer (Plus), Cornerstone Plus, Credit 41 (Extra), Envy (Intense), Four Power Plus, Glyfine Plus, Glyfos X-tra, Glyphogan (Plus), Glyphosate 4 Plus, Gly Star (Gold), Helosate Plus Advance, Honcho (Plus), Mad Dog (Plus), Makaze (Yield Pro), Rascal Plus, Showdown, Tomahawk 4	24-32 oz	\$2.15-3.20
4 ae	Buccaneer 5 Extra, Cinco, Cornerstone 5 Plus, Duramax, Durango DMA, Gly Star 5 Extra, Tomahawk 5	18-24 oz	\$2.50-4.10
4.5 ae, 5.5 ai	Abundit Edge, Gly Star K-Plus, Honcho K6, Roundup Powermax, Roundup Weathermax, RT 3	16-21 oz	\$3.20-5.35
4.5 ae, 5.8 ai	Credit Xtreme	16-21 oz	---

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.

Maximum Glyphosate Rates – Roundup Ready Corn
Use the chart below to adjust for concentrations.

Formulation	In-Crop Maximum/Application		In-Crop Total		Preplant	Preharvest	Total/Season
	RR	RR2	RR	RR2			
3 lb ae products	32 oz	48 oz	64 oz	96 oz	5 qt	32 oz	8 qt
4 lb ae products	24 oz	36 oz	48 oz	72 oz	3.75 qt	24 oz	6 qt
4.5 lb ae products	21 oz	32 oz	43 oz	64 oz	3.3 qt	22 oz	5.3 qt

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, Breakfree, Keystone etc.) products, metolachlor (Dual, Cinch etc) products, Aim, Armezon, Basis, Cadet, Callisto, Capreno, Clarity, dicamba, Hornet, 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.

WEED RESPONSE to CORN HERBICIDES

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

10-9	Excellent	90-99%	Usually over 90%	Best choice for weed
8-7	Good	80-90%	Sometimes over 90%	Usually satisfactory
6	Fair	70-80%	Sometimes under 70%	Sometimes unsatisfactory
5	Marginal	50-70%	Seldom over 70%	Seldom satisfactory
2, 3, 4	Poor	<50%	Usually under 50%	Not effective
0	None		No control	

Herbicide	Green foxtail	Yellow foxtail	Barnyardgrass	Field sandbur	Woolly cupgrass	Wild mustard	Wild buckwheat	Kochia (ALS)	C. ragweed	Lambsquarters	Pigweed	Waterhemp	Smartweed	Nightshade	Cocklebur	Sunflower	Velvetleaf	Canada thistle
<i>PPI/PRE:</i>																		
Acetochlor	10	9	8	6	6	0	0	4	4	6	8	8	4	7	0	0	0	0
Acuron	10	8	8	6	7	10	9	9	10	10	10	9	9	10	8	7	9	4
Atrazine	6	5	5	5	4	10	10	10	9	10	10	9	10	9	6	7	8	4
Balance Flexx	8	6	8	6	7	9	2	8	8	9	9	8	7	8	5	6	9	0
Callisto	4	4	4	4	4	9	1	6	9	8	10	9	8	9	6	5	9	4
Corvus	9	8	9	6	7	9	3	8	8	9	9	8	7	8	5	6	9	0
Instigate	8	7	7	5	6	10	4	6	8	9	10	7	8	9	7	8	9	5
Lumax	9	7	7	5	6	10	9	9	10	10	9	9	9	10	7	6	9	4
Metolachlor	9	8	7	5	6	0	0	4	4	4	7	7	4	7	0	0	0	0
Outlook	9	9	7	5	6	0	0	4	4	5	7	7	4	7	0	0	0	0
Python	0	0	0	0	0	9	2	4	7	8	9	8	8	6	6	7	8	0
Resicore	9	9	8	6	6	9	9	7	10	9	9	9	9	9	7	9	9	5
Rimsulfuron	7	6	6	5	5	7	0	0	4	7	7	5	5	5	4	5	5	4
Sharpen	0	0	0	0	0	9	9	6	8	8	8	8	9	8	8	8	8	0
Surestart II	9	9	8	6	6	9	8	6	10	9	9	9	8	9	7	8	8	5
Verdict	8	8	7	6	6	9	9	6	8	8	8	8	9	8	8	8	8	0
Zidua	9	8	8	6	6	3	6	6	6	7	8	8	5	8	4	2	5	0
<i>POST:</i>																		
Accent Q	9	7	7	8	8	9	2	0	4	4	7	5	7	4	5	4	4	5
Aim	0	0	0	0	0	8	4	8	6	9	9	8	6	9	6	6	10	4
Atrazine+oil	7	6	6	5	4	10	10	9	10	10	10	9	9	9	8	10	8	5
Basagran	0	0	0	0	0	9	8	6	7	6	4	4	9	6	9	7	8	7
Basis	9	6	6	5	5	9	7	0	4	9	9	8	9	4	5	5	6	4
Bromoxynil	0	0	0	0	0	6	9	9	9	8	5	4	9	9	9	9	7	5
Cadet	0	0	0	0	0	5	5	4	5	6	6	5	4	6	5	4	9	0
Callisto	4	4	4	4	4	9	5	8	9	10	9	8	9	10	8	7	9	5
Capreno	7	7	7	7	7	9	8	8	9	10	9	8	9	10	7	8	9	5
Clarity/DiFlexx	0	0	0	0	0	5	9	9	10	9	9	8	10	6	7	8	6	8
Glyphosate	10	10	10	10	10	9	7	8	8	8	9	8	9	9	10	9	7	9
Hornet	0	0	0	0	0	9	7	4	8	6	8	6	8	6	9	9	8	8
Impact/Armezon	7	5	7	4	6	9	5	8	9	10	9	9	9	10	8	8	9	5
Laudis	5	7	7	4	7	9	5	8	9	10	9	9	9	10	8	8	9	5
Liberty/Cheetah	9	7	7	7	9	9	8	8	8	7	7	7	9	8	9	9	7	5
Lightning	10	8	8	8	9	10	9	0	6	8	6	5	9	10	9	8	9	5
Permit	0	0	0	0	0	10	4	4	8	4	8	7	7	4	9	8	8	4
Realm Q	9	7	8	6	7	9	6	8	8	10	9	7	9	10	8	8	9	5
Resicore	4	4	4	4	4	9	8	8	10	10	9	8	9	10	10	10	10	8
Resolve Q	7	7	7	5	5	9	7	0	4	8	8	6	6	4	6	6	7	5
Resource	0	0	0	0	0	4	5	4	6	6	6	5	4	4	4	4	9	0
Starane	0	0	0	0	0	4	6	9	8	2	2	2	2	5	6	6	7	4
Status	4	4	4	4	0	7	9	10	10	10	9	9	10	6	8	8	8	8
Steadfast Q	9	7	7	7	7	9	7	0	4	4	7	6	7	4	5	4	4	5
Stinger	0	0	0	0	0	2	7	4	8	5	4	2	8	8	9	8	4	9
WideMatch	0	0	0	0	0	4	8	8	8	7	7	7	6	6	9	6	7	8
2,4-D	0	0	0	0	0	9	6	5	9	8	8	8	6	6	9	7	7	6

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Foliar Insecticides in Corn

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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 in order 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.**

The products are presented as follows:

Trade name(s) (*Chemical common name*) Mode of action: Group code (chemical class)

Additional resources regarding insecticide safety include:

- IRAC Insecticide Resistance Action Committee
<http://www.iraac-online.org/modes-of-action/>
- EPA United States Environmental Protection Agency
<http://www2.epa.gov/pesticide-worker-safety/restricted-use-products-rup-report>
- South Dakota Department of Agriculture
<https://sdda.sd.gov/farming-ranching-agribusiness/pesticide-programs/>

Insecticide Modes of Action

Mode of Action Group Number	Insecticide Class
1A	carbamate
1B	organophosphate
3A	pyrethroid, pyrethrin
4A	neonicotinoid
4D	butenolides
5	spinosyn
10A	hexythiazox
10B	etoxazole
18	diacylhydrazine
23	tetroic and tetramic acid derivatives
28	diamide

Check list of insects managed by each foliar-applied insecticide

Product Name	Fall armyworm	True armyworm	Yellowstriped armyworm	Black cutworm	Western bean cutworm	Common stalk borer	Corn earworm	European corn borer	Northern corn rootworm	Western corn rootworm	Flea beetle	Japanese beetle	Grasshopper	Bird cherry oat aphid	Corn leaf aphid	Stink bug	Two-spotted spider mite
Alpha-cypermethrin (<i>Fastac CS, Fastac EC</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Beta-cyfluthrin (<i>Baythroid XL</i>)	+	+	+	+	+	+	+	+	-	-	-	-	+	-	-	+	-
Bifenthrin (<i>Alpine, BiDash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Sniper, Sniper Helios, Sniper LFR, Tundra EC, Tundra Supreme, Xpedient Plus</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Carbaryl (<i>Carbaryl 4L, Sevin 4F, Sevin XLR Plus</i>)	+	+	+	+	+	-	+	+	+	+	+	+	-	-	-	-	-
Chlorantraniliprole (<i>Coragen, Lumivia, Prevathon</i>)	+	+	-	-	+	-	+	+	-	-	-	-	+	-	-	-	-
Chlorpyrifos (<i>Chlorpyrifos 4E, Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, CPF 4E, Govern 4E, Hatchet, Lorsban 15G, Lorsban 15G Smartbox, Lorsban 75 WG, Lorsban Advanced, Lorsban-4E, Nufos 4E, Pilot 4E, Saurus, Vesper, Vulcan, Warhawk, Warhawk Clearform, Whirlwind, Yuma 4E</i>)	+	+	+	+	+	+	+	+	+	+	+	-	+	+	+	-	-
Chlorpyrifos + Bifenthrin (<i>MatchUp, Tundra Supreme, Voltage Endurx</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Chlorpyrifos + Gamma-cyhalothrin (<i>Bolton, Cobalt</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Chlorpyrifos + Lambda-cyhalothrin (<i>Cobalt Advanced, Lambdafos</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Cyfluthrin (<i>Tombstone, Tombstone Helios</i>)	+	+	+	+	+	+	+	+	+	+	-	+	+	-	-	+	-
Deltamethrin (<i>Delta Gold</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Dimethoate (<i>Dimate 4E, Dimethoate 4 E, Dimethoate 400, Dimethoate 400 EC, Dimethoate 4EC, Dimethoate LV-4</i>)	-	-	-	-	-	-	-	-	+	+	-	-	+	+	+	-	+
Esfenvalerate (<i>Asana XL, S-FenvaloStar, Zyrate</i>)	-	+	-	+	+	+	+	+	-	-	-	-	+	+	+	-	-
Etoxazole (<i>Zeal Miticide-1, Zeal SC, Zeal WDG Miticide</i>)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Flupyradifurone (<i>Sivanto 200 SL, Sivanto Prime</i>)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-
Gamma-cyhalothrin (<i>Declare, Proaxis</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Hexythiazox (<i>Hexy 1E, Onager, Onager Optek</i>)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Lambda-cyhalothrin (<i>Cavalry, Cavalry II, Crossover, Crossover Pro, Firestone, Grizzly Too, Grizzly Z, Karate, Kendo, Kendo 22.8 CS, L-C Insecticide, Lambda-T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1 CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Serpent 1 EC, Silencer, Silencer VXN, Warrior II</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Lambda-cyhalothrin + Chlorantraniliprole (<i>Besiege</i>)	+	+	+	+	+	-	+	+	-	-	-	-	+	+	+	+	-
Malathion (<i>Fyfanon, Fyfanon ULV AG, Fyfanon 57% EC, Malathion 5, Malathion 8 Aqualmul, Malathion 57%, Malathion ULV</i>)	+	+	+	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Methomyl (<i>Corrida 29 SL, Corrida 90 WSP, Lannate LV, Lannate SP, Nudrin LV, Nudrin SP</i>)	+	+	+	-	-	-	+	+	+	+	+	-	-	+	+	+	-
Methoxyfenozide (<i>Intrepid 2F, Troubadour 2F, TurnStyle, Vexer</i>)	+	+	-	+	-	-	+	-	-	-	-	-	-	-	-	-	-
Permethrin (<i>Ambush, Arctic 3.2 EC, Permethrin, Permethrin 3.2 AG, Perm-UP 3.2 EC, Perm-UP 25 DF, PermaStar AG, Pounce 1.5G</i>)	+	+	+	+	+	+	+	+	-	-	+	-	-	-	-	-	-
Spinetoram (<i>Radiant SC</i>)	+	+	-	-	+	-	+	+	-	-	-	-	-	-	-	-	-
Spiromesifen (<i>Oberon 2SC</i>)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+
Spinosad (<i>Blackhawk, Entrust, Entrust SC, Spintor 2SC, Tracer</i>)	+	+	-	-	+	-	-	+	-	-	-	-	-	-	-	-	-
Spinosad + Gamma-cyhalothrin (<i>Consero</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Zeta-cypermethrin (<i>Mustang, Mustang Maxx</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-
Zeta-cypermethrin + Bifenthrin (<i>Hero, Hero EW, Steed</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Zeta-cypermethrin + Chlorpyrifos (<i>Stallion</i>)	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	-

+ = provides protection
 - = Does not provide protection

Check list of insects managed by each soil-applied insecticide

Product Name	Northern corn rootworm	Western corn rootworm	Grubs	Seedcorn beetle	Seedcorn maggot	Wireworm	Fall armyworm	True armyworm	Cutworm	Common stalk borer
Alpha-cypermethrin (<i>Fastac CS, Fastac EC</i>)	-	-	-	-	-	-	-	-	+	-
Beta-cyfluthrin (<i>Baythroid XL</i>)	-	-	+	-	+	+	-	-	-	-
Bifenthrin (<i>Alpine, Annex LFR, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture 3RIVE 3D, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Manticor LFR, Ruckus LFR, Sniper, Sniper Helios, Sniper LFR, Temitry LFR, Tundra EC, XPedient Plus, Xpedient Plus V</i>)	+	+	+	+	+	+	+	+	+	+
Chlorethoxyfos + Bifenthrin (<i>Index, SmartChoice 5G, SmartChoice 5G Smartbox, SmartChoice 5G Lock'N Load, SmartChoice HC</i>)	+	+	+	+	+	+	+	+	+	-
Chlorpyrifos (<i>Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, Chlorpyrifos 15G, Govern 4E, Hatchet, Lorsban 75 WG, Lorsban 15G, Lorsban 15G Smartbox, Lorsban-4E, Nufos 4E, Saurus, Vulcan, Warhawk, Warhawk Clearform, Yuma 4E</i>)	+	+	+	+	+	+	-	-	+	-
Chlorpyrifos + Bifenthrin (<i>MatchUp, Tundra Supreme</i>)	+	+	+	+	+	+	-	+	+	-
Chlorpyrifos + Gamma-cyhalothrin (<i>Bolton, Cobalt</i>)	-	-	+	+	+	+	-	-	+	-
Chlorpyrifos + Lambda-cyhalothrin (<i>Cobalt Advanced, Lambdafos</i>)	-	-	+	+	+	+	-	-	+	-
Cyfluthrin (<i>Tombstone, Tombstone Helios</i>)	-	-	+	-	+	+	-	-	-	-
Esfenvalerate (<i>Asana XL</i>)	-	-	-	-	-	-	-	-	+	-
Gamma-cyhalothrin (<i>Declare, Proaxis</i>)	+	+	+	+	+	+	-	-	+	+
Lambda-cyhalothrin (<i>Cavalry, Cavalry II, Firestone, Grizzly Too, Grizzly Z, Karate, Kendo, L-C Insecticide, Lambda T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Warrior II</i>)	+	+	+	+	+	+	-	-	+	-
Permethrin (<i>Ambush, Arctic 3.2 EC, Permethrin, Permethrin 3.2 AG, Perm-UP 3.2 EC, Perm-UP 25DF, PermaStar AG, Pounce 1.5G</i>)	-	-	-	-	+	+	+	+	+	-
Phorate (<i>Thimet 20-G Lock 'n Load, Thimet 20-G Smartbox</i>)	+	+	+	+	+	+	-	-	-	-
Tebupirimphos + Cyfluthrin/Tebupirimfos + Cyfluthrin (<i>Aztec 2.1G, Aztec HC, Aztec SmartBox 4.67G, Defcon 2.1G, Defcon 4.67G</i>)	+	+	+	+	+	+	-	-	+	-
Tefluthrin (<i>Force 3G, Force 3G SmartBox, Force CS, Precept</i>)	+	+	+	+	+	+	-	-	+	-
Terbufos (<i>Counter 15-G Lock'N Load, Counter 15G SmartBox, Counter 20G Lock'N Load, Counter 20G SmartBox</i>)	+	+	+	+	+	+	-	-	-	-
Zeta-cypermethrin + Bifenthrin (<i>Hero, Hero EW</i>)	-	-	+	-	+	-	+	+	+	+

+ = provides protection

- = Does not provide protection

Foliar-Applied Insecticides for Corn

Alpine, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Sniper, Sniper Helios, Sniper LFR, Tundra EC, Tundra Supreme, XPedient Plus (<i>bifenthrin</i>)	45
Ambush, Arctic 3.2 EC, Permethrin, Permethrin 3.2 AG, Perm-UP 3.2 EC, Perm-UP 25 DF, PermaStar AG, Pounce 1.5G (<i>permethrin</i>)	45
Asana XL, S-FenvaloStar, Zyrate (<i>esfenvalerate</i>)	45
Baythroid XL (<i>beta-cyfluthrin</i>)	46
Besiege (<i>lambda-cyhalothrin + chlorantraniliprole</i>)	46
Blackhawk, Entrust, Entrust SC, Spintor 2SC, Tracer (<i>spinosad</i>)	46
Bolton, Cobalt (<i>chlorpyrifos + gamma-cyhalothrin</i>)	46
Carbaryl 4L, Sevin 4F, Sevin XLR Plus (<i>carbaryl</i>)	47
Cavalry, Cavalry II, Crossover, Crossover Pro, Firestone, Grizzly Too, Grizzly Z, Karate, Kendo, Kendo 22.8 CS, L-C Insecticide, Lambda-T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1 CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Serpent 1 EC, Silencer, Silencer VXN, Warrior II (<i>lambda-cyhalothrin</i>)	47
Chlorpyrifos 4E, Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, CPF 4E, Govern 4E, Hatchet, Lorsban 15G, Lorsban 15G Smartbox, Lorsban 75 WG, Lorsban Advanced, Lorsban-4E, Nufos 4E, Pilot 4E, Saurus, Vesper, Vulcan, Warhawk, Warhawk Clearform, Whirlwind, Yuma 4E (<i>chlorpyrifos</i>)	47
Cobalt Advanced, Lambdafos (<i>chlorpyrifos + lambda-cyhalothrin</i>)	48
Consero (<i>spinosad + gamma-cyhalothrin</i>)	48
Coragen, Lumivia, Prevathon (<i>chlorantraniliprole</i>)	48
Corrida 29 SL, Corrida 90 WSP, Lannate LV, Lannate SP, Nudrin LV, Nudrin SP (<i>methomyl</i>)	48
Declare, Proaxis (<i>gamma-cyhalothrin</i>)	48
Delta Gold (<i>deltamethrin</i>)	49
Dimate 4E, Dimethoate 4 E, Dimethoate 400, Dimethoate 400 EC, Dimethoate 4EC, Dimethoate LV-4 (<i>dimethoate</i>)	49
Fastac CS, Fastac EC (<i>alpha-cypermethrin</i>)	49
Fyfanon ULV AG, Fyfanon, Fyfanon 57% EC, Malathion 5, Malathion 8 Aquamul, Malathion 57%, Malathion ULV (<i>malathion</i>)	49
Hero, Hero EW, Steed (<i>zeta-cypermethrin + bifenthrin</i>)	49
Hexy 1E, Onager, Onager Optek (<i>hexythiazox</i>)	50
Intrepid 2F, Troubadour 2F, TurnStyle, Vexer (<i>methoxyfenozide</i>)	50
Lumivia, Prevathon (<i>chlorantraniliprole</i>)	50
Match-Up, Tundra Supreme, Voltage Endurx (<i>chlorpyrifos + bifenthrin</i>)	50
Mustang, Mustang Maxx (<i>zeta-cypermethrin</i>)	51
Oberon 2SC (<i>spiromesifen</i>)	51
Radiant SC (<i>spinetoram</i>)	51
Sivanto 200 SL, Sivanto Prime (<i>flupyradifurone</i>)	51
Stallion (<i>zeta-cypermethrin + chlorpyrifos</i>)	51
Tombstone, Tombstone Helios (<i>cyfluthrin</i>)	52
Zeal Miticide-1, Zeal SC, Zeal WDG Miticide (<i>etoxazole</i>)	52

Soil-Applied Insecticides for Corn

Alpine, Annex LFR, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture 3RIVE 3D, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Manticor LFR, Ruckus LFR, Sniper, Sniper Helios, Sniper LFR, Temitry LFR, Tundra EC, XPedient Plus, Xpedient Plus V (<i>bifenthrin</i>)	52
Ambush, Arctic 3.2 EC, Permethrin, Permethrin 3.2 AG, Perm-UP 3.2 EC, Perm-UP 25 DF, PermaStar AG, Pounce 1.5G (<i>permethrin</i>)	52
Asana XL (<i>esfenvalerate</i>)	52
Aztec 2.1G, Aztec HC, Aztec SmartBox 4.67G, Defcon 2.1G, Defcon 4.67G (<i>tebupirimphos+cyfluthrin/tebupirimfos+cyfluthrin</i>)	53
Baythroid XL (<i>beta-cyfluthrin</i>)	53
Bolton, Cobalt (<i>chlorpyrifos + gamma-cyhalothrin</i>)	53
Cavalry, Cavalry II, Firestone, Grizzly Too, Karate, Kendo, L-C Insecticide, Lambda-T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1 CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Warrior II (<i>lambda-cyhalothrin</i>)	53
Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, Chlorpyrifos 15G, Govern 4E, Hatchet, Lorsban 75 WG, Lorsban 15G, Lorsban 15G Smartbox, Lorsban-4E, Nufos 4E, Saurus, Vulcan, Warhawk, Warhawk Clearform, Yuma 4E (<i>chlorpyrifos</i>)	54
Cobalt Advanced, Lambdafos (<i>chlorpyrifos + lambda-cyhalothrin</i>)	54
Counter 15-G Lock'N Load, Counter 15G SmartBox, Counter 20G Lock'N Load, Counter 20G SmartBox (<i>terbufos</i>)	54
Declare, Proaxis (<i>gamma-cyhalothrin</i>)	54
Fastac CS, Fastac EC, Fastac ES (<i>alpha-cypermethrin</i>)	54
Force 3G, Force 3G SmartBox, Force CS, Precept (<i>tefluthrin</i>)	55
Hero, Hero EW (<i>zeta-cypermethrin + bifenthrin</i>)	55
Index, SmartChoice 5G, SmartChoice 5G Smartbox, SmartChoice 5G Lock'N Load, SmartChoice HC (<i>chlorethoxyfos + bifenthrin</i>)	55
MatchUp, Tundra Supreme (<i>chlorpyrifos + bifenthrin</i>)	55
Thimet 20-G Lock 'n Load, Thimet 20-G Smartbox (<i>phorate</i>)	56
Tombstone, Tombstone Helios (<i>cyfluthrin</i>)	56

Foliar-Applied Insecticides

Alpine, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Sniper, Sniper Helios, Sniper LFR, Tundra EC, Tundra Supreme, XPedient Plus (*bifenthrin*) Mode of Action: 3A (pyrethroids)

Application Rate: 2.1-8.5 fl oz/A or 0.033-0.10 lb ai/A

Re-Entry Interval (REI): 12 hours (24 hours for Empower 2) **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, 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, 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.

Ambush, Arctic 3.2 EC, Permethrin, Permethrin 3.2 AG, 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.

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 (early development stage).

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*) Mode 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.

Bolton, Cobalt (*chlorpyrifos*+*gamma-cyhalothrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Application Rate: 5.0-42 fl oz/A

REI: 24 hours

PHI: 21 days for grain, 14 days for forage or silage

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 92 fl oz/A per year. Do not make more than three applications per calendar year.

Do not reapply within 10 days of previous application. Do not apply in tank mixes with Steadfast or Lightning herbicides. Do not apply more than 46 fl oz/A after silk initiation. Do not apply more than 23 fl oz/A after milk stage. Do not make more than three applications in a single season. Do not apply more than 2.5 lb ai/A for *chlorpyrifos* and 0.13 lb ai/A for *lambda-cyhalothrin*.

Black cutworm: Apply when soil is moist, and the caterpillars are active on or near the soil surface. Dry, cloddy, or crusted soil may protect the caterpillars from the insecticide.

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.

Cavalry, Cavalry II, Crossover, Crossover Pro, Firestone, Grizzly Too, Grizzly Z, Karate, Kendo, Kendo 22.8 CS, L-C Insecticide, Lambda-T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1 CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Serpent 1 EC, Silencer, Silencer VXN, Warrior II (lambda-cyhalothrin) Mode of Action: 3A (pyrethroids)

Application Rate: 0.96-3.84 fl oz/A or 0.015-0.03 lb ai/A

Crossover Application Rate: 8-9.5 fl oz/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.

Chlorpyrifos 4E, Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, Chlorpyrifos 15G, CPF 4E, Govern 4E, Hatchet, Lorsban 75 WG, Lorsban 15G, Lorsban 15G Smartbox, Lorsban-4E, Nufos 4E, Pilot 4E, Saurus, Vesper, Vulcan, Warhawk, Warhawk Clearform, Yuma 4E (chlorpyrifos) Mode of Action: 1B (organophosphates)

Application Rate: 8-32 fl oz/A or 0.25-1.0 lb ai/A

Lorsban 15G, Lorsban 15G Smartbox, Saurus Application Rate: 0.76-1.0 lb ai/A

Pilot 4E, Vesper Application Rate: 0.5-2 pts/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, corn leaf aphid nymphs and adults, bird cherry oat aphid nymphs and adults, grasshopper nymphs and adults, corn rootworm adults, and flea beetle adults.

Restrictions: Do not apply more than 3.0 lb ai/A in a single season. Do not tank mix with a burn down herbicide application. Do not tank mix with Steadfast or Lightning herbicides.

Lorsban 15G, Lorsban 15G Smartbox, and Saurus Restrictions: These are granular insecticides that may be applied as a foliar broadcast. Do not apply more than 3.0 lb ai/A in a single season.

Black cutworm: It is advised to apply these insecticides for management of this pest when the soil is moist. Black cutworm larvae hide in the soil, and dry, cloddy, or crusted soil may prevent the insecticide from reaching them.

Cobalt Advanced, Lambdafos (*chlorpyrifos + lambda-cyhalothrin*)

Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Application Rate: 6-42 fl oz/A or 0.12-0.82 lb ai/A (chlorpyrifos)**Application Rate:** 0.006-0.042 lb ai/A (lambda-cyhalothrin)**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, 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 make more than three applications in a single season. Do not apply more than 2.5 lb ai/A for chlorpyrifos and 0.13 lb ai/A for lambda-cyhalothrin. Do not apply as a tank mix with Steadfast or Lightning herbicides.**Black cutworm:** Apply when soil is moist, and the caterpillars are active on or near the soil surface. Dry, cloddy, or crusted soil may protect the caterpillars from the insecticide.

Consero (*spinosad + gamma-cyhalothrin*) Mode 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.

Coragen (*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.

Corrida 29 SL, Corrida 90 WSP, Lannate LV, Lannate SP, Nudrin LV, Nudrin SP (*methomyl*)

Mode of Action: 1A (carbamates)

Corrida 29 SL, Corrida 90 WSP, 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.

Declare, Proaxis (*gamma-cyhalothrin*) Mode of Action: 3A (pyrethroids)**Application Rate:** 0.51-1.54 fl oz/A or 0.005-0.015 lb ai/A**REI:** 24 hours**PHI:** 21 days, 1 day 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 0.06 lb ai/A in a single season. Do not apply more than 0.03 lb ai/A after silk initiation, or 0.015 lb ai/A after corn has reached the milk stage.

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 boring into the ear or stalk.**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 pollenshed period if pollinators are active.**Factac 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.**Fyfanon ULV AG, Fyfanon, Fyfanon 57% EC, Malathion 5, 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.**Hero, Hero EW (*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.

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.

Intrepid 2F, Troubadour 2F, TurnStyle, Vexer (*methoxyfenozide*) Mode of Action: 18 (diacylhydrazines)

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.

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

Application Rate: 14.0-20.0 fl oz/A or 0.047-0.067 lb ai/A

REI: 4 hours

PHI: 14 days, 1 day for forage

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

Restrictions: Do not apply more than 0.2 lb ai/A in a single season. Do not make more than four applications per crop in a single season. Wait a minimum of seven days between applications.

Grasshoppers: For best results insecticides should be applied to manage grasshoppers during their nymphal stages. Upon ingestion of Prevathon feeding will cease, but mortality may not be observed for seven or more days.

MatchUp, Tundra Supreme, Voltage Endurx (*chlorpyrifos + bifenthrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Application Rate: 5.6-16.8 fl oz/A or 0.11-0.32 lb ai/A (chlorpyrifos)

Application Rate: 0.015-0.1 lb ai/A (bifenthrin)

REI: 24 hours

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, 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 0.3 lb ai/A of bifenthrin in a single season. Do not apply as a tank mix with Steadfast or Lightning herbicides. Do not apply insecticide if rainfall is imminent. Ultra-low volume applications are prohibited.

Black cutworm: Apply this insecticide when the ground is moist as dry, cloddy, or crusted soil may prevent effective management.

Common stalk borer: Do not use in combination with a burndown herbicide. Treat approximately 11 days after herbicide application for best results.

European corn borer: Management should occur during peak egg hatch.

Two-spotted spider mite: Apply insecticide when colonies are first forming, and prior to leaf damage.

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 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 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.**Sivanto 200 SL, Sivanto Prime** (*flupyradifurone*) Mode of Action: 4D (butenolides)**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.**Stallion** (*zeta-cypermethrin + chlorpyrifos*) Mode of Action: 3A (pyrethroids) and 1B (organophosphates)**Application Rate:** 3.75-11.75 fl oz/A or 0.008-0.25 lb ai/A (zeta-cypermethrin)**Application Rate:** 0.08-0.25 lb ai/A (chlorpyrifos)**REI:** 24 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, stink bug nymphs and adults, corn rootworm adults, flea beetle adults, and Japanese beetle adults.**Restrictions:** Do not apply more than 0.075 lb ai/A of zeta-cypermethrin or 0.75 lb ai/A of chlorpyrifos in a single season. Do not reapply within ten days.**Common stalk borer, corn earworm, European corn borer:** Management should occur prior to larvae boring into the stalk or ear.

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, Zeal WDG Miticide (*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, Annex LFR, Bi-Dash 2E, Bifen 2 AG Gold, Bifen 25% EC, Bifen 2EC Select, Bifender FC, Bifenthrin 2EC, Bifenture EC, Bifenture LFC, Brigade 2EC, Capture 3RIVE 3D, Capture LFR, Discipline 2EC, Ethos XB, Fanfare EC, Fanfare 2EC, Fanfare ES, Manticor LFR, Ruckus LFR, Sniper, Sniper Helios, Sniper LFR, Temitry LFR, Tundra EC, XPedient Plus, 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 0.15-0.74 fl oz/1000 feet of row

REI: 12 hours

Targeted Insects: Northern corn rootworm larvae, western corn rootworm larvae, white grub larvae, seedcorn beetle larvae, seedcorn 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.

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

Ambush Application Rate: 0.5 oz/1000 feet of row

Arctic 3.2 EC Application Rate: 0.3 oz/1000 feet of row

REI: 12 hours

Targeted Insects: Black cutworm caterpillars, dingy cutworm caterpillars, fall armyworm caterpillars, and true armyworm caterpillars. Arctic 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 2.1G, Aztec HC, Aztec SmartBox 4.67G, Defcon 2.1G, Defcon 4.67G (*tebupirimphos + cyfluthrin/tebupirimfos + cyfluthrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Application Rate: 1.5-6.7 oz/1000 feet of row

Application Rates for 30 inch row spacing:

Aztec 2.1G: 7.3 lb/A

Aztec HC: 1.63 lb/A

Aztec SmartBox 4.67G: 3.27 lb/A

Defcon 2.1G: 7.3 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, seedcorn beetle larvae, seedcorn 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.

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.

Bolton, Cobalt (*chlorpyrifos + gamma-cyhalothrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Application Rate: 18-50 fl oz/A

REI: 24 hours

Targeted Insects: White grub larvae, seed corn beetles, seed corn maggots, wireworm larvae, and cutworm caterpillars.

Restrictions: Do not apply more than 92 fl oz/A per year. Do not make more than three applications per calendar year. Do not apply more than 2.5 lb ai/A for chlorpyrifos and 0.13 lb ai/A for lambda-cyhalothrin.

Cavalry, Cavalry II, Firestone, Grizzly Too, Karate, Kendo, L-C Insecticide, Lambda-T, Lambda T-2, Lambda-Cy AG, Lambda-Cy EC, Lambda-Cy 1EC, LambdaStar 1 CS, LambdaStar, LambdaStar Plus, Lamcap II, Paradigm, Paradigm VC, Province, Province II, Ravage, Warrior II (*lambda-cyhalothrin*) Mode of Action: 3A (pyrethroids)

Application Rate: 0.33 fl oz/1000 feet of row

Cavalry, Firestone, Paradigm VC Application Rate: 0.66 fl oz/1000 feet of row

Application Rate for 30 inch row spacing: 5.75 fl oz/A

Cavalry, Firestone, Paradigm VC Application Rate for 30 inch row spacing: 11.5 fl oz/A

REI: 24 hours

PHI: 21 days (for Cavalry)

Targeted Insects: Corn rootworm larvae, white grub larvae, seedcorn beetle larvae, seedcorn maggot larvae, wireworm larvae, and black cutworm.

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.

Chlorpyrifos 15G, Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG, Govern 4E, Hatchet, Lorsban 75 WG, Lorsban 15G, Lorsban 15G Smartbox, Lorsban-4E, Nufos 4E, Saurus, Warhawk, Warhawk Clearfrom, Whirlwind, Yuma 4E (*chlorpyrifos*) Mode of Action: 1B (organophosphates)

Chlorpyrifos 4E AG, Chlorpyrifos 4E-AG Application Rate: 1-2 pints/A

Application Rate: 8 oz/1000 feet of row

Application Rate for 30 inch row spacing: 8.7 lb/A

REI: 24 hours

Targeted Insects: Fall armyworm caterpillars, true armyworm caterpillars, and cutworm caterpillars.

Chlorpyrifos 15G, Lorsban 15G, Lorsban 15G Smartbox, Saurus Targeted Insects: Corn rootworm larvae, white grub larvae, seedcorn beetle larvae, seedcorn maggot larvae, wireworm larvae, and black cutworm caterpillars.

Restrictions: Do not use more than 2.3 lb ai/A in a single season.

Cobalt Advanced, Lambdafos (*chlorpyrifos + lambda-cyhalothrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)

Cobalt Advanced Application Rate: 33-50 fl oz/A

Lambdafos Application Rate: 26-50 fl oz/A

REI: 24 hours

PHI: 21 days

Targeted Insects: Cutworm caterpillars, white grub larvae, seed corn beetles, seed corn maggots, and wireworm larvae.

Restrictions: Do not make more than three applications in a single season. Do not apply more than 2.5 lb ai/A for chlorpyrifos and 0.13 lb ai/A for lambda-cyhalothrin.

Counter 15-G Lock'N Load, Counter 15G SmartBox, Counter 20G Lock'N Load, Counter 20G SmartBox (*terbufos*) Mode of Action: 1B (organophosphates)

Application Rate: 4.5-6 oz/1000 feet of row

Application Rates for 30 inch row spacing:

Counter 20G Lock'N Load: 3.3-6.5 lb/A

Counter 20G SmartBox: 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 beetle 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.

Declare, Proaxis (*gamma-cyhalothrin*) Mode of Action: 3A (pyrethroids)

Application Rate: 0.041-0.26 fl oz/1000 feet of row

REI: 24 hours

Targeted Insects: Corn rootworm larvae, white grub larvae, seedcorn beetle larvae, seedcorn maggot larvae, wireworm larvae, and black cutworm caterpillars.

Restrictions: Do not apply more than 0.06 lb ai/A in a single season.

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 3G SmartBox, Force CS, 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 3G SmartBox:** 3.3-5.5 lb/A**Force CS:** 8-10 fl oz/A**REI:** 0 hours**Targeted Insects:** Corn rootworm larvae, white grub larvae, seedcorn beetle larvae, seedcorn maggot larvae, wireworm larvae, and black cutworm caterpillars.**Restrictions:** Do not use more than 0.165 lb ai/A (5.5 lb/A for Force 3G and Force 3G SmartBox) (10 fl oz/A of Force CS) in a season.**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.**Index, SmartChoice 5G, SmartChoice 5G Smartbox, SmartChoice 5G Lock'N Load, SmartChoice HC** (*chlorothoxyfos + bifenthrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)**Index Application Rate:** 0.44-0.72 fl oz/1000 feet of row**SmartChoice 5G, Smartchoice 5G Smartbox, SmartChoice 5G Lock 'n Load, SmartChoice HC Application Rate:** 0.4-5.0 oz/1000 feet of row**Application Rates for 30 inch row spacing:****Index:** 15.3-17.8 fl oz/A**SmartChoice 5G, SmartChoice 5G Smartbox, SmartChoice 5G Lock'N Load:** 3.3-5.4 lb/A**Smart Choice HC:** 1.1-1.8 lb/A**Tundra Extreme:** 13.9 fl oz/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, seedcorn maggot larvae, seedcorn 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. Do not apply Tundra Extreme in tank mixes with Steadfast or Lightning herbicides.**MatchUp, Tundra Supreme** (*chlorpyrifos + bifenthrin*) Mode of Action: 1B (organophosphates) and 3A (pyrethroids)**Application Rate:** 0.4-0.8 fl oz/1000 feet of row**REI:** 24 hours**Targeted Insects:** Northern corn rootworm larvae, western corn rootworm larvae, fall armyworm caterpillars, true armyworm caterpillars, white grubs, cutworm caterpillars, seed corn beetle larvae, seed corn maggots, and wireworm larvae.**Restrictions:** Do not apply more than 0.3 lb ai/A of bifenthrin in a single season.

Thimet 20-G Lock 'n Load, Thimet 20-G Smartbox (*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, seedcorn beetle larvae, seedcorn maggot larvae, and wireworm larvae.

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.

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

PHI: 21 days

Targeted Insects: Seedcorn 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.

Corn Seed Treatments

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Seed treatments are widely used in corn and are a useful tool that 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, ponder 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 seedlot, and desired planting population (low planting population may require seed treatments to prevent any further loss of stand)

Integrated Disease Management

Pest management in agricultural crops requires a multi-faceted approach as part of an integrated disease management program. Effective components of an integrated plant disease management program include: crop rotation residue management for reduction of 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 control will vary with seed treatment product, rate, environmental conditions, and pests present. Seed treatments may provide some level of control for early season diseases as well as control seedling blights.

Newly Opened Land – a Special Consideration

Newly opened land, such as 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 are planted into these high-residue fields. Also, insect pressure on newly cultivated lands may differ from a typical cropping situation 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. These products generally 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 properly.

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, Avicta Complete Corn 500 (<i>Thiamethoxam + Abamectin + Thiabendazole + Fludioxonil + Mefenoxam + Azoxystrobin</i>)	60
Avicta Duo 250, Avicta Duo Corn 500 (<i>Abemectin + Thiamethoxam</i>)	60
Poncho/Votivo (<i>Clothianidin + Bacillus firmus I-1582</i>)	60

Fungicide products

Acceleron DC-509, Acceleron DX-509, Vortex (<i>Ipiconazole</i>)	60
Acceleron DX-709 (<i>Tryfloxystrobin</i>)	60
Acceleron DC-309, 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 (<i>Metalaxyl</i>)	60
Apron XL (<i>Mefenoxam</i>)	61
Captan 4L (<i>Captan</i>)	61
Dithane F-45, Manzate Flowable, Manzate Max, Manzate Pro-Stick (<i>Mancozeb + surfactant</i>)	61
Dithane M-45 (<i>Mancozeb</i>)	61
Dyna-shield fludioxonil (<i>Fludioxonil</i>)	61
Dynasty (<i>Azoxystrobin</i>)	61
Evergol Energy (<i>Penflufen + Prothioconazole + Metalaxyl</i>)	61
Evergol Prime (<i>Penflufen</i>)	61
Maxim 4FS, Spirato 480 FS (<i>Fludioxonil</i>)	61
Maxim Quattro (<i>Fludioxonil + Azoxystrobin + Mefenoxam + Thiabendazole</i>)	62
Metlock (<i>Metconazole</i>)	62
Rancona V 100 Pro FS (<i>Ipiconazole + Carboxin</i>)	62
Serenade Soil (<i>Bacillus subtilis strain QST 713</i>)	62
Signet 480 FS, 42-S Thiram (<i>Thiram</i>)	62
Stamina (<i>Pyraclostrobin</i>)	62
Trilex 2000 (<i>Tryfloxystrobin + Metalaxyl</i>)	62
Vibrance (<i>Sedaxane</i>)	62
Vitaflo-280 (<i>Carbox + Thiram</i>)	63
Vitavax-34 (<i>Carboxin</i>)	63
Xanthion (<i>Bacillus subtilis, Strain MBI 600 + Pyraclostrobin</i>)	63

Insecticide products

Acceleron IC-609, Poncho 600 (<i>Clothianidin</i>)	63
Acceleron IX-409, Gaucho 600, Nitro Shield (<i>Imidacloprid</i>)	63
Cruiser 5FS (<i>Thiamethoxam</i>)	63
Lumivia (<i>chlorantraniliprole</i>)	63

Nematicide products

Aveo EZ Nematicide (<i>Bacillus amyloliquefaciens strain PTA-4838</i>)	64
BioST Nematicide 100 (<i>Burkholderia spp strain A396</i>)	64

Fungicide FRAC Codes and Group Names

FRAC Code	Group Name
1	Methyl benzimidazole carbamate (MBC)
3	Demethylation inhibitor (DMI)
4	Phenylamide (PA)
7	Succinate dehydrogenase inhibitor (SDHI)
11	Quinone outside inhibitor (QoI)
12	Phenylpyrroles (PP)
M3	Dithiocarbamate
M4	Pthalimide
44	Microbial

Insecticide Modes of Action

Mode of Action Group Number	Insecticide Class
4A	Neonicotinoids
6	Avermectins
28	Diamides

Check list of pests controlled by seed treatment products

Product Name	Seed & seedling rots	Fusarium root rot	Pythium root rot	Rhizoctonia root rot	Head smut	Insects	Corn nematodes
Combo products							
Avicta Complete Corn 250	+	-	-	-	-	+	+
Avicta Complete Corn 500	+	-	-	-	-	+	+
Avicta Duo 250, Avicta Duo Corn 500	-	-	-	-	-	+	+
Poncho/Voivo	-	-	-	-	-	+	+
Fungicide products							
Acceleron DC-509, Acceleron DX-509, Vortex	+	+	-	+	-	NA	NA
Acceleron DX-709	+	+	-	+	-	NA	NA
Acceleron DC-309, Acquire, Metalaxyl etc	+	-	-	-	-	NA	NA
Apron XL	-	-	+	-	-	NA	NA
Captan 4L	+	-	-	-	-	NA	NA
Dithane F-45, Manzate Flowable, etc	+	-	-	-	-	NA	NA
Dithane M-45	+	-	-	-	-	NA	NA
Dyna-shield fludioxonil	+	-	-	-	-	NA	NA
Dynasty	+	-	-	+	+	NA	NA
Evergol Energy	+	-	-	-	-	NA	NA
Evergol Prime	+	-	-	+	-	NA	NA
Maxim 4FS, Spirato 480 FS	+	+	-	+	+	NA	NA
Maxim Quattro	+	+	-	+	+	NA	NA
Metlock	+	+	-	+	+	NA	NA
Rancona V 100 Pro FS	+	+	+	+	-	NA	NA
Serenade Soil	-	+	+	+	+	NA	NA
Signet 480 FS, 42-S Thiram	+	-	-	-	-	NA	NA
Stamina	+	(+)	(+)	+	-	NA	NA
Trilex 2000	+	+	-	+	+	NA	NA
Vibrance	+	-	-	+	+	NA	NA
Vitaflo-280	+	+	+	+	+	NA	NA
Vitavax-34	+	-	-	+	+	NA	NA
Xanthion	+	+	+	-	-	NA	NA
Insecticide products							
Acceleron IC-609, Poncho 600	NA	NA	NA	NA	NA	+	NA
Acceleron IX-409, Gaucho 600, Nitro Shield	NA	NA	NA	NA	NA	+	NA
Cruiser 5FS	NA	NA	NA	NA	NA	+	NA
Lumivia	NA	NA	NA	NA	NA	+	NA
Nematicide products							
Aveo EZ Nematicide	NA	NA	NA	NA	NA	NA	+
BioST Nematicide 100	NA	NA	NA	NA	NA	NA	+

+ = 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, AVICTA COMPLETE CORN 500 (*thiamethoxam + abamectin + thiabendazole + fludioxonil + mephenoxam + 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

Targeted diseases: Seed and seedling rots 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.

AVICTA DUO 250, AVICTA DUO CORN 500 (*abamectin + thiamethoxam*) Insecticide Mode of Action: 4A (neonicotinoids) and 6 (avermectins)

Application Rate: 0.2 – 0.25 mg /seed **Abamectin**

Application Rate: 0.4538 – 0.5672 mg/seed **Thiamethoxam**.

Targeted diseases: 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.

PONCHO/VOTIVO (*clothianidin + Bacillus firmus strain I-1582*) Insecticide Mode of Action: 4A (neonicotinoids)

Application Rate: 2.7 fl oz/80,000 seed unit

REI: 12 hours

Targeted diseases: corn nematodes

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.

Fungicide products

ACCELERON DC-509, ACCELERON DX-509, VORTEX (*ipiconazole*) Mode of Action: 3 (DMI)

Application Rate: Acceleron DC-509, Acceleron DX-509: 0.085 fl oz/cwt

Application Rate: Vortex: 0.044 fl oz/cwt

Targeted diseases: Seed and seedling rots, *Fusarium* and *Rhizoctonia* root rots.

ACCELERON DX-709 (tryfloxystrobin) Mode of Action: 11 (QoI)

Application Rate: 0.32-0.64 fl oz/cwt

Targeted diseases: Seed and seedling rots, *Fusarium* and *Rhizoctonia* root rots.

ACCELERON DC-309, 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: 0.75 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 ST: 0.75 fl oz/cwt

Sebring 318 FS: 0.75 fl oz/cwt

Sebring 480 FS: 0.50 fl oz/cwt

Targeted diseases: Seed and seedling rots.

APRON XL (*mefenoxam*) Mode of Action: 4 (PA)

Application Rate: 0.0425-0.085 fl oz/cwt

Targeted diseases: Seed rot and damping-off caused by *Pythium*.

CAPTAN 4L (*captan*) Mode of Action: M4 (multi-site)

Application Rate: 2.2 fl oz/cwt

Targeted diseases: Seed and seedling rots.

DITHANE F-45, MANZATE FLOWABLE, MANZATE MAX, MANZATE PRO-STICK (*mancozeb + surfactant*) Mode of Action: M3 (multi-site)

Application Rates:

Dithane F-45, Manzate Flowable: 4.3-8.6 fl oz/cwt

Manzate Max: 2.4-4.8 fl oz/cwt

Manzate Pro-Stick: 2.7-5.4 of oz/cwt

Targeted diseases: Seed and seedling rots.

DITHANE M-45 (*mancozeb*) Mode of action: M3 (multi-site)

Application Rate: 2.7-5.4 fl oz/100 lb of seed

Targeted diseases: damping-off and seed rots, seedling blight.

DYNA-SHIELD FLUDIOXONIL (*fludioxonil*) Mode of action: 12 (PP)

Application Rate: 0.08-0.16 fl oz/100 lb of seed

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/100 lb of seed

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: 0.24-0.95 fl oz/80,000 seeds

Targeted diseases: Seed rot and damping-off caused by *Rhizoctonia*, *Fusarium* and *Pythium*, seed decay.

EVERGOL PRIME (*penflufen*) Mode of Action: 7 (SDHI)

Application Rate: 0.64 fl oz/cwt

Targeted diseases: Seed and seedling rots and *Rhizoctonia* root rot diseases.

MAXIM 4FS, SPIRATO 480 FS (*fludioxonil*) Mode of Action: 12 (PP)

Application Rate: 0.08-0.16 fl oz/cwt

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 per 80,000 kernel count

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 (*metconazole*) Mode of Action: 3 (DMI)

Application Rate: 0.045-0.09 fl oz/cwt (0.18-0.52 fl oz/cwt for head smut)

Targeted diseases: Head smut, seed and seedling rots, *Fusarium* root rot diseases, *Rhizoctonia* root rot diseases.

RANCONA V 100 PRO FS (*ipiconazole + carboxin*) Mode of Action: 3 (DMI), 7 (SDHI)

Application rate: 1.5 fl /cwt

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*.

SERENADE SOIL (*Bacillus subtilis strain QST 713*) Mode of action: 44 (microbial)

Application Rate: 2-6 qt/acre

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 480 DP (*thiram*) Mode of Action: M3 (multi-site)

Application Rate: 1.5 fl oz/bu

Application Rate: Thiram 480 DP: 2.7/100lbs of seed

Targeted diseases: Seed and seedling rots.

STAMINA (*pyraclostrobin*) Mode of action: 11 (QoI)

Application Rate: 0.4-0.8 fl oz/100 lbs of seed

Targeted diseases: Seed and seedling diseases caused by *Rhizoctonia solani*, *Penicillium oxalicum*. Suppression only: *Aspergillus spp.*, *Fusarium spp.*, *Pythium spp.*

TRILEX 2000 (*trifloxystrobin + metalaxyl*) Mode of Action: 11 (QoI), 4 (PA)

Application Rate: 0.5 fl oz/cwt

Targeted diseases: Seed and seedling rots, *Fusarium* and *Rhizoctonia* root rots.

VIBRANCE (*sedaxane*) Mode of Action: 7 (SDHI)

Application Rate: 2.5-5 g ai/100 kg; 20-40 g ai/100kg for control of head smut

Targeted diseases: Head smut, seed decay, seedling blight and damping off caused by *Rhizoctonia solani*.

VITAFLO 280 (*carboxin + thiram*) Mode of Action: M3 (multi-site), 7 (SDHI)

Application rates: 4.5 fl oz/cwt

Targeted diseases: Seed and seedling rots, *Fusarium*, *Rhizoctonia* and *Pythium* root rots.

Restrictions: Do not graze or feed livestock on forage and hay grown on treated areas.

VITAVAX 34 (*carboxin*) Mode of Action: M7 (multi-site)

Application rate: 2-4 fl oz/cwt

Targeted diseases: Seedborne head smut (*Sphacelotheca reiliana*) and root rot caused by *Rhizoctonia solani*.

XANTHION (*Bacillus subtilis strain MBI 600 + pyraclostrobin*) Mode of action 44 (microbial), 11 (QoI)

Application Rate: Component A: 0.6-1.2 fl oz/acre

Application Rate: Component B: 3.0-6.0 fl oz/acre

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, PONCHO 600 (*clothianidin*) Mode of Action: 4A (neonicotinoids)

Application Rate: 1.13-5.64 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, seedcorn maggot larvae, white grub larvae, and wireworm larvae.

ACCELERON IX-409, GAUCHO 600, NITRO SHIELD (*imidacloprid*) Mode of Action: 4A (neonicotinoids)

Application Rate: 0.72-6.0 fl oz/80,000 units of seed

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.

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.

LUMIVIA (*chlorantraniliprole*) Mode of Action: 28 (diamides)

Application Rate: 0.25-0.75 mg/kernel

REI: NA

Targeted insects: Black cutworm caterpillars, seed corn maggot larvae, white grub larvae, and wireworm larvae.

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

Targeted nematodes: corn nematode

BIOST NEMATICIDE 100 (*heat-killed Burkholderia spp. strain A396*) Mode of Action: Unknown
(Biological agent)

Application Rate: 8 oz/cwt

Targeted nematodes: corn nematode

Foliar Fungicides in Corn

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A number of 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. Other than rusts, which are blown up from the southern states, the rest of the fungal pathogens are residue-borne. Therefore residue management through tillage, where applicable, and rotation can significantly reduce inoculum levels for these pathogens especially early in the season. Luckily, diseases like gray leaf spot, northern corn leaf blight and others rarely reach yield reducing levels in South Dakota except under corn-on-corn, no-till and irrigated corn conditions. However, in some years and also depending on the cultural practices, foliar fungal diseases can reach yield reducing levels and under such conditions, a foliar fungicide is necessary to protect corn against yield loss.

When deciding on foliar fungicide treatment, consider the level of disease developing, field conditions (corn following corn, no-till, under irrigation), current and forecast weather conditions, corn growth stage (diseases appearing after corn is dented is likely to not cause significant yield loss), susceptibility of the hybrids and potential yield (low yield potential corn crop may not benefit from fungicide application).

Is there a benefit when fungicide is applied in the absence of disease or minimum disease pressure?

Several years of research at South Dakota State University and 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 as a result of applying strobilurins have been reported, such as, keeping plants green longer, these benefits do not result into increased significant yield from untreated plots in the absence of fungal pathogens. If a corn plant remains greener after black layer, no additional nutrients can go into the kernel. Therefore keeping plants green is helpful until black layer. This would be the case where fungicides help keep diseases under check to ensure leaves (ear leaf and above) remain photosynthetic until black layer. Therefore, to avoid problems associated with unnecessary application of fungicides (such as resistance development, added expenses) growers should always scout to determine the need for a fungicide application.

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 once 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. This period also coincides when several corn fungal diseases start to develop. 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.

Product Table of Contents

Absolute Maxx (<i>Trifloxystrobin Tebuconazole</i>)	68
Affiance (<i>Azoxystrobin + Tetraconazole</i>)	68
Aframe Plus, Cover XL (<i>Propiconazole + Azoxystrobin</i>)	68
Astera with aβ Pro Yield Enhancer (<i>Propiconazole + Hairpin aβ Protein</i>)	68
Approach (<i>Picoxystrobin</i>)	69
Approach Prima (<i>Picoxystrobin + Cyproconazole</i>)	69
Amtide Propiconazole 41.8% EC, Bumper 41.8 EC, Bumper ES, Fitness, Propicure 3.6F, Tide Propiconazole 41.8% EC, Propicon 3.6 EC, Propimax EC, Propi-Star EC, Tilt, Topaz, Shar-Shield PPZ, Vigil (<i>Propiconazole</i>)	69
Amtide Tebu 3.6F, 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, Vibe (<i>Tebuconazole</i>)	69
Ballad Plus (<i>Bacillus pumilus strain QST2808</i>)	70
Bravo Weather Stik (<i>Chlorothalonil + Surfactant</i>)	70
Chloronil 720, Bravo Ultrex, Echo 720, Echo 90 DF, Echo ZN, Equus 500 ZN, Equus, 720 SST, Equus DF, Initiate 720 (<i>Chlorothalonil</i>)	70
Crossover (<i>Tebuconazole + Lambda-cyhalothrin</i>)	70
Dithane F-45 Rainshield, Fortuna 75 WDG, Manzate Pro Stick, Penncozeb 4FL, Penncozeb 75 DF, Penncozeb 80 WP (<i>Mancozeb</i>)	71
Domark 230 ME (<i>Tetraconazole</i>)	71
Evito 480 SC, Aftershock (<i>Fluxastrobin</i>)	71
Evito T (<i>Fluxastrobin + Tebuconazole</i>)	71
Fortix (<i>Fluxastrobin + Flutriafol</i>)	71
Headline, Headline SC (<i>Pyraclostrobin</i>)	72
Headline AMP (<i>Pyraclostrobin+ Metconazole</i>)	72
Lucento (<i>Bixafen + Flutriafol</i>)	72
Miravis Neo (<i>Pydiflumetoen + Azoxystrobin + Propiconazole</i>)	72
Preemptor SC (<i>Fluoxastrobin + Flutriafol</i>)	72
Priaxor (<i>Fluxapyroxad + Pyraclostrobin</i>)	73
Proline (<i>Prothioconazole</i>)	73
Prosaro 421 SC (<i>Prothioconazole + Tebuconazole</i>)	73
Quadris, Satori, Aframe, Amistar, Azoxy 2SC, Azoxystar, Tetraban, Trevo (<i>Azoxystrobin</i>)	73
Quilt, Quilt Xcel, Avaris (<i>Propiconazole+ Azoxystrobin</i>)	74
Regalia (<i>Extract of Reynoutria sachalinensis</i>)	74
Revytek (<i>Mefentrifluconazole + Fluxapyroxad + Pyraclostrobin</i>)	74
Serenade ASO, Serenade Max (<i>Bacillus subtilis strain QST 713</i>)	74
Stratego, Delaro 325 SC (<i>Propiconazole + Trifloxystrobin</i>)	74
Stratego YLD (<i>Prothioconazole + Trifloxystrobin</i>)	75
Topguard (<i>Flutriafol</i>)	75
Topguard EQ (<i>Flutriafol + Azoxystrobin</i>)	75
Trivapro (<i>Banzovindiflupy + Azoxystrobin + Propiconazole</i>)	75
Veltyma (<i>Mefentrifluconazole + Pyraclostrobin</i>)	76
Vertisan (<i>Penthiopyrad</i>)	76
Zolera FX (<i>Fluoxastrobin + Tetraconazole</i>)	76

Fungicide FRAC Codes and Group Names

FRAC Code	Group Name
3	Demethylation inhibitor (DMI)
7	Succinate dehydrogenase inhibitor (SDHI)
11	Quinone outside inhibitor (QoI)
M3	Dithiocarbamate
M5	Chloronitriles
44	Microbial

Check list of diseases controlled by the products.

Product Name	Anthraco nose leaf blight	Gray leaf spot	Northern corn leaf blight	Common rust	Southern rust	Physoderma brown spot	Eye spot
Absolute Maxx	+	+	+	+	+	-	+
Affiance	+	+	+	+	+	-	+
Aframe Plus, Cover XL	+	+	+	+	+	+	+
Astera with aβ Pro Yield Enhancer	-	+	-	+		-	-
Approach	+	+	+	+	+	+	+
Approach Prima	+	+	+	+	+	+	+
Amtide Propiconazole 41.8% EC, Bumper 41.8 EC, Bumper ES, Fitness, Propicure 3.6F, Tide Propiconazole 41.8% EC, Propicon 3.6 EC, Propimax EC, Propi-Star EC, Tilt, Topaz, Shar-Shield PPZ, Vigil	+	+	+	+	+	-	+
Amtide Tebu 3.6F, 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, Vibe	-	+	+	+	+	-	-
Ballad Plus	-	-	-	+	+	-	-
Bravo Weather Stik	+	+	+	+	+	+	+
Chloronil 720, Bravo Ultrex, Echo 720, Echo 90 DF, Echo ZN, Equus 500 ZN, Equus, 720 SST, Equus DF, Initiate 720	+	+	+	+	+	+	+
Crossover	-	+	+	+	+	-	-
Dithane F-45 Rainshield, Fortuna 75 WDG, Manzate Pro Stick, Penncozeb 4FL, Penncozeb 75 DF, Penncozeb 80 WP	-	+	+	+	-	-	-
Domark 230 ME	+	+	+	+	+	+	+
Evito 480 SC, Aftershock	+	+	+	+	+	-	+
Evito T	+	+	+	+	+	-	+
Fortix	+	+	+	+	+	-	+
Headline, Headline SC	+	+	+	+	+	+	-
Headline AMP	+	+	+	+	+	+	+
Lucento	+	+	+	+	+	+	+
Miravis Neo	+	+	+	+	+	+	+
Preemptor SC	+	+	+	+	+	+	+
Priaxor	+	+	+	+	+	+	+
Proline	+	+	+	+	+	+	+
Prosaro 421 SC	+	+	+	+	+	-	+
Quadris, Satori, Aframe, Amistar, Azoxy 2SC, Azoxystar, Tetraban, Trevo	+	+	+	+	+	+	+
Quilt, Quilt Xcel, Avaris	+	+	+	+	+	+	+
Regalia	+	+	+	+	+	-	+
Revytek	+	+	+	+	+	+	+
Serenade ASO, Serenade Max	-	-	-	+	-	-	-
Stratego, Delaro 325 SC	+	+	+	+	+	-	+
Stratego YLD	+	+	+	+	+	+	+
Topguard	+	+	+	+	+	-	+
Topguard EQ	+	+	+	+	+	-	+
Trivapro	+	+	+	+	+	+	+
Veltyma	+	+	+	+	+	+	+
Vertisan	+	+	+	+	+	+	-
Zolera FX	+	+	+	+	+	-	+

+ = 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

Targeted diseases: Anthracnose leaf blight (*Colletotrichum graminicola*), Common rust (*Puccinia sorghi*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zeae-maydis*), Northern corn leaf blight (*Helminthosporium turcica*), Northern corn leaf spot (*Cochliobolus carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*), Southern rust (*Puccinia polysora*)

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 per crop.

AFFIANCE (tetraconazole+azoxystrobin) Mode of action: 3, 11 (DMI, QoI)

Application rate: 10.0-17.0 fl oz/A

Targeted diseases: Gray leaf spot (*Cercospora zeae-maydis*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Anthracnose leaf blight (*Colletotrichum graminicola*), Eye spot (*Aureobasidium zeae*), Northern corn leaf spot (*Cochliobolus carbonum*), Northern corn leaf blight (*Helminthosporium turcica*), Southern corn leaf blight (*Cochliobolus heterostrophus*)

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.

AFRAME PLUS, COVER XL (propiconazole+azoxystrobin) Mode of action: 3, 11 (DMI, QoI)

Application rates:

Anthracnose leaf blight, Eye spot, Grey leaf spot: 10.5 fl oz/A

Other diseases rate: 10.5-14 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Collectotrichum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora seae-maydis*), Northern corn leaf blight (*Setopshaeria turcica*), Northern corn leaf spot (*Cochliobolus carbonum*), Physoderma brown spot (*Physoderma maydis*), Rusts (*Puccinia spp.*), Southern corn leaf blight (*Cochliobolus heterostrophus*), Helminthosporium leaf blights (*H. maydis*, *H. turcicum*, *H. carbonum*) Suppression of: Diplodia ear rot (*D. maydis*)

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.

ASTERA WITH ABPRO YIELD ENHANCER (propiconazole+Harpin aβ protein) Mode of action: 3 (DMI)

Application rate: 4 fl oz/A + 0.5 oz/A of aβPro

Targeted diseases: Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*).

Restrictions: Apply when disease first appears and reapply every 14 days.

Do not apply more than 16 fl oz/A of Astera/year. Do not apply more than 8 fl oz/A of Astera for field corn harvested for forage. Do not apply within 30 days of harvest for forage, grain or stover.

Astera with aβpro Yield Enhancer by be applied by ground, air or chemigation. Apply a minimum of 2 gal/A by air or 10 gal/A ground.

APROACH (*picoxystrobin*) Mode of action: 11 (QoI)

Application rate: 3-12 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Southern corn leaf blight (*Cochliobolus heterostrophus*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Leaf spots (*Alternaria* spp.), Physoderma brown spot (*Physoderma maydis*), Eye spot (*Aureobasidium zeae*), and Yellow leaf blight (*Phyllosticta maydis*).

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 two sequential applications of Aproach without alternating with another fungicide chemistry. Do not apply more than 36 fl oz/A per crop.

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.

APROACH PRIMA (*cyproconazole+picoxystrobin*) Mode of action: 3, 11 (DMI, QoI)

Application rate: 3.4-6.8 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Northern corn leaf spot (*Cochliobolus carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Southern corn leaf blight (*Cochliobolus heterostrophus*), Physoderma brown spot (*Physoderma maydis*), and Yellow leaf blight (*Phyllosticta maydis*).

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.

AMTIDE PROPICONAZOLE 41.8% EC, BUMPER 41.8 EC, BUMPER ES, FITNESS, PROPICURE 3.6F, TIDE PROPICONAZOLE 41.8% EC, PROPICON 3.6 EC, PROPIMAX EC, PROPI-STAR EC, TILT, TOPAZ, SHAR-SHIELD PPZ, VIGIL (*propiconazole*) Mode of action: 3 (DMI)

Application rate: 4 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Eye spot (*Aureobasidium zeae*), Northern corn leaf spot (*Helminthosporium carbonum*).

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.

Tilt, AmTide Propiconazole, Bumper 41.8 EC, Bumper ES, Fitness, Propicon 3.6 EC, Propicure 3.6 F, PropiMax EC, Propi-Star EC 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. Do not apply more than 8 fl oz/A/season on field corn harvested for forage.

AMTIDE TEBU 3.6F, MONSOON, ONSET 3.6L, TEBUCONAZOLE 3.6F, ORIOUS 3.6F, TEB 3.6SC, TEBUCON 3.6SC, TEBU-CROP 3.6F, TEBUCURE 3.6, TEBUSTAR 3.6L, TEBUZOL 3.6F, TOLEDO 3.6, VIBE (*tebuconazole*) Mode of Action: 3 (DMI)

Application rate: 4-6 fl oz/A

Targeted diseases: Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Exserohilum turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: Begin preventative applications when conditions favor disease development and repeat at a 7-14 day interval if conditions remain favorable for disease development

Do not apply more than 24 fl oz/A/season. Do not apply within 36 days of harvest of grain or 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.

BALLAD PLUS (*Bacillus pumilus strain QST2808*) Mode of Action: 44 (microbial)

Application rate: 1-4 quarts/A

Targeted diseases: Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*)

Restrictions: Begin applications when conditions favor disease development and repeat at a 7–14 day interval if conditions remain favorable for disease development. Use the higher rates and shorter intervals when disease pressure is high.

Ballad Plus has a 0 day pre-harvest interval.

BRAVO WEATHER STIK (*chlorothalonil*) Mode of Action: M5 (multi-site)

Application rate: 0.75-2 pints/A

Targeted diseases: Northern corn leaf blight (*Exserohilum turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*).

Restrictions: Begin applications when conditions favor disease and repeat every 7 days. Under severe disease conditions use 1.5–2 pints/A.

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 more than 12 pints of product/A per season.

CHLORONIL 720, BRAVO ULTREX, ECHO 720, ECHO 90DF, ECHO ZN, EQUUS 500 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

Chloronil 720, Echo 720, Equus 720 SST: 0.75-2 pints/A

Equus DF: 0.7-1.8 lbs/A

Echo 90 DF: 1¼ - 1 5/8 lbs/A

Echo ZN: 1 1/8 – 2 ¾ pints/A

Equus 500 ZN: 1.125-2.75 pints/A

Targeted diseases: Northern corn leaf blight (*Exserohilum turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*).

Restrictions: Begin applications when conditions favor disease and repeat every 7 days. Under severe disease conditions, use 1.4–1.8 lbs/A (Bravo Ultrex, Equus DF), 2.125-2.75 pints/A (Equus 500 ZN), 1.5-2 pints/A (Chloronil 720, 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. Do not apply more than 10.9 lbs (Bravo Ultrex, Equus DF), 9.0 lbs a.i. (Echo 720, Echo 90 DF, Echo ZN), 17 pints (Equus 500 ZN), 12 pints (Chloronil 720, Equus 720 SST) of product per acre per season.

CROSSOVER (*tebuconazole+lambda-cyhalothrin*) Mode of action: 3 (DMI)

Application rate: 8-9.5 fl oz/acre

Targeted diseases: Rust (*Puccinia spp.*) Northern leaf blight (*Helminthosporium triticum*), Southern leaf blight (*Helminthosporium maydis*), Northern leaf spot (*Helminthosporium carbonum*), Gray leaf spot (*Cercospora zeae maydis*)

Restrictions: Do not feed treated corn fodder or silage to meat or dairy animals within 21 days of last treatment. Do not apply more than 0.48 lb a.i. all Tebuconazole containing products (34 fl oz. of this product) per acre per year. Do not apply more than 0.12 lb a.i. of all Lambda Cyhalothrin containing products (38 fl oz of this product) per acre per year. Do not apply more than 0.06 lb. a.i. per acre after silk initiation. Do not apply more than 0.03 lb. a.i. per acre after corn has reached the milk stage. Maximum application of Crossover is 34 fl oz per acre per season.

DITHANE F-45 RAINSHIELD, FORTUNA 75 WDG, MANZATE PRO STICK, PENNCOZEB 4FL, PENNCOZEB 75 DF, PENNCOZEB 80 WP (*mancozeb*) Mode of action: M3 (multi-site)

Application rates:

Dithane F-45: 1.2 qt/acre

Fortuna 75 WDG, Manzate Pro Stick: 1.5 lb/acre

Penncozeb 4FL: 0.8-1.2 qts/A

Penncozeb 75 DF, Penncozeb 80 WP: 1-1.5 lbs/A (repeat as needed)

Targeted diseases: Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*).

Restrictions: Start applications at disease onset and repeat at 4–14 day intervals.

Do not apply more than 12 qts (Penncozeb 4FL and 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 not labeled for gray leaf spot.

DOMARK 230 ME (*tetraconazole*) Mode of Action: 3 (DMI)

Application rate: 4-6 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Exserohilum turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Physoderma brown spot (*Physoderma maidis*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*)

Restrictions: Begin preventative applications when conditions favor disease development.

Do not make more than 1 application 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.

EVITO 480 SC, AFTERSHOCK (*fluxastrobin*) Mode of action: 11(QoI)

Application rate: 2.0-5.7 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Southern corn leaf blight (*Cochliobolus heterostrophus*),

Restrictions: Apply before disease occurs and at a 7-10 day interval. Use the higher rate and shorter interval when disease pressure is high.

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.

EVITO T (*fluxastrobin+tebuconazole*) Mode of action: 11, 3

Application rate: 4-9 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Southern corn leaf blight (*Cochliobolus heterostrophus*)

Restrictions: Apply before disease occurs and at a 7 day interval. Do not apply more than twice. Do not apply after the R4 growth stage. Do not apply more than 18 fl oz/A per season.

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.

FORTIX (*flutriafol+fluoxastrobin*) Mode of action: 3, 11 (DMI, QoI)

Application rate: 4-6 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: 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.

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.

Fortix may be applied by ground or air. Apply a minimum of 5 gal/A air or 10 gal/A ground. Do not use adjuvants when spraying corn after the V8 growth stage and prior to the VT growth stage.

HEADLINE, HEADLINE SC (*pyraclostrobin*) Mode of Action: 11 (QoI)

Application rate: 6-12 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Exserohilum turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Physoderma brown spot (*Physoderma maids*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: 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.

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 two sequential applications of Headline, Headline SC.

Adjuvants may be used with Headline and Headline SC. 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.

HEADLINE AMP (*metconazole+pyraclostrobin*) Mode of Action: 3, 11 (DMI, QoI)

Application rate: 10-14.4 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Exserohilum turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Physoderma brown spot (*Physoderma maids*).

Restrictions: 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.

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 apply more than two sequential applications of Headline AMP. Do not make more than 4 applications 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.

LUCENTO (*bixafen+flutriafol*) Mode of action: 7, 3 (SDHI, DMI)

Application rate: 3 – 5.5 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Northern corn leaf spot (*Helminthosporium carbonum*), Suppression only: Fusarium ear rot (*Fusarium spp.*), Diplodia ear rot (*Diplodia maydis*).

Restrictions: Apply from onset of diseases up through R4 growth stage.

Do not apply more than two applications per season. Restricted entry interval is 12 hours. Pre-harvest interval is 10 days.

MIRAVIS NEO (*pydiflumetofen+azoxystrobin + propiconazole*) Mode of action: 7, 3, 11 (SDHI, DMI, QoI)

Application rate: 13.7 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Northern corn leaf spot (*Helminthosporium carbonum*), Suppression only: Fusarium ear rot (*Fusarium spp.*), Diplodia ear rot (*Diplodia maydis*).

Restrictions: 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.

Do not apply more than two applications per season. Restricted entry interval is 12 hours. Pre-harvest interval is 30 days.

PREEMPTOR SC (*flutriafol+fluoxastrobin*) Mode of action: 3, 11, (DMI, QoI)

Application rate: 4-6 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Northern corn leaf spot (*Helminthosporium carbonum*).

Restrictions: Apply before disease occurs and repeat on a 7-10 day interval, if conditions continue to favor disease.

Do not apply after R4 (soft dough). Do not apply more than 2 applications per year. Do not apply within 30 days of harvest.

Do not apply more than 12 fl oz 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. Restricted entry interval for detasselling is 5days, all other activities is 12 hours.

PRIAXOR (*fluxapyroxad+pyraclostrobin*) Mode of action: 7, 11 (SDHI, QoI)

Application rate: 4-8 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Physoderma brown spot (*Physoderma maydis*).

Restrictions: Apply before disease occurs and repeat on a 7-14 day interval, if conditions continue to favor disease.

Do not apply more than 2 applications of Priaxor 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.

PROLINE (*prothioconazole*) Mode of Action: 3 (DMI)

Application rate: 5.7 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*). Will also suppress ear rots, Fusarium (*Fusarium spp.*), Gibberella (*Gibberella spp.*), Aspergillus (*Aspergillus spp.*).

Restrictions: Apply when disease first appears and at 7-14 day intervals, thereafter if conditions continue to favor disease.

For optimum suppression of ear rots, apply Proline from the R1 (initial silk emergence) to the R2 (brown silk) corn growth stages.

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.

PROSARO 421 SC (*prothioconazole+tebuconazole*) Mode of Action: 3 (DMI)

Application rate: 6.5 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*) Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: 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.

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.

QUADRIS, SATORI, AFRAME, AMISTAR, AZOXY 2SC, AZOXYSTAR, TETRABAN, TREVO
(*azoxystrobin*) Mode of Action: 11 (QoI)

Application rate: 6-15.5 fl oz/A

Amistar: 2-5 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

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 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 123 fl oz of product/A per season.

Amistar should be integrated into an overall disease management strategy that includes selection of varieties with disease tolerance, optimum plant populations, proper fertilization, plant residue management, crop rotation, and water management practices.

QUILT, QUILT XCEL, AVARIS (*propiconazole+azoxystrobin*) Mode of Action: 3, 11 (DMI, QoI)

Application rate: 7-14 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*).

Restrictions: Apply when disease first appears. If conditions favorable for disease persist, reapply every 14 days.

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.

REGALIA (*extract of Reynoutria sachalinensis*) Mode of action: unknown

Application rate: 1-2 qt/15-40 gal water/acre

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern leaf blight (*Exserohilum turcicum*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern leaf blight (*Cochliobolus heterostrophus*)

Restrictions: For ground application on corn, apply 1-2 qts of Regalia preventatively in 15-40 gallons of water per acre using sufficient volume for thorough coverage. For improved performance, apply 0.5-2 qts Regalia in a tank mix with another registered fungicide. Consult your local Extension Specialist or Crop Consultant regarding the optimum timing of fungicide applications.

REVYTEK (*mefentrifluconazole+fluxapyroxad+pyraclostrobin*) Mode of Action: 3, 7, 11 (DMI, SDHI, QoI)

Application rate: 8-15 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

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.

SERENADE ASO, SERENADE MAX (*Bacillus subtilis strain QST 713*) Mode of Action: 44 (microbial)

Application rates:

Serenade ASO: 2-6 quarts/A

Serenade MAX: 1-3 lbs/A

Targeted diseases: Common rust (*Puccinia sorghi*), Southern Corn Leaf Blight (*Cochliobolus heterostrophus*)

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, DELARO 325 SC (*propiconazole+trifloxystrobin*) Mode of Action: 3, 11 (DMI, QoI)

Application rates:

Stratego: 10-12 fl oz/A

Delaro 325 SC: 8-12 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: 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.

Do not apply more than 24 fl oz/A of Stratego or Delaro/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 total applications of Stratego or other strobilurin fungicides.

Do not use adjuvants in Delaro sprays made between V8 and VT. Pre-harvest interval for Delaro is 14 days for grain and fodder.

STRATEGO YLD (*prothioconazole+trifloxystrobin*) Mode of Action: 3, 11 (DMI, QoI)

Application rate: 2-5 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Physoderma brown spot (*Physoderma maidis*), Northern corn leaf spot (*Helminthosporium carbonum*), Diplodia ear rot (*Diplodia maydis*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: 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.

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 same day as the 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.

TOPGUARD (*flutriafol*) Mode of Action: 3 (DMI)

Application rate: 7-14 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: Use the higher rate when disease pressure is high and if conditions are favorable for disease development. Minimum retreatment interval is 7 days.

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.

TOPGUARD EQ (*flutriafol+azoxystrobin*) Mode of Action: 3, 11 (DMI, QoI)

Application rate: 5-7 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: Apply preventatively or when conditions are favorable for disease development. Apply no later than growth R4 (early dough stage)

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. Restricted entry interval is 12 hours.

TRIVAPRO (*benzovindiflupyr, azoxystrobin+propiconazole*) Mode of Action: 7, 11, 3 (SDHI, QoI, DMI)

Application rate: 13.7 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Eye spot (*Aureobasidium zeae*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Rust (*Puccinia sorghi*), Physoderma brown spot (*Physoderma maydis*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*). Suppression only: Diplodia ear rot (*Diplodia spp.*).

Restrictions: 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. Trivapro B may be applied by ground, air or chemigation.

Do not apply more than 56 fl oz/A/season. Do not apply more than 28 fl oz for corn harvested for forage. Do not apply more than 0.45 lb ai Propiconazole-containing products/season. Do not apply more than 2.0 lb ai azoxystrobin-containing products/A/season. Restricted-entry interval: 12 hours.

Do not apply within 30 days of harvest for forage, grain, or stover.

VELTYMA (mefentrifluconazole+pyraclostrobin) Mode of Action: 3, 11 (DMI, QoI)

Application rate: 7-10 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Eye spot (*Aureobasidium zeae*) Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*).

Restrictions: Do not apply more than 10 fl oz per acre per application. Do not apply more than 2 applications per year. Post-harvest interval: 21 days.

VERTISAN (penthiopyrad) Mode of action: 7 (SDHI)

Application rate: 10-24 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), Physoderma brown spot (*Physoderma maydis*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*), Leaf spots (*Alternaria spp.*).

Restrictions: 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.

Do not apply within 7 days of grain and stover harvest. Do not apply more than two sequential applications of Vertisan without alternating with another fungicide chemistry. Do not apply more than 48 fl oz/A/season. Apply a minimum of 2 gal/A by air or 15 gal/A ground. Corn may be grazed or used for forage right after application.

ZOLERA FX (tetraconazole+fluoxastrobin) Mode of action 3 11, ((DMI, QoI)

Application rate: 4.4-6.8 fl oz/A

Targeted diseases: Anthracnose leaf blight (*Colletotricum graminicola*), Gray leaf spot (*Cercospora zea-maydis*), Northern corn leaf blight (*Helminthosporium turcicum*), Common rust (*Puccinia sorghi*), Southern rust (*Puccinia polysora*), eye spot (*Aureobasidium zeae*), Northern corn leaf spot (*Helminthosporium carbonum*), Southern corn leaf blight (*Cochliobolus heterostrophus*)

Restrictions: Do not apply more than 6.8 fl oz (0.09 lb ai tetraconazole, 0.09 lb ai fluoxastrobin) of ZOLERA FX Fungicide per acre per application. A maximum of 1 application of ZOLERA FX Fungicide may be made per year. Do not apply more than 0.09 lb ai tetraconazole per acre per year.

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 ZOLERA FX Fungicide within 30 days of harvest. Do not apply after corn growth stage R3 (brown silk/milk).

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 stage. An adjuvant may be used at any other growth stage. Restricted entry interval is 12 hours. Pre-harvest interval is 30 days.