

South Dakota State University
**Open PRAIRIE: Open Public Research Access Institutional
Repository and Information Exchange**

Fact Sheets

SDSU Extension

12-1-2010

Weed Control in Soybeans: 2011

Mike Moechnig
South Dakota State University

Darrell L. Deneke

Leon J. Wrage

Follow this and additional works at: http://openprairie.sdstate.edu/extension_fact

Recommended Citation

Moechnig, Mike; Deneke, Darrell L.; and Wrage, Leon J., "Weed Control in Soybeans: 2011" (2010). *Fact Sheets*. Paper 5.
http://openprairie.sdstate.edu/extension_fact/5

This Other is brought to you for free and open access by the SDSU Extension at Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. It has been accepted for inclusion in Fact Sheets by an authorized administrator of Open PRAIRIE: Open Public Research Access Institutional Repository and Information Exchange. For more information, please contact michael.biondo@sdstate.edu.

WEED CONTROL

in Soybeans: 2011



FS525B

Mike Moechnig, Extension Weed Specialist
Darrell L. Deneke, Extension IPM Coordinator
Leon J. Wrage, Distinguished Professor – Emeritus

Herbicide Suggestions

Information in this publication is based on South Dakota Agricultural Experiment Station research and other research or observations. Herbicides are included only after the chemical is registered by the Environmental Protection Agency (EPA) as to residue tolerances in crops used for food or feed.

There is no intent to specify product performance guarantees; such agreements involve the labeler and user. Users are responsible for following all label directions and precautions.

Rates. Rates for each treatment are stated as the amount of product per acre. All rates are on a broadcast basis. Labeled rates for the range in soil types and suggested rates based on SDSU tests are stated.

Cost. The cost per acre is based on current price information. The cost for low and high rates is listed. Cost does not include additives. Consult your dealer for actual price.

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 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.

Resistance Management. Refer to the table on page 29 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 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.

Safety First

Follow the Label. It is a violation of federal pesticide laws to use an herbicide in a manner inconsistent with its labeling. Read the entire label for 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 herbicides away from wells and water sources. Prevent back siphoning. Install anti-backflow devices in irrigation equipment used for pesticides. Triple rinse containers. Store herbicides properly. Identify high-risk areas such as coarse soils or areas where the water table is near the surface. Be aware of herbicide 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.

SOUTH DAKOTA STATE UNIVERSITY
College of Agriculture & Biological Sciences • Cooperative Extension Service
U.S. Department of Agriculture

SOYBEAN
RESEARCH & PROMOTION COUNCIL

Tradenames for herbicides are used in this publication to aid reader recognition. The common name is also listed and is used for herbicides 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.

LIST of SOYBEAN HERBICIDES

Aim EC (<i>carfentrazone</i>)	30	Parallel (<i>metolachlor</i>)	6
Amplify (<i>cloransulam</i>)	9	Phoenix (<i>lactofen</i>)	21
Arrow (<i>clethodim</i>)	27	Poast (<i>sethoxydim</i>)	26
Assure II (<i>quizalofop</i>)	24	Poast Plus (<i>sethoxydim</i>)	26
Authority Assist (<i>sulfentrazone + imazethapyr</i>)	12	Prefix (<i>s-metolachlor + fomesafen</i>)	6
Authority First (<i>sulfentrazone + cloransulam</i>)	12	Propel (<i>dimethenamid</i>)	7
Authority MTZ (<i>sulfentrazone + metribuzin</i>)	12	Prowl (<i>pendimethalin</i>)	4
Autumn (<i>iodosulfuron</i>)	21	Pursuit (<i>imazethapyr</i>)	15
Axiom (<i>flufenacet + metribuzin</i>)	18	Pursuit Plus (<i>imazethapyr + pendimethalin</i>)	16
Basagran (<i>bentazon</i>)	18	Python (<i>flumetsulam</i>)	8
Blazer, Ultra (<i>acifluorfen</i>)	19	Raptor (<i>imazamox</i>)	15
Boundary (<i>metribuzin</i>)	6	Reflex (<i>fomesafen</i>)	22
Butyrac 200 (<i>2,4-DB</i>)	28	Resource (<i>flumiclorac</i>)	23
Brawl (<i>s-metolachlor</i>)	5	Rezult (<i>sethoxydim + bentazon</i>)	26
Cadet (<i>fluthiacet</i>)	23	Scepter (<i>imazaquin</i>)	17
Charger Basic (<i>s-metolachlor</i>)	5	Section (<i>clethodim</i>)	27
Cinch (<i>s-metolachlor</i>)	5	Select (<i>clethodim</i>)	27
Classic (<i>chlorimuron</i>)	20	Select Max (<i>clethodim</i>)	27
Clethodim (<i>clethodim</i>)	27	Sencor (<i>metribuzin</i>)	9
Cobra (<i>lactofen</i>)	21	Sequence (<i>metolachlor + glyphosate</i>)	7
Command (<i>clomazone</i>)	8	Shadow (<i>clethodim</i>)	27
Define (<i>flufenacet</i>)	17	Sharpen (<i>saflufenacil</i>)	14
Dimetric (<i>metribuzin</i>)	9	Slider (<i>dimethenamid</i>)	7
Domain (<i>flufenacet + metribuzin</i>)	18	Sonalan (<i>ethalfuralin</i>)	4
Dual II Magnum (<i>s-metolachlor</i>)	5	Sonic (<i>sulfentrazone + cloransulam</i>)	11
Encompass (<i>flumioxazin</i>)	13	Spartan (<i>sulfentrazone</i>)	10
Enlite (<i>chlorimuron + flumioxazin + thifensulfuron</i>)	14	Spartan Advance (<i>sulfentrazone + glyphosate</i>)	11
Establish (<i>dimethenamid</i>)	7	Spartan Charge (<i>sulfentrazone + carfentrazone</i>)	11
Extreme (<i>imazethapyr + glyphosate</i>)	16	Stalwart (<i>metolachlor</i>)	6
Fierce (<i>flumioxazin + pyroxasulfone</i>)	13	Stellar (<i>flumiclorac + lactofen</i>)	23
FirstRate (<i>cloransulam</i>)	10	Storm (<i>acifluorfen + bentazon</i>)	20
Flexstar GT (<i>fomesafen + glyphosate</i>)	22	Synchrony XP (<i>thifensulfuron + chlorimuron</i>)	21, 32
Flexstar 2L (<i>fomesafen</i>)	22	Tackle (<i>imazethapyr + glyphosate</i>)	16
Fusilade DX (<i>fluazifop</i>)	24	Targa (<i>quizalofop</i>)	24
Fusion (<i>fluazifop + fenoxaprop</i>)	25	Thunder (<i>imazethapyr</i>)	16
Gangster (<i>flumioxazin + cloransulam</i>)	13	Thunder Master (<i>imazethapyr + glyphosate</i>)	16
Glyphosate Products	28, 30	TriCor (<i>metribuzin</i>)	9
Gramoxone (<i>paraquat</i>)	29	Trifluralin Products (<i>Treflan, etc.</i>)	4
Harmony GT (<i>thifensulfuron</i>)	20	2,4-D (<i>ester and amine</i>)	28
Ignite (<i>glufosinate</i>)	32	Valor SX (<i>flumioxazin</i>)	13
Intensity (<i>clethodim</i>)	27	Verdict (<i>saflufenacil + dimethenamid</i>)	15
Intrro (<i>alachlor</i>)	5	Vida (<i>pyraflufen</i>)	30
Medal (<i>s-metolachlor</i>)	5	Volunteer (<i>clethodim</i>)	27
Metolachlor Products (<i>Dual, etc.</i>)	5	Warrant (<i>acetochlor</i>)	7
Metri DF (<i>metribuzin</i>)	9		
Metribuzin (<i>metribuzin</i>)	9	Mode of Action Table	33
Microtech (<i>alachlor</i>)	5	Weed Response Table	34
OpTill (<i>saflufenacil + imazethapyr</i>)	14		
Outlook (<i>dimethenamid</i>)	7		

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 using preemergence herbicides or rotating different crop species or crop varieties such as Liberty Link or conventional.

Kochia: Several locations in northcentral SD west of Hwy 281 and east of the Missouri River. The best management option may be rotating to Liberty Link or conventional soybeans. In Roundup Ready soybeans, consider using a full rate of a preemergence herbicide such as Valor (flumioxazin) or Authority products (sulfentrazone). Postemergence options are limited, but if necessary, consider using Cobra (lactofen) or Flexstar (fomesafen) where permissible.

Common ragweed: Some reports in southeastern SD. In Roundup Ready soybeans, consider using a preemergence herbicide that contains cloransulam (Authority First/Sonic or Gangster), metribuzin (Sencor or Authority MTZ), fomesafen (Prefix), or flumioxazin (Valor) followed by a glyphosate tank mix partner such as FirstRate (cloransulam) or Flexstar (fomesafen). Do not apply Flexstar postemergence if Prefix was applied preemergence. Consider rotating to Liberty Link or conventional soybean varieties.

Horseweed (marestail): Several reports in southeastern and northcentral SD. In Roundup Ready soybeans, use 2,4-D ester in the burndown application before planting or use a preemergence herbicide that also has foliar activity such as saflufenacil (Sharpen or OpTill) or cloransulam (Authority First/Sonic or Gangster). For postemergence, consider tank mixing FirstRate (cloransulam) with glyphosate.

Common lambsquarters: May be resistant during adverse conditions, but this has not yet been adequately proven in SDSU trials. The best management option may be to use pre-emergence herbicides such as Valor (flumioxazin), Authority products (sulfentrazone), Sencor (metribuzin), or Sharpen/OpTill (saflufenacil). Harmony (thifensulfuron) may be the most effective postemergence tank mix partner Cadet (fluthiacet) or Resource (flumiclorac) may be moderately effective.

Common waterhemp: Some reports near the Huron area, but not verified yet. The best management option may be to use pre-emergence herbicides such as Valor (flumioxazin), Authority products (sulfentrazone), Prefix (fomesafen), and Sencor (metribuzin). Flexstar (fomesafen) may be one of the most effective postemergence tank mix partners, but other products such as Cadet (fluthiacet) or Resource (flumiclorac) may be effective on small plants.

ABBREVIATIONS and DEFINITIONS

EPP:	Surface applications usually 2 to 6 weeks before planting in no-till systems.
SPP:	Surface preplant, applied before planting.
PPI:	Before the crop is planted, incorporated.
SPPI:	Preplant incorporated, but herbicide is usually restricted to the top 1 to 2 inches with single-pass incorporation.
PRE:	After planting, but before crop or weeds emerge.
POST:	After crop or weeds emerge.

pt = pint	G = granule
qt = quart	L = liquid, flowable, or EC
oz = ounce	DG, DF = dry flowable
gal = gallon	WDG = water dispersible granule
lb = pound	OM = organic matter
ae = acid equivalent	COC = crop oil concentrate
ai = active ingredient	NIS = non-ionic surfactant
and/+ = split application (and) or as a tank-mix (+)	N = liquid nitrogen fertilizer
gpa = gallon per acre	AMS = ammonium sulfate
psi = pounds per square inch pressure	MSO = processed seed oil

SOYBEAN HERBICIDES

TRIFLURALIN PRODUCTS (trifluralin) *Site of Action: 3*

Trifluralin is available in several brand name products, including **Treflan, Trifluralin, Trust, Tri-4, Triflurex**, and others. Formulation and use may vary. Follow directions for product used.

1-2 pt trifluralin 4L (0.5-1.0 lb ai)
5-10 lb Treflan 20G

(\$3.00-9.65)

Dinitroaniline herbicide. Excellent control of most annual grasses and fair control of small-seeded annual broadleaves such as pigweed and lambsquarters. Gives partial waterhemp control. Does not control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Consistent performance. Very good crop tolerance. Rates of 1.5 pt 4L per acre have been satisfactory in most SDSU tests. Minimum carrier is 5 gpa for ground or air. Carryover may damage oats or sorghum planted the following year. No restriction on use of vines for feed.

FALL. Liquid or granule formulation may be applied in late fall and incorporated with one fall tillage and one pass in the spring. Spray forms preferred for spring application. Granules perform best in fall. Weed control with fall-applied granules has been equal to that for spring-applied liquid.

PPI. Spring application. Immediate incorporation preferred, but may be delayed up to 24 hours if soils surface is dry and wind is under 10 mph. Incorporate into the top 2 to 3 inches. A second incorporation improves uniformity, especially under wet, lumpy, or trashy conditions. Follow with a harrow or leveling device.

PENDIMETHALIN PRODUCTS (pendimethalin) *Site of Action: 3*

1.2-3.6 pt pendimethalin 3.3L (0.5-1.5 lb ai)
1.5-3.0 pt Prowl H₂O 3.8L (0.7-1.5 lb ai)

(\$5.55-16.65)

Dinitroaniline herbicide. Excellent control of most annual grasses and fair control of small-seeded annual broadleaves such as pigweed and lambsquarters. Does not control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Consistent performance as a preplant incorporated treatment. Very good crop tolerance; less tolerance if left on the surface. Prowl H₂O is a new water based formulation with less odor and staining and has shown improved performance in high residue tests. Rates of 3 pt 3.3L or 2.5 to 3 pt 3.8L per acre have been satisfactory in most SDSU tests. Minimum carrier is 10 gpa for ground and 5 gpa for air. No label restrictions for crops planted the following year if normal crop was produced. No use restrictions on vines for feed.

FALL. Pendimethalin may be surface applied or incorporated in the fall. Follow-up weed program required. Apply after October 1 and before freezeup. Rates are 1.8 to 3.6 pt 3.3L or 1.5 to 3 pt 3.8L per acre.

EPP. Apply up to 15 days before planting. One inch rainfall or mechanical incorporation required.

PPI. Apply up to 60 days before planting. Immediate incorporation preferred but may be delayed up to 7 days. Incorporate into the top 1 to 2 inches. A second incorporation improves uniformity, especially if no rain was received, or under lumpy, trashy conditions. Follow with a harrow or leveling device.

SONALAN (ethalfluralin) *Site of Action: 3*

1.5-3.5 pt Sonalan 3L or 5.5-13 lb Sonalan 10G (0.55-1.3 lb ai)

(\$6.80-17.05)

Dinitroaniline herbicide. Excellent control of most annual grasses; fair to good control of small-seeded annual broadleaves such as pigweed and lambsquarters. Gives partial waterhemp control. Does not control mustard, smartweed, or large-seeded annual broadleaves. Consistent performance. Good crop tolerance in most situations. Performance has been similar to Treflan when amount of product are adjusted to label rates. Rate of 3 to 3.5 pt is for eastern black nightshade suppression and added broadleaf control. Rate of 2.5 pt per acre has been satisfactory in most SDSU tests. Minimum carrier is 5 gpa. Less soil residual than Treflan; no label limitations for common crops the following year. Do not feed vines to livestock.

PPI. Apply within 3 weeks before planting. Incorporate into top 2 to 3 inches. Immediate incorporation preferred; however, incorporation may be delayed up to 48 hours. Second incorporation improves uniformity.

INTRRO or MICRO-TECH (alachlor) *Site of Action: 15***2-3 qt Intro 4L or Micro-Tech 4L (broadcast) (2-3 lb ai)****(\$13.10-21.40)**

Chloroacetamide herbicide. Very good to excellent control of several annual grasses and fair control of pigweed with high rates and favorable conditions. Useful to special weed problems such as nightshade, nutsedge, or waterhemp. Consistent on annual grasses when rainfall is adequate. Excellent crop tolerance. Rates of 2.5 to 3 qt 4L or 18 to 20 lb 15G per acre (broadcast) have been satisfactory in most preemergence SDSU tests. Use the higher rates for preplant incorporated or high residue, reduced till systems. Minimum carrier is 10 gpa for ground or 3 gpa for air. Intro is an emulsifiable liquid and Micro-Tech is a microencapsulated alachlor formulation. Granule or spray formulations appear equally effective. No carryover. Do not feed forage, hay, or straw or harvest for silage. **Restricted Use Pesticide.**

EPP. For Micro-Tech only. Apply 60% as the first part of a split application if treating 30 to 45 days before planting and the remainder at planting. Split application preferred when applying more than 14 days before planting.

SPPI. Incorporate into top 2 inches of soil within 7 days of planting. Use a field cultivator, shallow disk, or multi-weeder, or other suitable equipment during final seedbed preparation. Rate of 3 qt 4L per acre has been used in most tests. Furrow planters move treated soil from row area.

PRE. Requires 0.5 to 0.75 inch rain within one week.

TANK-MIX/SEQUENTIAL

2 to 3 qt Intro or Micro-Tech 4L with 1 pt trifluralin 4L or 1.2 to 3 pt pendimethalin 3.3L or 1.5 to 3 pt 3.8L or 1.25 to 3 pt Sonalan 3L per acre. Tank-mix or sequential application. Rates are essentially full rates of each used alone.

SPPI or **SPLIT PPI** and **PRE.** Tank-mixes. Incorporate shallowly not to exceed 2 inches or apply trifluralin, Sonalan, or pendimethalin preplant incorporated and use Intro or Micro-Tech preemergence. Use 1 pt per acre more when incorporating.

METOLACHLOR PRODUCTS *Site of Action: 15***DUAL II MAGNUM (s-metolachlor)****1-2 pt Dual II Magnum 7.64L (0.95-1.95 lb ai)****(\$13.75-27.45)****6-12 lb Dual 16G (broadcast)**

Additional 7.62L s-metolachlor products include Dual Magnum, Medal, Brawl, and Charger Basic, and 7.64L s-metolachlor products include Dual II Magnum, Medal II, Brawl II, and Cinch. Very good to excellent control of several grasses and fair control of pigweed. Useful for special weed problems such as nightshade, nutsedge, or waterhemp. Consistent on annual grasses when rainfall is adequate. Excellent crop tolerance. Rates of 1.7 to 2 pt per acre have been satisfactory in most SDSU tests. Products designated "Magnum" contain a resolved form of metolachlor (s-metolachlor). Labeling includes higher rates for certain grass problems. Minimum carrier is 10 gpa for ground and 2 gpa for air. No carryover. Vines may be used for livestock feed.

FALL. Apply after September 30. For minimum and no-till systems on soil having greater than 2.5% OM. Use 1.7 to 2 pt or 8 to 10 lb Dual 16G per acre on medium textured soil. Use the high rate for fine textured soil. Apply before ground freezes. Performs best in early, dry spring seasons where grass pressure is moderate to light.

EPP. Intended for early-season annual grasses and residual control into the season. Rain required. Does not control emerged weeds. Weed control has been acceptable except in seasons with heavy, early rain that delays planting.

SPPI. Incorporate into top 2 inches within 14 days before planting. Deep incorporation reduces grass control. Use maximum rate for soil type.

PRE. Requires 0.5 to 0.75 inch rain within one week after application.

POST. Dual II Magnum may be applied alone from emergence up to the third soybean trifoliolate at 1-1.33 pt/A. Do not make a postemergence application if any s-metolachlor product was also applied preemergence. Do not graze or feed forage to livestock after a postemergence application. Make postemergence applications at least 90 days before harvest.

Metolachlor Products (continued . . .)

STALWART or PARALLEL PCS or PARALLEL (metolachlor)

1-2 pt Stalwart 8L or Parallel PCS 8L or Parallel 7.8L (1-2 lb ai)

Products contain metolachlor. EPA required labeling at the same product rate as for s-metolachlor products. Higher rates are labeled for certain grassy weed problems. Apply fall, EPP, PPI, or PRE as listed above.

FALL, EPP, PPI, and PRE. Apply as listed above.

TANK-MIX/SEQUENTIAL

1 to 2 pt metolachlor product with 1 to 2 pt trifluralin 4L or 1.2 to 3 pt pendimethalin 3.3L or 1.5 to 3 pt 3.8L or 1.25 to 3 pt Sonalan 3L per acre. Tank-mix or sequential application. Rates are essentially full rates of each used alone.

SPPI or SPLIT PPI and PRE. Tank-mix and incorporate shallowly not to exceed 2 inches. Apply metolachlor preemergence over preplant incorporated herbicide.

PREMIX

BOUNDARY (s-metolachlor + metribuzin) Site of Action: 15+5 (\$9.70-24.25)

1 to 2.5 pt Boundary 6.5EC per acre. Boundary 7.8L is a premix containing 5.25 lb s-metolachlor (Dual) +1.25 lb metribuzin (Sencor) per gallon. For coarse soils with less than 3% OM use 1.2 to 1.5 pt or 1.5 to 1.8 pt per acre for over 3% OM. For medium soils with less than 3% OM use 1.8 to 2.1 pt to 2.4 pt per acre for over 3% OM. For fine soil with less than 3% OM use 2.4 to 2.7 pt or use 2.4 to 3 pt per acre for over 3% OM soil. Boundary is used at 1.25 pt as a foundation program to be followed by a postemergence option. This provides the equivalent of 1 pt Dual II Magnum + 0.3 lb Sencor DF and provides early-season residual for specific weeds including waterhemp. Winter wheat and alfalfa may be planted in 4.5 mo; corn, peas, barley, and spring wheat in 8 mo; forage grasses and other crops in 12 mo. Treated soybean plants cannot be grazed or fed to livestock 40 days after Boundary application. Do not apply to calcareous soils or soils with pH of 7.5 or higher.

EPP, PRE. Apply preplant surface or incorporated, preemergence. Application rate of 1.5 to 1.8 pt per acre when used as a foundation in a sequential program.

PREFIX (s-metolachlor + fomesafen) Site of Action: 15+14 (\$13.00-15.15)

2 – 2.33 pt Prefix (1.1 – 1.3 lb a.i. s-metolachlor + 0.24 – 0.28 lb a.i. fomesafen)

Prefix at 2 pt/A is equivalent to 1.1 pt/A Dual II Magnum + 0.95 pt/A Flexstar. Provides residual control of several common grass weed species such as crabgrass, barnyardgrass, foxtails, and witchgrass. Also controls several broadleaf weed species such as common lambsquarters, pigweed, purslane, common ragweed, and waterhemp. May provide approximately 5 wks residual control. Maximum application rate is 2.33 pt once every 2 years.

Minimum carrier is 10 gpa for ground applications or 5 gpa for aerial applications.

Rotation restriction is 4.5 mo for wheat, barley, oat, or rye; 12 mo for corn; 18 mo for sunflower or sorghum.

Limited region for application in South Dakota includes land east of I-29 from North Dakota to Watertown, east of Hwy 81 from Watertown to Madison, and all areas east and south of State Road 34 and Hwy 281 down to the Nebraska border. Do not apply Flexstar or Reflex (fomesafen) postemergence if Prefix is applied preemergence at 2 pt/A.

EPSS. Apply within 15 days prior to planting. Minimize soil movement at planting.

PPI. Incorporate into the top 2 inches of soil within 7 days after application.

PRE. Apply during or after planting but before weeds or soybeans emerge.

EPOST. Apply 2 – 2.33 pt/A between cracking and the third trifoliolate. Temporary spotting, bronzing, or growth deformity may occur on the soybeans. If tank mixing with a glyphosate that does not have an adjuvant, NIS may be added at 0.25% v/v. Do not use COC.

Metolachlor Products (continued . . .)

SEQUENCE (metolachlor + glyphosate) Site of Action: 15+9 (\$16.40-26.25)

2.5 to 4 pt Sequence 5.25L per acre. Sequence is a premix containing 3 lb s-metolachlor plus 2.25 lb ae glyphosate per gallon. It provides preemergence residual control for some annual grasses and certain small-seeded annual broadleaves and non-selective burndown of emerged weeds.

The 4 pt rate provides the equivalent of 1.2 pt Dual Magnum plus 48 oz glyphosate 3L ae product. Minimum carrier is 10 gpa for ground or 3 gpa for air. Do not feed treated forage or hay for 30 days.

EPP and **PRE.** Apply up to 30 days before planting but before crop emergence.

TANK-MIXES

Sequence may be tank-mixed with several herbicides labeled for preemergence use in soybeans.

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

8-21 oz Outlook 6L (0.4-1 lb ai) (\$11.35-29.80)

Chloroacetamide herbicide chemically related to Intro or Dual. 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 appears adequate under conditions in SDSU tests.

Rates of 16 to 21 oz 6L per acre are suggested for most situations. Minimum carrier is 2 gpa for ground or air. There are no crop rotation restrictions for the next season. Winter wheat can be planted 4 months after application. Do not graze or feed forage.

EPP. 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.

SPPI. Apply within 2 weeks of planting and incorporate shallowly into the top 1 to 2 inches. Avoid deep incorporation. Incorporated applications not recommended for coarse soils with less than 1.5% OM.

PRE. Requires rain prior to weed emergence.

POST. May be applied early postemergence through trifoliolate stage. Avoid late application. Emerged weeds are not controlled.

TANK-MIX/SEQUENTIAL

Outlook and Propel may be tank-mixed with other herbicides; postemergence herbicides may be used sequentially.

10 to 21 oz Outlook 6L with 1 to 2 pt trifluralin 4L or 1.2 to 3 pt pendimethalin 3.3L or 1.5 to 3 pt 3.8L or 1.5 to 3.5 pt Sonalan 3L per acre. Tank-mix or sequential application. Rates are essentially full rates of each used alone.

SPPI or **SPLIT PPI** and **PRE.** Tank-mix and incorporate shallowly not to exceed 2 inches. Apply Outlook preemergence over preplant incorporated herbicide.

WARRANT (acetochlor) Site of Action: 15

1.25 – 2 qt Warrant 3L (0.94 – 1.5 lb ai) (\$10.15-16.25)

Primarily intended for early postemergence applications with a foliar herbicide to provide soil residual activity. Does not control emerged weeds. Preemergence control of grasses such as foxtails, barnyardgrass, crabgrass, and wild oats and broadleaf weed species such as waterhemp, lambsquarters, purslane, and others. Average rate may be 1.5 qt/A, but rates vary with soil texture. Do not apply more than 4 qt/A per year. Minimum carrier is 10 gpa for ground applications. Do not apply with aerial equipment. For best performance, 0.5 – 0.75 in precipitation is required within one week after application.

Soybeans may be replanted immediately, but crop injury could result. Rotation restriction is 4 mo for wheat, 9 mo for alfalfa, or 12 mo for sunflower, pulse crops (beans and peas), and other crops.

Warrant (continued . . .)

Do not apply within 100 ft of a well or areas where the ground water is less than 30 ft below the soil surface. Do not apply on sand soils with less than 3% organic matter (O.M.), loamy sands with less than 2% O.M., or sandy loams with less than 1% O.M. Do not mix or load within 50 ft of a well, sink hole, or surface water (lakes, reservoirs, streams, etc.) unless done on a properly designed impervious pad.

EPOST. Apply after soybean emergence but prior to the R2 (full bloom) soybean growth stage. Optimal timing may be V2 – V3 soybeans. Early applications are recommended to take advantage of the soil residual activity. Canopy cover may inhibit soil contact at later application dates.

COMMAND (clomazone) Site of Action: 13

1.3-2.6 pt Command 3ME (0.5-1 lb ai)

Command 3ME is a 3 lb/gal encapsulated formulation intended for preemergence or shallow incorporation. Command gives excellent control of velvetleaf and very good to excellent control of annual broadleaves such as lambsquarters and Venice mallow. Smartweed and ragweed require high rates. Pigweed and nightshade control is less consistent; cocklebur is partially controlled. Foxtail control is very good in some tests but has been variable. Excellent crop tolerance. There are no restrictions for high soil pH; however, carryover potential may increase at pH below 6. Velvetleaf control is usually satisfactory with 2 pt in most soils; use 2.6 pt per acre for heavy, high-organic-matter soil or for less susceptible weeds. Combination with other herbicides improves pigweed and grass control. Affected plants show chlorosis or bleaching of leaf tissue. Crop rotation restriction is 9 mo for field corn, sorghum, and peas; 12 mo for wheat and sweet corn; and 16 mo for crops not listed on the label. Treated fields may be rotated to corn or sorghum. Temporary whiteness may be noted, especially in spray overlaps or if it is very dry. Minimum carrier is 10 gpa for ground equipment.

Avoid application when spray may move to non-target vegetation. Ornamental and fruit trees, shrubs, evergreens, oats, alfalfa, and several garden plants are sensitive and will show whitening. Do not apply within 1200 ft of housing areas and commercial nurseries. Do not exceed 30 psi. Wind should not exceed 10 mph. Do not graze or harvest forage from clomazone treated field.

EPP, PRE. Preemergence or shallow incorporated application allows use in bands, no-till, and other conservation tillage. Experience suggests the 3ME formulation can be applied preemergence if extra precautions are followed to prevent movement.

TANK-MIX/SEQUENTIAL

Command can be tank-mixed with Metolachlor Products, Intro, Micro-Tech, or Boundary to improve grass control. It can also be tank-mixed with Sencor or used preplant followed by labeled postemergence herbicides.

PYTHON (flumetsulam) Site of Action: 2

0.8-1.33 oz Python 80WDG (0.04-0.07 lb ai)

(\$10.20-16.95)

Python is a soil-applied broadleaf herbicide. Rates vary according to weed species and soil texture. Python is packaged in 4 oz packets. Rates of 0.8 to 1 oz per acre are for the most susceptible weeds including Russian thistle, lambsquarters, Venice mallow, mustard, redroot pigweed, waterhemp, and kochia. Rates of 0.9 to 1.33 oz per acre are required for sunflower, marehail, nightshade, smartweed, and others. Python does not control ALS resistant biotypes. Results in SDSU tests with grass control combinations have been good to excellent for velvetleaf, pigweed, waterhemp, mustard, and lambsquarters. Cocklebur and common ragweed are suppressed but require additional herbicide for best results.

Crop tolerance has been good in SDSU tests. Temporary leaf chlorosis and stunting may be noted on calcareous soils. Varieties with tolerance to iron chlorosis should be used in fields with a history of early season chlorosis.

Alfalfa, dry beans, peas, and small grain may be planted after 4 mo; forage grasses and cover crops 9 mo; grain sorghum 12 mo; sunflower 18 mo; and canola and all other crops not listed on label after 26 mo and successful bioassay.

Minimum carrier is 10 gpa for ground equipment; 20 gpa for reduced till systems. Preharvest interval is 85 days. Do not apply to soils with a pH exceeding 7.8. Do not graze or feed forage, hay, or stray to livestock.

FALL. Special labeling allows fall application of 1 to 1.25 oz 80WDG in a tank-mix with 3 to 4 oz Sencor DF. Intended to reduce need for burndown. Apply late fall after soil temperature drops below 50° F.

PPI and **PRE.** Apply from 30 days before planting to after planting but before soybeans emerge.

Python (continued . . .)

TANK-MIXES and SEQUENTIAL

Mixes with burndown herbicides may be used for no-till. Python may be used with preplant or preemergence grass herbicides. Basagran, Blazer, Cobra, and other similar herbicides may be used postemergence for additional broadleaf control.

FIRSTRATE or AMPLIFY (cloransulam) Site of Action: 2

0.3-0.75 oz FirstRate or Amplify 85WDG (0.016-0.04 lb ai)

(\$11.45-28.65)

Cloransulam is a soil applied or postemergence ALS inhibitor herbicide used for broadleaf weed control. There is root and foliar uptake. Soil and postemergence applications provide good to excellent control of cocklebur, sunflower, velvetleaf, marestail, common ragweed, giant ragweed, and Venice mallow. Soil applications also control redroot pigweed and lambsquarters. Nightshade is suppressed. Sunflower and cocklebur control in SDSU tests with postemergence applications has been excellent; velvetleaf control has been satisfactory.

Rate for soil application is 0.6 oz for soils less than 3% OM or 0.75 oz per acre for higher OM. The postemergence rate is 0.3 oz per acre. Product is packaged in 1.5 oz soluble bags; one bag will treat 5 acres at the postemergence rate. Minimum carrier is 10 gpa for ground equipment. For postemergence application, add NIS at 1 to 2 pt/100 gal plus 28% N at 2.5 gal/100 gal or 2 lb AMS per acre. COC plus 28% N may be used under adverse conditions. Do not harvest forage for 14 days; do not harvest soybeans for 65 days after application.

Crop tolerance is very good. There are no soil pH restrictions. Iron chlorosis may increase under stress conditions with soil applications. Wheat may be planted after 3 mo; alfalfa, corn, dry beans, oats, peas, or sorghum after 9 mo; sweet corn after 18 mo; sunflower or other crops not listed on label after 30 months and successful bioassay.

PPI, EPP, PRE. Apply within 2 weeks of planting. Incorporate into the top 1 to 3 inches or apply to soil surface prior to crop emergence. Rain required for preemergence.

POST. Apply from emergence to flowering. Crop tolerance best after first trifoliate leaf is emerged.

TANK-MIXES

FirstRate or Amplify may be tank-mixed with burndown herbicides for no-till or tank-mixed with postemergence broadleaf herbicides (Basagran, Ultra Blazer, Cobra, Harmony GT, Raptor, Pursuit) or grass herbicides (Select, Poast Plus, Assure II, Fusion) or with glyphosate (Roundup Ready). Grass antagonism may be noted with tank-mixes with postemergence grass herbicides.

SENCOR (metribuzin) Site of Action: 5

0.5-1 pt Sencor 4L or 0.33 to 0.66 lb Sencor 75DF (0.25-0.5 lb act)

Triazine herbicide. Alternative products include Dimetric, Metri DF, Metribuzin 75DF, or TriCor DF. Metribuzin is usually used with other soil applied herbicides. It gives good to excellent control of small-seeded annual broadleaves and fair to good control of certain large-seeded broadleaves. Aids in early season waterhemp control. Foxtail control is variable. Mustard is very sensitive; also used for normal and ALS kochia, lambsquarters, Russian thistle, and wild buckwheat. Sencor at 0.5 pt 4L or 0.33 lb 75DF per acre is usually satisfactory for light infestations of many small-seeded broadleaves with reduced risk of crop injury.

Fair crop tolerance. Risk of injury from metribuzin on variable, sandy, high pH, low-organic-matter soils or on clay knolls. Do not use on soil that is sandy, has a pH over 7.4, or has less than 1% OM. Cold, wet soil conditions that slow crop emergence increase risk of injury. Combined effects of metribuzin with atrazine carryover can produce serious crop injury. Rotation interval is 4 mo for alfalfa, corn, forage grasses; 8 mo for barley, peas, and wheat; 12 mo for sunflower, sorghum, and several other crops. Fields treated with metribuzin should not be grazed or harvested for 40 days after application.

2.5-3 oz Sencor 75DF

BURNDOWN/PRE. Metribuzin provides improved burndown and some residual control. Sencor labeling includes special burndown rates; higher rates may be used for preemergence application. Tank-mixes with glyphosate in SDSU tests improve control of seedling dandelion and kochia. Rates of 5 to 8 oz DF per acre are required for residual.

Sencor (continued . . .)

TANK-MIXES

In addition to the combinations listed below, refer to label or sections for Command, Pursuit, Authority, or preemergence grass products.

0.5 to 1 pt Sencor 4L or 0.33 to 0.66 lb Sencor 75DF with 1 to 2 pt trifluralin 4L or 1.2 to 3 pt pendimethalin 3.3L or 1.25 to 3 pt Sonalan 3L. Incorporate as for trifluralin, pendimethalin, or Sonalan alone.

PPI. Best performance if rainfall very limited, but gives slightly less control of large-seeded annual broadleaves and has slightly less crop tolerance than split overlay application. Maximum metribuzin rate is 0.38 lb active per acre for most soils. Rates of 1.5 pt trifluralin 4L or 3 pt pendimethalin 3.3L or 1.5 to 3 pt 3.8L or 2.5 pt Sonalan 4L + Sencor at 0.75 pt 4L or 0.6 lb 75DF per acre have been satisfactory in most SDSU tests. Good for small-seeded broadleaves.

SPLIT PPI and **PRE.** Apply Sencor preemergence. Slightly better crop tolerance than for preplant tank-mix.

SPLIT TANK-MIX PPI and **PRE.** Incorporate trifluralin or pendimethalin with Sencor. Apply additional Sencor preemergence. Rates of 0.5 pt 4L or 0.33 lb 75DF per acre have been used as the overlay in most SDSU tests. Provides better crop tolerance when higher Sencor rates are needed to control weed such as velvetleaf. Follow soil precautions carefully.

0.5 to 1 pt Sencor 4L or 0.33 to 0.66 lb Sencor 75DF with 2 to 3 qt Intrro or Micro-Tech 4L or 0.8 to 1.7 pt metolachlor product or 16 to 32 oz Frontier or 10 to 21 oz Outlook 6L per acre.

EPP. Apply 15 to 30 days before planting. Split application. Apply approximately 2/3 of the total amount early and the remaining 1/3 as an overlay at planting.

SPPI. Tank-mix. Incorporate as for Micro-Tech or Dual, Frontier or Outlook alone. Improves results if rain is very limited, but gives slightly less control than preemergence application with adequate rain. Rates of 2.5 qt Micro-Tech or 1.4 pt Dual II Magnum or Frontier at 32 oz 6L + Sencor at 0.75 pt 4L or 0.5 lb 75DF per acre have been satisfactory in most SDSU tests. Use high rate for heavy, clay soil.

SPLIT PPI and **PRE.** Incorporate Micro-Tech, Dual, Frontier, or Outlook shallowly before planting. Apply Sencor preemergence after planting. Slightly better crop tolerance than for preplant tank-mix.

SPLIT TANK-MIX PPI and **PRE.** Incorporate a tank-mix of Intrro, Micro-Tech, Metolachlor products, Frontier, or Outlook with Sencor. Apply additional Sencor preemergence after planting using 0.25 to 0.75 pt 4L or 0.17 to 0.5 lb 75DF per acre. Rate of 0.5 pt 4L or 0.33 lb 75DF Sencor per acre has been used as the overlay in most SDSU tests. Better crop tolerance if high Sencor rates are needed for weeds such as velvetleaf. Follow label directions carefully.

PRE. Tank-mix. Must have 0.5 to 0.75 inch rain within 1 week. Metribuzin applied preemergence gives slightly better control of broadleaves and has slightly better crop tolerance than preplant incorporated. Rates of 2 qt Micro-Tech or Intrro or 1.4 pt Dual II Magnum or Frontier at 32 oz or Outlook at 21 oz 6L + Sencor at 0.75 to 1 pt 4L or 0.5 to 0.66 lb 75DF per acre have been satisfactory in most SDSU tests.

SPARTAN (sulfentrazone) *Site of Action: 14*

4.5-12 oz Spartan 4F (0.141-0.375 lb ai)

(\$20.65-55.05)

Sulfentrazone is a soil-applied herbicide used primarily for broadleaf weeds. It is root or shoot absorbed, and is translocated, causing cell membrane disruption in susceptible species. It is non-volatile and does not photo-degrade. Pigweed and waterhemp control has been excellent in SDSU trails; normal and ALS resistant kochia control have been very good. Black nightshade is also controlled. Other herbicides are required to control grass and broadleaf weeds such as velvetleaf, sunflower, ragweed, and cocklebur.

Application rates are based on soil organic matter and texture. The 6 oz rate is suggested for most preemergence applications. Incorporation must be uniform and no deeper than 2 inches for preplant incorporated treatments. Improper soil incorporation increases the change for erratic weed control and/or crop injury. Applications made near or after crop emergence may cause severe crop injury. May be applied by air or ground. Minimum carrier is 10 gpa for ground or 5 gpa for aerial applications. There are no pH restrictions. Do not apply more than 12 oz per acre per 12 month period.

Crop rotation restrictions are 4 mo for wheat, barley, triticale, and rye; 10 mo for corn or sorghum; 12 mo for alfalfa, oats, and millet; 18 mo for sorghum (rates above 8 oz/A), popcorn, and sweet corn; and 24 mo for canola.

Spartan (continued . . .)

FALL. Spartan 4F may be applied as a fall treatment to the stubble of harvested crops for the burndown of existing vegetation and preemergence control of labeled weeds the following spring in no-till and conservation till systems. Apply after harvest when the sustained soil temperature is 55° F and falling at a 4-inch soil depth. Applications can be made after September 30 in areas north of Interstate 90 and after October 15 in areas north of Interstate 70. If weeds are emerged at time of application, use a suitable tank-mix burndown herbicide partner at labeled rates. Use a minimum of 20 gpa per acre of carrier to ensure adequate weed coverage. COC or MSO is suggested.

PPI. Incorporate into top 1 to 2 inches. Avoid deep incorporation.

PRE. Apply up to 3 days after planting but before soybean emergence. Rain (0.5-1 inch) required.

PREMIX

SPARTAN ADVANCE (sulfentrazone + glyphosate) Site of Action: 14+9

23-85 oz Spartan Advance (0.19+0.73 – 0.37+2.68 lb ai) (\$17.00-62.75)

Rates range from 32-85 fl oz/A in conventional soybeans or 23-36 fl oz/A in Roundup ready soybeans. Rates vary depending on soil texture and O.M. Do not apply in sandy soil with less than 1% O.M. Spartan Advance at 30 fl oz/A is equivalent to 4.2 fl oz/A Spartan 4F and 20 fl oz/A of a 4.5 lb a.e. glyphosate product, such as Roundup WeatherMax.

Add NIS at 0.5% v/v or 2 qt per 100 gallons spray solution. If hard water is used, AMS may be added at 8-16 lbs per 100 gallons of solution. Use 10-40 gpa carrier for ground applications or 5 gpa for aerial applications.

EPP. For fall applications, the label recommends 15 gpa of carrier. For larger weeds or in adverse growing conditions, COC or MSO may be added. Do not apply to frozen soil. For spring applications, apply up to 45 days prior to planting. If applying earlier than 30 days prior to planting, use the high recommended rates.

PRE. Apply up to 3 days after planting. Properly closed seed furrows are necessary prior to application.

SPARTAN CHARGE (sulfentrazone + carfentrazone) Site of Action: 14+14 (\$5.15-7.60)

The mix with carfentrazone improves foliar activity on emerged seedlings at the time of application. Provides preemergence control of pigweed, waterhemp, kochia, lambsquarters, Russian thistle, nightshade, and other weed species. Rates range from 5.75 – 8.5 fl. oz/A depending on the soil texture. Do not use on sandy soils with less than 1% organic matter. Temporary soybean stunting or discoloration may occur in soils with a high pH (above 7.5), cool temperatures, excessive soil moisture, and other conditions that inhibit vigorous growth. Do not apply to frozen soils or over snow cover. Thorough coverage is important for foliar activity. Minimum carrier is 10 gpa for ground applications or 5 gpa for aerial applications. When applied alone, add MSO or COC. When applied with glyphosate, add a NIS.

BURNDOWN, PREPLANT, and PRE. Do not apply after soybean emergence. If applying prior to soybean planting, minimize soil disturbance when planting. If applying after planting, it is important to have closed furrows to avoid soybean injury.

AUTHORITY FIRST or SONIC (sulfentrazone + cloransulam) Site of Action: 14+2 (\$13.50-36.55)

Rate range is 6.45-8 oz/A in conventional soybeans or 3-4 oz/A in RR soybeans. Authority First DF and Sonic are premixes that contain 0.62 lb ai sulfentrazone (Spartan) + 0.08 lb ai cloransulam-methyl (FirstRate) per pound of product and is equivalent to 8-10 oz/A Spartan 4F plus 0.61-0.75 oz/A FirstRate. Rates are based on soil organic matter. The higher rate is used on soil organic matter greater than 3%. Apply preplant or preemergence (within 3 days after planting).

Weeds controlled include marehail, waterhemp, lambsquarters, velvetleaf, common and giant ragweed, cocklebur, smartweed, nightshade, sunflower and kochia. Do not make more than one soil application in a single season. Do not apply more than 8 oz of Authority First DF or Sonic per season. Do not feed treated soybean forage or soybean hay to livestock. Do not apply to sandy soils containing less than 1% organic matter.

PREPLANT and PRE. Do not harvest for 65 days after application.

BURNDOWN. Apply as a preplant burndown treatment at 6.45-8 oz/A. Use minimum of 10 gpa finished spray volume. Use NIS at 0.125-0.25% v/v or 1-2 pt/100 gal or COC at 1.2% v/v plus AMS. May be tank-mixed with other herbicides like Aim EW, 2,4-D, glyphosate, or paraquat to improve weed spectrum.

Spartan (continued . . .)

AUTHORITY MTZ (sulfentrazone + metribuzin) Site of Action: 14+5

8-20 oz Authority MTZ (0.09-0.23 + 0.14-0.34 lb a.i.)

(\$9.15-22.90)

Rates in conventional soybeans are 12-20 oz/A and rates for weed suppression in glyphosate-tolerant soybeans are 8-14 oz wt/A depending on soil texture and O.M. Authority MTZ at 10 oz/A is equivalent to 3.6 fl oz/A Spartan 4F + 3.6 oz wt/A Sencor 75DF. Standard rates control several common broadleaf weed species, such as common lambsquarters, pigweed, waterhemp, velvetleaf, kochia, cocklebur, marehail, and others and provide grass suppression.

Minimum carrier volume is 10 gpa for ground applications or 5 gpa for aerial applications. Continuous agitation during application is required. May use NIS (0.25% v/v), COC (1 qt/A), or MSO (fall applications only) when applying to emerged weeds prior to crop planting, but it is recommended to tank mix with an herbicide intended for foliar activity.

Risk of crop injury increases in soils with pH greater than 7.5, soils with less than 0.5% O.M., planting seed less than 1.5 inches deep, or applying with an organophosphate insecticide. Cool temperatures or heavy rainfall after application may cause stunting or stand reduction.

Rotation restriction is 4 mo for soybeans, wheat, or barley; 10 mo for field corn; 12 mo for alfalfa, dry beans, sorghum, sunflower; or 18 mo for crops not specified on the label.

EPP. For fall applications, apply in the fall after September 30 north of I-90 or October 15 south of I-90 when soils are less than 55° F. For spring applications, apply within 30-45 days prior to planting. Use higher rates for applications between 30-45 days prior to planting.

PPI. Do not incorporate deeper than 2 inches.

PRE. Application to emerged soybeans may cause severe crop injury.

AUTHORITY ASSIST (sulfentrazone + imazethapyr) Site of Action: 14+2

4-12 oz Authority Assist 4L (0.1 + 0.02-0.31 + 0.06 lb ai)

(\$10.05-30.10)

Rates range from 6-12 fl oz/A in conventional soybeans or 4-6 oz/A in Roundup Ready soybeans. Rates vary depending on soil texture and O.M. Do not apply to soils with less than 1% O.M. or pH greater than 7.5. Authority Assist at 5 oz/A is equivalent to 4.2 oz/A Spartan 4F and 1.7 oz/A Pursuit 2L. Provides control or suppression of many annual broadleaf weed species such as mustards, pigweeds, kochia, velvetleaf, lambsquarters, wild buckwheat, and several others and some annual grass species, such as foxtails, fall panicum, and shattercane as well as sedges, such as yellow nutsedge.

Use 10-40 gpa carrier for ground applications or 5 gpa for aerial applications. Carrier may be water or liquid fertilizer, but a jar test is recommended to test compatibility if mixing with liquid fertilizer. Rotation restrictions are 4 months for wheat; 10 months for chickpeas or field peas; 12 months for alfalfa; 18 months for sorghum, safflower, sunflower, and oats; and 26 months for flax.

EPP. For use in no-till or conservation tillage systems. For fall applications, the label recommends 15 gpa of carrier. For larger weeds or in adverse growing conditions, COC or MSO may be added. Do not apply to frozen soil. For spring applications, apply up to 45 days prior to planting. If applying earlier than 30 days prior to planting, use the high recommended rates.

PPI. Do not incorporate deeper than 2 inches.

PRE. Apply up to 3 days after planting but before crop emergence. Properly closed seed furrows are necessary prior to application.

TANK-MIX

Spartan 4F may be tank-mixed with other herbicides for the control of additional weed species. Conduct appropriate compatibility tests prior to tank-mixing. Follow all precautions and restrictions on the tank-mix partner label.

VALOR SX or ENCOMPASS (flumioxazin) Site of Action: 14

1.5-3 oz Valor 51WDG (0.75-1.5 lb ai)

(\$8.10-16.20)

Valor is a soil-applied herbicide used primarily to control small-seeded broadleaf weeds. Valor is a PPO herbicide that is non-volatile and is absorbed primarily by shoot and some by root. It does not photo-degrade. Rates of 2 to 3 oz per acre control waterhemp, nightshades, pigweeds, and lambsquarters. Provides good control of kochia including ALS-resistant biotypes.

Rates for conventional soybeans are 2 to 2.5 oz per acre. The 1.5 oz per acre rate is primarily used for residual in burndown applications with glyphosate. There are no pH restrictions. Minimum carrier is 10 gpa for ground or 5 gpa for preemergence or 7 gpa for burndown with aerial equipment.

At rates to 2 oz, corn, sorghum, sunflower, and wheat can be planted after 1 mo with 1 in rainfall; delay planting for 2 mo with rates up to 3 oz per acre. Barley, peas, dry beans, and rye can be planted after 4 mo; alfalfa, canola, oats, and other crops after 12 mo and a field bioassay.

BURNDOWN. Tank-mixes with glyphosate provide increased control of wild buckwheat, lambsquarters, wild mustard, kochia, and waterhemp. Can also be tank-mixed with 2,4-D for control of dandelion, marestail, and other winter annual weeds. Tank-mix with Select if targeting only grasses. Use COC at 1 gal/100 gal when using in burndown applications. A 30-day interval and 1 in rain required before planting corn, sorghum, sunflower, or wheat after burndown.

EPP. May be applied up to 14 days prior to planting.

PRE. Apply within 3 days after soybean planting. Do not apply after cracking or emergence. Rain (0.5 inch) required for activation.

TANK-MIX and SEQUENTIAL

Valor may be tank-mixed with pendimethalin or Python for more broad spectrum weed control. Do not tank-mix acetanilide (e.g. Dual, Intro, Outlook) herbicides as severe crop injury may occur. A sequential program of Cobra/Phoenix, FirstRate, and Select is recommended for control of grasses and large-seeded broadleaf weeds like cocklebur and sunflower.

MULTI-PACK and PREMIXES

GANGSTER (flumioxazin + cloransulam) Site of Action: 14+2

(\$13.90-27.80)

1.8 to 3.6 oz per acre. Multi-pack containing 51% flumioxazin (Gangster V) and 84% cloransulam (Gangster FR). Each unit contains 5 lb of Gangster V and 16.2 oz of Gangster FR that will treat 26 to 32 acres. Rates for conventional soybeans are 3.1 to 3.6 oz per acre, which equate to 2.5 to 3 oz of Gangster V (Valor) and 0.6 oz of Gangster FR (FirstRate). Rate for Roundup Ready soybeans is 1.8 oz, which equals 1.5 oz of Gangster V and 0.3 oz of Gangster FR. Gangster provides control of most broadleaf weeds including waterhemp, nightshade, lambsquarters, cocklebur, sunflower, ragweed, Venice mallow, pigweed, and velvetleaf and suppression of some annual grasses. Wheat may be planted after 3 mo; dry beans, corn, sorghum, and oats after 9 mo; alfalfa after 12 mo; canola and flax 24 mo; and sunflowers after 30 mo.

BURNDOWN. Gangster provides control of emerged weeds such as cocklebur, marestail, sunflower, velvetleaf, sand Venice mallow. Add NIS at 1 to 2 pt/100 or COC/MSO at 1 to 2 pt per acre and AMS at 2.5%. Minimum carrier is 10 gpa.

EPP. May be applied up to 14 days prior to planting.

PRE. Apply after planting but before soybean emergence or cracking.

PREMIX

FIERCE 76WDG (flumioxazin + pyroxasulfone) Site of Action: 14+15

3 – 4.5 oz wt per acre. Registration pending. Rate varies with soil texture. Provides residual control of grass weed species such as foxtails and barnyardgrass and broadleaf species such as lambsquarters, pigweed, waterhemp, common ragweed, velvetleaf, kochia, horseweed (marestail), and others.

SPP or PRE. May apply preplant or preemergence up to 3 days after planting but prior to soybean emergence.

Valor SX or Encompass (continued . . .)

ENLITE (chlorimuron + flumioxazin + thifensulfuron) Site of Action: 2+14+2 (\$14.60)

2.8 oz per acre. Provides residual control of several annual broadleaf weed species similar to Valor (flumioxazin) but provides greater control of emerged broadleaf weed species such as mustards, lambsquarters, redroot pigweed, and others.

For burndown applications, add either a COC or NIS (COC recommended). Add COC at 1% v/v under normal conditions or 2% v/v in dry conditions or NIS at 0.25% v/v under normal conditions or 0.5% v/v in dry conditions. Minimum carrier volume is 10 gpa for ground applications in conventional tillage, 15 gpa for ground applications in conservation tillage, or 5-10 gpa for aerial applications. Do not use Enlite in the same field where flufenacet (Axiom, Domain), alachlor (Micro-Tech), metolachlor (Dual, Cinch, Boundary, Prefix), or dimethenamid (Outlook) have recently been applied or soybean injury may result if the application is followed by an extended period of cool and wet weather. Do not apply within 14 days of application of an organophosphate insecticide.

Crop rotation restriction is 4 months for barley, wheat, and winter rye; 9 months for dry beans, peas, field corn, sorghum, and sunflower; 12 months for alfalfa, clover, and oats; and 18 months for canola, flax, and lentils. Do not graze treated fields or harvest for forage or hay.

FALL. Apply after October 15 or when soil temperature is less than 50° F. Apply when annual broadleaf weeds are less than 3 inches tall or when perennial weeds are less than 6 inches tall. Tank mix with 2,4-D or glyphosate for greater weed control. Do not till soil after application.

EPP. Tank mix with glyphosate, paraquat, or 2,4-D for difficult species or if weeds are greater than 1-3 inches tall.

PRE. Applications after soybeans emerge will result in severe soybean injury.

SHARPEN (saflufenacil) Site of Action: 14

1 oz Sharpen (0.02 lb ai) (\$4.80)

Provides foliar and residual control of broadleaf weed species such as wild buckwheat, common lambsquarters, waterhemp, pigweed, mustard species, Russian thistle, horseweed (marestalk), and several others. After application, at least 0.5 inches of rain is needed to activate the herbicide. Sharpen may provide 2-3 weeks of residual weed control. May tank mix with glyphosate, dicamba, Pursuit (imazethapyr), or Prowl (pendimethalin) for control of additional weed species. Do not tank mix or apply sulfentrazone (e.g. Authority products) or flumioxazin (e.g. Valor) during the same year as a Sharpen application.

For foliar activity, add either MSO (1% v/v or 1 gallon per 100 gallons) or COC (1% v/v) and either AMS (8.5-17 lbs per 100 gallons) or UAN (1.35-2.5% v/v or 1.25-2.5 gallons per 100 gallons). Minimum carrier volume is 5 gpa for ground applications or 3 gpa for aerial applications. Crop rotation restriction is 4 months or less for most crops.

EPP. For most soils, soybeans may be planted at any time after application but on coarse soils with less than 2% O.M., applications must be made 30 days prior to planting.

PRE. Do not apply after soybeans begin to emerge. Make sure seeds are completely covered prior to application.

PREMIX

OPTILL (saflufenacil + imazethapyr) Site of Action: 14+2 (\$11.75)

2 oz per acre. Provides foliar and residual control of several broadleaf species and grass species such as foxtail. After application, at least 0.5 inches of rain is needed to activate the herbicide. Crop injury may occur during stressful conditions such as extreme hot or cold conditions, excessive moisture or drought, high soil pH, or disease injury. Do not tank mix or apply sulfentrazone (e.g. Authority products), flumioxazin (e.g. Valor), or clomazone product during the same year as an OpTill application.

For foliar activity, add either MSO (1% v/v or 1 gallon per 100 gallons) or COC (1% v/v) and either AMS (8.5-17 lbs per 100 gallons) or UAN (1.25-2.5% v/v or 1.25-2.5 gallons per 100 gallons). Minimum carrier volume is 5 gpa for ground applications or 3 gpa for aerial applications. Crop rotation restriction is 4 months for wheat or alfalfa, 8.5 months for corn, 18 months for oats, sorghum, sunflower, or safflower, or 26 months for flax.

SPP. For most soils, soybeans may be planted at any time after application but on coarse soils with less than 2% O.M., applications must be made 30 days prior to planting.

PRE. Do not apply after soybeans begin to emerge. Make sure seeds are completely covered prior to application.

Sharpen (continued . . .)

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

(\$7.70-15.40)

5 - 10 fl. oz per acre. Provides foliar and residual control of several broadleaf weed species and residual control of grass species such as foxtail and barnyardgrass. Temporary crop injury may occur if applied during stressful conditions that reduce soybean growth. Properly closed furrows will help minimize the chance of seedling injury from PRE applications. Minimum carrier volume is 3 gpa for ground or aerial applications. If weeds are emerged at the time of application and foliar activity is desired, add AMS (8.5 – 17 lb/100 gal.) or UAN (1.25 – 2.5 gal/100 gal.) and MSO (1 gal/100 gal.). Rainfast 1 hr after application. There are no crop rotation restrictions for the spring following application.

FALL. Apply 5 – 10 fl. oz/A prior to a killing frost.

EPP, SPP, or PRE. Apply 5 fl. oz/A prior to crop emergence. A minimum preplant interval of 30 days is required on coarse soils (sand, loamy sand, or sandy loam) with less than 2% organic matter. Verdict may be applied in the spring if another saflufenacil product (Sharpen, OpTill, or Verdict) was applied the previous fall.

RAPTOR (imazamox) Site of Action: 2

4-5 oz Raptor 1L (0.03-0.04 lb ai)

(\$17.15-21.45)

Raptor controls several annual grasses and annual broadleaf weeds. Raptor is an imidazolinone herbicide with foliar and root uptake action. Residual activity is less than for Pursuit.

Foxtail control has been very good. Also controls velvetleaf, cocklebur, sunflower, non-ALS kochia, mustard, and black nightshade. Raptor will suppress woolly cupgrass, wild proso millet, and sandbur; however, control will be best if a soil herbicide is included in the program. Perennials such as Canada thistle, common waterhemp, and ALS resistant weed biotypes are not controlled. Common ragweed control is variable. Lambsquarters should be treated with the high rate when small.

Treat early when weeds are less than 4 to 5 inches. Crop tolerance has been adequate in SDSU tests. Stress reduces crop tolerance; avoid application immediately after cold weather. Hot, humid weather may cause temporary response. Apply before bloom stage. Wheat may be planted in 3 mo; barley and rye, 4 mo; corn 8.5 mo; alfalfa, oat, sunflower, sorghum, and several other crops after 9 mo; canola 18 mo; and crops not listed on the label, 26 mo. Do not apply Pursuit, Classic, Python, Scepter, or products containing similar residual herbicides in the same year as Raptor. Do not harvest for 85 days after application. Do not graze or feed soybean forage, hay, or straw.

POST. Raptor is used only postemergence. The rate is 4 oz when used following a soil-applied grass herbicide such as pendimethalin or 5 oz 1L per acre in a total postemergence program. Minimum carrier is 10 gpa for ground (20 gpa for no-till) or 5 gpa for air. Use COC or MSO at 1 gal or NIS at 1 qt and 1.25 to 2.5 gal 28% N or 8.5 to 17 lb AMS/100 gal for ground application. Use NIS at 1 qt/100 gal or COC at 1 gal/100 gal and 28% N at 1 qt per acre for aerial application.

TANK-MIX/SEQUENTIAL

Raptor may be applied postemergence following a soil applied grass herbicide or tank-mixed with postemergence grass herbicides. Use the full complement of COC or MSO plus 28% N for the tank-mixes. Avoid antagonism for grass control by delaying the postemergence grass herbicide for 7 days after applying Raptor; delay Raptor for 3 days if the grass herbicide is applied first.

PURSUIT (imazethapyr) Site of Action: 2

4 oz Pursuit 2L (0.06 lb ai)

(\$19.35)

Thunder 2L is an alternative product. Pursuit action is by root and foliar uptake. It controls several annual broadleaves and provides some foxtail control. Control of redroot pigweed, mustard, non-ALS kochia, velvetleaf, and black nightshade has been very good to excellent. Velvetleaf is controlled most effectively with preplant incorporated treatments. Cocklebur and sunflower are controlled postemergence. If heavy grass, lambsquarters, or common ragweed is expected, use Pursuit with another herbicide. Not satisfactory for common waterhemp.

Crop tolerance is adequate. Delay or stunting has been noted in situations associated with stress. There are no major soil pH or texture limitations. Pursuit DG is packaged in 0.45 lb soluble bags. Each bag treats 5 acres; equal to 4 oz of 2L per acre.

Pursuit (continued . . .)

Rain is the primary factor affecting carryover. Early-season stunting has been associated with low precipitation and in turn or overlap areas; however, yield reductions have not been noted. Uniform application is important. Wheat, alfalfa, rye, edible peas, and beans may be planted 4 months after application; some risk with fall-planted wheat if rain is below normal. Field corn may be planted in 8.5 mo; barley in 9.5 mo; safflower, sorghum, and sunflower in 18 mo; potatoes and flax in 26 mo; and other non-listed crops in 40 mo. Oats and sorghum have shown considerable injury; do not plant the following year. Apply in a minimum of 10 gpa for ground or 5 gpa for air; use at least 20 gpa when applying soil treatments in liquid fertilizer. Do not apply products containing chlorimuron, imazaquin, and flumetsulam the same year as Pursuit. Do not graze vines or feed to livestock.

EPP or **PPI**. Apply within 45 days of planting. Incorporate before planting or surface apply as an early preplant in no-till. Incorporate into the top 1 to 2 inches. Make second pass at an angle to insure uniform mixing.

PRE. Rain required. Control is more variable than for preplant or postemergence applications.

POST. Apply early postemergence when weeds are less than 3 inches and growing actively. Weed size and stress-free growing conditions are important. Effective on most broadleaf species. Add MSO or COC at 1 gal or NIS at 1 qt/100 gal plus 28% N at 1 to 2 qt or AMS at 2.5 lb per acre. If weeds are stressed, COC or MSO preferred.

PREMIX

PURSUIT PLUS (imazethapyr + pendimethalin) Site of Action: 2+2 **(\$20.35)**

Pursuit Plus 3L premix at 2.5 pt per acre. Pursuit Plus 3L contains 0.2 lb imazethapyr + 2.8 lb pendimethalin per gallon. At 2.5 pt it provides the herbicide equivalent of 1.44 oz Pursuit DG + 2 pt pendimethalin 3.3L per acre.

EXTREME (imazethapyr + glyphosate) **(\$8.15)**

Alternative products include Tackle and Thunder Master. Tackle (4.1L has a slightly different ratio of imazethapyr and glyphosate (0.128 lb imazethapyr and 4 lb glyphosate per gallon) so rates and restrictions are different than for Extreme and Thunder Master. The standard rate for Extreme is 3 pt/A which is equivalent to 24 oz/A glyphosate (3 lb a.e./gallon product) + 4 oz/A Pursuit 2L whereas the standard rate for Tackle is 2 pt/A which is equivalent to 32 oz/A glyphosate (3 lb a.e./gallon product) + 2 oz/A Pursuit 2L.

POST. For postemergence use in Roundup Ready soybeans. Extreme contains 0.17 lb imazethapyr (Pursuit) plus 2 lb ai glyphosate per gal. Controls several annual broadleaves; especially useful for nightshade and velvetleaf control and residual activity on other weeds. For ground applications, add NIS at 0.125% v/v and AMS at 8.5-17 lb/A in at least 10 gpa carrier. For aerial applications, add NIS at 0.125% v/v and AMS at 2.5 lbs/A in at least 5 gpa carrier. Apply before bloom and 85 days before harvest. Rotational restrictions as for Pursuit.

TANK-MIX/SEQUENTIAL

Pursuit labeling includes tank-mixes with Basagran, Ultra Blazer, or Cobra broadleaf herbicides or grass herbicides including Fusilade DX, Poast Plus, Select, Fusion, and Assure. Activity of grass herbicides may be reduced. Refer to section for each herbicide alone.

1.44 oz Pursuit 70DG or 4 oz Pursuit 2L with trifluralin 4L, pendimethalin 3.3L or 3.8L, Intrro 4L, or Micro-Tech 4L per acre. These combinations have provided excellent control of several weeds in preplant incorporated treatments in SDSU tests.

EPP. Pursuit combinations may be applied up to 45 days before planting.

PPI. Incorporate as for trifluralin, pendimethalin, or Micro-Tech or Intrro alone.

PRE. Micro-Tech or Intrro tank-mix. Do not apply Pursuit Plus or Prowl tank-mix after planting.

FALL. Supplemental labeling provides for fall application (2.5 pt/A) or Pursuit Plus in South Dakota. Apply after October 31 but before freezeup. Additional pendimethalin 3.3L at 1.25 pt per acre may be used if heavy grass pressure is anticipated.

1.44 oz Pursuit 75DG or 4 oz Pursuit 2L with 0.8 to 1.7 pt Metolachlor Product per acre. Tank-mix or sequential application.

EPP, PPI, PRE. Apply within 30 days before planting or follow with postemergence Pursuit as a sequential treatment.

Pursuit (continued . . .)

1.44 oz Pursuit 70DG or 4 oz Pursuit 2L with 15 to 20 oz Frontier or 9 to 14 oz Outlook 6L per acre. Tank mix. **PPI, PRE, POST.** For postemergence, apply through the third trifoliate leaf stage. Use additives as for postemergence Pursuit.

1.44 oz Pursuit 70DG or 4 oz Pursuit 2L with 0.04 oz Harmony GT 75DF per acre. Tank mix. Harmony improves control of lambsquarters. **POST.** Use NIS at 1 qt/100 gal and 1 to 2 qt 28% N per acre. Apply at 1 to 3 trifoliate leaf stage.

SCEPTER (imazaquin) Site of Action: 2

1.4-2.8 oz Scepter 70Dg (0.06-0.125 lb ai)

(\$5.55-11.05)

Labeling includes use in South Dakota east of Highway 81. Scepter controls several annual broadleaves and gives limited control of annual grasses. Scepter gives excellent control of pigweed, smartweed, lambsquarters, non-ALS kochia, and sunflower. Cocklebur control has been satisfactory but is more variable. Velvetleaf and black nightshade control has been good to very good; these weeds are controlled best with preplant incorporated applications.

Crop tolerance appears good. There are no major soil pH or texture limitations.

Soil carryover affects susceptible crops the following season. Scepter labeling prohibits planting field corn, wheat, barley, oats, or other sensitive crops in the fall or spring following a soil application at any rate or a postemergence application at rates above 1.4 oz per acre. Postemergence applications not exceeding 1.4 oz per acre may be rotated to wheat, barley, oats, field corn, edible beans, or grain sorghum in the fall or the following spring, if at least 10 inches of rainfall occurs from application through October. Do not plant canola for 26 mo; other crops for 18 mo. High rates for all soil applications have additional restrictions. Risk of carryover is greater after dry, cool seasons. Do not graze or harvest vines for feed.

Corn is more sensitive to carryover than wheat or sorghum. Corn stunting and some stand reduction have occurred. Using IMI corn hybrids with resistance or tolerance to Scepter and other related herbicides will reduce the risk of carryover. Apply in 10 to 20 gpa for ground and 5 gpa for air.

PPI. Incorporate into the top 1 to 2 inches. Rate is 1.4 to 2.8 oz per acre; 2.15 oz may be used on light soil. Apply up to 45 days before planting. Double-pass incorporation required if using disk or field cultivator. Preplant results have been most consistent.

PRE. Apply before crop emergence. Rates as for preplant incorporated.

POST. Apply before weeds reach 12 inches. Rate is 1.4 to 2.8 oz per acre. The low rate is primarily for cocklebur, sunflower, and volunteer corn. Control of sunflower has been very good; velvetleaf control has been less than for preplant incorporated applications. Use 20 gpa for ground equipment. Add 1 qt NIS/100 gal.

TANK-MIX

Scepter may be tank-mixed with other soil-applied herbicides such as trifluralin, pendimethalin, Dual, or Frontier to improve grass control. Scepter may also be mixed with postemergence herbicides such as Basagran, Blazer, or Pursuit to improve weed spectrum.

DEFINE (flufenacet) Site of Action: 15

12 oz Define SC (0.45 lb ai)

Define is a soil-applied herbicide. It controls annual grasses and some small-seeded broadleaf weeds. The rate in soybeans is less than required for full season weed control used alone. It is useful to add foxtail, pigweed, and waterhemp control in a combination premix program in Axiom or Domain.

Define (continued . . .)

PREMIX

AXIOM (flufenacet + metribuzin) Site of Action: 15+5

(\$11.60-21.55)

7-13 oz Axiom 68DF per acre. Axiom premix controls/suppresses annual grasses and selected broadleaf weeds in soybeans. Axiom contains 54.4% flufenacet (Define) + 13.6% metribuzin (Sencor). Rates are based on soil texture and organic matter. The 13 oz per acre rate (0.44 + 0.11 lb ai) provides extended control of annual grasses and broadleaf weeds on coarse textured soils but provides only early season weed control on medium and fine textured soils. Rates lower than 13 oz per acre provide only early-season weed control. Do not apply more than 13 oz per acre in soybeans. Seed should be planted a minimum of 1 to 1.5 inches deep.

Minimum carrier is 10 gpa for ground application. Do not apply Axiom when conditions favor drift. If any crop treated with Axiom is lost, corn or soybeans may be replanted immediately. Do not make a second application of Axiom. Potatoes can be planted after 1 mo; alfalfa, barley, buckwheat, proso millet, oats, popcorn, rye, sorghum, and wheat after 12 mo. Do not graze or feed forage, hay or straw to livestock.

PREMIX

DOMAIN (flufenacet + metribuzin) Site of Action: 15+5

(\$8.50-15.10)

9-16 oz Domain 60DF per acre. Domain is a premix containing 24% flufenacet (Define) + 36% metribuzin (Sencor). Provides higher rates of metribuzin than with Axiom. Intended for early-season preplant control of grass and broadleaf or preemergence in a tank-mix or as part of a planned postemergence sequential program. Broadleaf activity includes kochia, marestail, Venice mallow, common ragweed, lambsquarters, and waterhemp. Rate of 9 to 16 oz 60DF per acre is for all soils over 0.5% OM, except sandy soils with less than 1% OM. The 12 oz rate provides the equivalent of 0.36 lb Sencor DF per acre. Do not apply more than 16 oz per acre per season. Seed should be planted 1.5 inches deep. Refer to label for listing of sensitive soybean varieties not recommended for Domain application. Do not apply to calcareous soils or soils with pH of 7.5 or higher. Use minimum of 10 gpa for ground application. Crop rotation restrictions allow corn in 1 mo; alfalfa, sorghum, barley, wheat, and several other crops after 12 mo. Do not graze or feed forage, hay, or straw to livestock. Do not apply by air. Do not spray near sensitive plants and do not apply in conditions that would favor movement to non-target sites.

SPP. For use in minimum or no-till systems. Apply Axiom or Domain within 14 days after planting. Can be used with additive or other herbicides for burndown.

PPI. Apply Axiom or Domain and incorporate into the upper 1 to 2 inches within 14 days before planting. Avoid deep incorporation.

PRE. Apply Axiom or Domain after planting but before weed or crop emergence.

TANK-MIXES/SEQUENTIAL

Axiom or Domain is recommended for use in tank-mixes sequentially with other herbicides. Refer to Axiom or Domain label for list of approved tank-mix and sequential partners. For improved annual weed burndown in preplant surface applications, tank-mix Axiom or Domain with glyphosate or Gramoxone Extra.

BASAGRAN (bentazon) Site of Action: 6

1-2 pt Basagran 4L (0.5-1 lb ai)

(\$12.50-25.00)

POST. Gives excellent control of cocklebur and very good control of small sunflower and velvetleaf. Pigweed, waterhemp, and kochia usually are not controlled. Weeds should be small. Excellent crop tolerance. Some leaf margin burn may occur if plants are under stress. Best results under good growing conditions; less effective under low humidity or dry conditions. Rain with 1 hour reduces effectiveness.

Use 1.5 pt for cocklebur under 6 inches, velvetleaf under 2 inches, or sunflower or mustard under 4 inches. The high rate is for larger weeds, cocklebur up to 10 inches, velvetleaf to 5 inches, or sunflower or mustard to 6 inches.

Primarily contact action. Good coverage important. Minimum carrier is 20 gpa for ground or 5 gpa for air with minimum of 40 psi pressure. Do not use flood-jet nozzles. Do not cultivate for 3 to 5 days before or after application.

A COC additive is suggested for weeds such as ragweed and lambsquarters. COC rate is 1 qt for ground and 1 pt per acre for air. For velvetleaf, 28% N at 0.5 gal per acre is suggested in addition to COC. Vines may be grazed or used for feed.

Basagran (continued . . .)

SPLIT POST. Two applications improve control of weeds such as sunflower, mustard, velvetleaf, and Venice mallow. Apply 1 pt when weeds are small and make a second application of 1 pt per acre 10 to 14 days later. Velvetleaf, mustard, or Venice mallow should not exceed 2 inches; sunflower should not exceed 3 inches for the first application. Best sunflower control in SDSU tests is with split application of 1.5 pt followed by 1 pt per acre 10 to 14 days later. Two late-season treatments of 0.75 qt applied 10 to 14 days apart or a single application of 1.5 qt per acre will give partial control of cocklebur up to 24 inches. For Canada thistle, best results are with 1 qt per acre applied when weeds reach 8 inches to bud stage followed by a second application 7 to 10 days later.

TANK-MIX

Basagran tank-mixes with several broadleaf herbicides are listed below. Basagran may also be tank-mixed with Poast Plus and other grass herbicides. Refer to the section for each herbicide.

1.5 to 2 pt Basagran 4L with 2 oz Butyrac 200 per acre.

POST. Tank-mix. Thorough coverage and early application required. Corsoy, Amsoy, and SRF 250 are reported to be more sensitive to 2,4-DB. Do not add COC or NIS.

1.5 pt Basagran 4L with 0.25 oz Classic 25DF per acre.

POST. Tank-mix. Add NIS at 1 to 2 pt/100 gal plus 28% N at 2 to 4 qt or AMS at 2.5 lb per acre. Improves control of sunflower.

1 to 1.5 pt Basagran 4L with 0.04 to 0.083 oz Harmony GT 75XP per acre.

POST. Tank-mix. The combination controls lambsquarters, pigweed, wild buckwheat, smartweed, cocklebur, velvetleaf, Venice mallow, wild mustard, and sunflower. Suppresses Canada thistle but retreatment with Basagran is usually required. Weeds should be actively growing. Use additives as for Harmony GT. Risk of injury increases with high rates of NIS, COC, or 28% N. Apply in minimum of 20 gpa for ground or 5 gpa for air. Do not apply within 60 days of harvest. Soybean vines should not be grazed or fed. Refer to the Harmony GT section.

1 to 1.5 pt Basagran 4L with 0.72 to 1.44 oz Pursuit 70DG or 4 oz Pursuit 2L per acre.

POST. Tank-mix. Use NIS at 1 qt plus 2 qt 28% N per acre or 17 lb AMS/100 gal.

1 to 2 pt Basagran 4L with 0.5 to 1.5 pt Blazer 2L per acre.

POST. Tank-mix Blazer improves control of pigweed and lambsquarters. Basagran is most effective for velvetleaf or cocklebur. The rate may be adjusted to about 75% of the normal rate of the herbicide which will give the best control of the predominant weed and about 50% of the normal rate of the other product. The rate of 1.5 pt of each is suggested for heavy stands of mixed weeds. Use NIS at 1 pt/100 gal for general application. For most severe weed situations, COC may be used up to 1 qt per acre; however, risk of foliage burn increases. 28% N at 1 gal per acre may be used as a replacement for NIS or COC. Velvetleaf control is improved. Leaf burn is less than for crop oil. Weeds should be less than 2 or 3 inches tall for best results. Minimum tank-mix carrier is 20 gpa for ground or 5 gpa for air. Do not graze or harvest vines for feed.

BLAZER (acifluorfen) *Site of Action: 14*

0.5-1.5 pt Ultra Blazer 2L (0.125-0.38 lb ai)

POST. Good to excellent control of annual broadleaves including black nightshade, pigweed, and wild mustard. Results on velvetleaf and cocklebur are variable. Foliar burn on field bindweed and Canada thistle has been satisfactory in most situations. Some annual grass suppression noted. Fair crop tolerance. Leaf burn or speckling is frequently noted. Crop recovers rapidly under good growing conditions. Most risk is during high humidity and high temperature. Delay cultivation for 7 days before or after application. Rain within 6 hours reduces control.

Primarily a contact herbicide. Good coverage is important. Apply when weeds are small, at the 2- to 4-leaf stage. Low rates primarily for susceptible weeds such as wild mustard or pigweed. Add 1 pt NIS/100 gal. Increase NIS to 2 to 4 pt for lambsquarters, buffalo bur, and other hard to control weeds. Fields may be retreated if necessary. The use of 2 qt 28% N per acre improves velvetleaf control and causes less crop leaf burn than COC. Do not use flood nozzles. Minimum carrier is 20 gpa for ground and 5 gpa for air. Use 40 to 60 psi pressure. Do not apply within 50 days of harvest. Do not graze or harvest vines for feed.

Blazer (continued . . .)

STORM (acifluorfen + bentazon) Site of Action: 14+6

1.5 pt Storm per acre. Postemergence control of smartweed, lambsquarters, Venice mallow, ragweed (common or giant), pigweed, waterhemp, and other weeds 2 – 6 in tall. Temporary soybean leaf speckling, yellowing, or bronzing may occur. Rainfast 4 hrs after application. Good coverage is important. Minimum carrier volume is 10 – 20 gpa for ground applications or 5 – 10 gpa for aerial applications. Add one of the following: AMS, UAN, NIS, or COC. See label for specific adjuvant rates based on tank mix options.

TANK-MIXES

Several combination treatments are included in Blazer labeling. Refer to sections for tank-mix partner.

0.5 to 1.5 pt Blazer 2L with 0.3 oz FirstRate 80WDG or 4 oz Raptor 2L or 0.7 to 1.4 oz Pursuit 70DG or 4 oz Pursuit 2L or 0.33 oz Classic 25DF or 0.083 oz Harmony GT 75XP per acre.

POST. Tank-mix. Refer to section for each herbicide used alone.

0.5 to 1.5 pt Blazer 2L with 0.75 pt Poast Plus 1L or 1 to 2 pt glyphosate 3 lb ae per acre.

BURNDOWN. Tank-mix. Refer to each section for each herbicide used alone.

CLASSIC (chlorimuron) Site of Action: 2

0.33 oz Classic 25DF (0.005 lb ai)

(\$4.80)

Chlorimuron is used for postemergence annual broadleaf control. The maximum rate is 0.33 oz of 25DF. Adds control of pigweed, cocklebur, and sunflower.

Soil persistence is influenced considerably by pH. Carryover increases with high pH. However, the maximum rate labeled for South Dakota provides considerable rotation flexibility without pH restrictions. Restrictions are 3 mo for cereal grains; 8 mo for IR corn; 9 mo for peas, dry beans, corn, alfalfa, and sunflower; 18 mo for flax, canola, and lentil; and 30 mo for crops not listed on the label guidelines.

Apply in a minimum of 10 gpa for ground or 3 gpa for air. Add NIS at 2 pt/100 gal. Under dry conditions, COC at 1 gal/100 gal may replace the NIS. An ammonium fertilizer product should be added for velvetleaf. Do not graze or use vines for feed.

POST. Apply after the first trifoliolate leaf up to 60 days before maturity.

TANK-MIXES

Several combination treatments are labeled; refer to sections for tank-mix partners.

HARMONY GT (thifensulfuron) Site of Action: 2

0.083 oz Harmony GT 75XP (0.004 lb ai)

(\$3.80)

0.125 oz Harmony 50SG (0.004 lb ai)

Harmony GT provides very good to excellent control of lambsquarters, pigweed, and smartweed. Russian thistle control has been good in SDSU tests. Velvetleaf results are less than for several other treatments. Results on kochia have been variable; ALS resistant biotypes are not controlled. Crop tolerance is adequate. Stunting and chlorosis on upper leaves may occur under humid, hot conditions.

In STS soybeans, may apply Harmony GT at 0.33 oz/A. Lower rates are often used in combination with other broadleaf herbicides. There are no soil pH or crop rotation restrictions. Do not graze vines or harvest for livestock feed. Do not apply within 60 days of harvest.

Good coverage is important. Minimum carrier is 10 gpa for ground or 5 gpa for air. NIS at 1 to 2 pt/100 gal is required. Use low NIS rate except for stress conditions. Adding 28% N at 2 to 4 pt or AMS at 2 to 4 lb per acre improves control of velvetleaf. COC at 4 pt/100 gal is labeled in place of NIS under dry or cool conditions; however crop response may increase.

POST. Apply after the first trifoliolate leaf is fully expanded. Weeds should be small and actively growing. Do not cultivate 7 days before or after application.

PREMIX

SYNCHRONY XP (thifensulfuron + chlorimuron) Site of Action: 2+2 (\$3.80)

0.375 oz Synchrony XP per acre. Synchrony XP contains 6.9% thifensulfuron (Harmony) + 21.5% chlorimuron (Classic). The 0.375 oz rate provides the equivalent of 0.03 oz Harmony GT + 0.33 oz Classic per acre. Synchrony XP may be used on standard, STS, or STS/RR herbicide resistant soybeans. For standard soybeans, use NIS rather than COC as an additive.

TANK-MIXES. Synchrony labeling includes tank-mixing with postemergence herbicides for grass control and to improve waterhemp, nightshade, velvetleaf, or common ragweed control. Use NIS rate than COC or MSO in post grass tank-mix combinations; grass control may be reduced under some conditions.

POST. Apply after the first trifoliolate leaf is expanded and weeds are 1-4 inches tall.

AUTUMN (iodosulfuron) Site of Action: 2

0.3 oz Autumn 10WDG (0.00188 lb ai) (\$6.50)

Controls broadleaf weeds such as alfalfa, marestalk, some mustard species including volunteer canola, dandelion, and others. Apply when weeds are less than 3 inches tall. Autumn is a foliar herbicide and is not intended for residual weed control. Rainfall within 2 hrs after application may reduce control. Do not apply to soils with pH >8.

Minimum carrier is 10 gpa for ground applications. Add COC (1% v/v) and either UAN (28 or 32% N at 1.5-2 qt/A) or AMS (1.5-3 lbs/A). Agitation required during application.

Rotation restriction is 30 days for corn; 90 days for soybeans; 4 mo for winter wheat, winter barley or winter rye; 8 mo for spring wheat or spring barley; 9 mo for sorghum or oats; 18 mo for sunflower, alfalfa, canola, dry beans, peas, snap beans, or other crops not specified on the label.

EPPS. Apply after fall harvest or up to 90 days prior to soybean planting. Do not apply to frozen ground.

COBRA or PHOENIX (lactofen) Site of Action: 14

8 to 12.5 oz Cobra 2L or Phoenix 2L (0.125-0.195 lb ai) (\$10.95-17.10)

Cobra and Phoenix are selective 2L formulations for preemergence and postemergence control of certain broadleaf weeds. Phoenix has a built-in adjuvant system developed to reduce crop response. Rates are based on weed species and height.

POST. Good to excellent control of several annual broadleaves including pigweed, wild mustard, nightshade, and buffalo bur. Common ragweed control has been excellent, even with low rates. Results on cocklebur and velvetleaf have been variable. Fair to marginal crop tolerance. Leaves show some speckling or discoloration; newest leaves may show some crinkling. Leaf burn is greatest in humid, hot weather. Crop recovers under good growing conditions. Do not cultivate within 5 days of treating.

Primarily a contact herbicide. Apply when weeds are small, usually at the 2- to 4-leaf stage. Labeling includes suppression of tall weeds including common ragweed, giant ragweed, and velvetleaf 15 to 36 inches tall. The kind and amount of additive is based on plant growth, humidity, and weeds present.

COC is considered most effective with Cobra; however, crop response is greater than for other additives. NIS at 2 pt/100 gal, COC at 0.5 pt or 28% N at 1 gal, or AMS at 2.5 lb per acre is used with high humidity (over 80%). COC at 1 pt per acre or addition of NIS to 28% N or AMS is used for moderate (60-80%) humidity. Use COC at 1 to 2 pt per acre or COC with 28% N or AMS with low humidity (under 60%). For velvetleaf under ideal conditions, use minimum of 1 pt per acre COC; for other situations NIS at 2 pt/100 gal plus 28% N at 1 gal per acre or AMS at 2.5 lb per acre. Use NIS at 1 to 2 pt/100 gal with Phoenix at the 8 to 12.5 oz rate until weeds reach maximum weed height; then COC at 1 pt per acre is an option. Minimum carrier is 20 gpa for ground and 5 gpa for aerial application. COC at 1 qt per acre has been approved for aerial application. Use 40 to 60 psi to insure good coverage. Do not apply within 45 days of harvest. Do not graze or harvest vines for feed.

Cobra or Phoenix (continued . . .)

TANK-MIXES

Rates for Cobra or Phoenix range from 4 oz to 12.5 oz depending on tank-mix partner. Refer to label section for each product. Several combination treatments are listed below.

6 to 12.5 oz Cobra 2L with 1 to 2 pt Basagran 4L or 0.38 to 0.5 oz Classic 75DF or 1.44 oz Pursuit 70DG per acre.

POST. Tank-mix. Refer to section for each herbicide used alone.

6 to 8 oz Cobra 2L with 0.3 oz FirstRate 80WDG or 0.083 oz Harmony GT 75XP or 0.5 oz Synchrony STS per acre.

POST. Tank-mix. Refer to section for each.

8 to 12.5 oz Phoenix 2L with 1 to 2 pt Basagran or 0.3 oz FirstRate 80WDG or 0.5 to 0.66 oz Classic 25DF or 1/24 oz Harmony GT 75XP or 0.5 oz Synchrony STS or 1.08 to 1.44 oz Pursuit 70DG or 3 to 4 oz Pursuit 2L per acre.

POST. Tank-mix. Refer to section for each herbicide alone.

FLEXSTAR or REFLEX (fomesafen) *Site of Action: 14*

0.75-1 pt Flexstar 2L or Reflex 2L (0.18-0.25 lb ai)

(\$11.30-15.60)

Flexstar and Reflex are postemergence contact herbicides for annual broadleaf weeds. Rates and use in South Dakota are limited to defined geographical areas (see label for regional maps). The maximum rate of 1 pt per acre may be used east of I-29 from North Dakota to Watertown, east of Hwy 81 from Watertown to Madison, and south of Hwy 34 and each of Hwy 281 to Nebraska. In addition to the above area, a maximum of 0.75 pt per acre may be applied east of Hwy 281.

Flexstar has demonstrated good activity on wild mustard, Venice mallow, common ragweed, wild mustard, pigweed, common waterhemp, and smartweed at the low rate. Weeds should be at the 2- to 3-true leaf stage. Nightshade and lambsquarters control may not be satisfactory, kochia control has been fair. The higher rate improves control, especially under less favorable conditions. Crop tolerance is adequate; temporary leaf burn will be noted under stress conditions. Coverage is important. Minimum carrier is 10 gpa for ground or 5 gpa for air. Use 30 to 60 psi pressure. Reflex is similar to Flexstar except it contains less adjuvant. Flexstar contains surfactant; however, 28% N at 1 gal/100 or 4 lb AMS per acre plus COC or MSO at 1 to 2 pt/25 gal is required.

Small grain may be planted after 4 mo; alfalfa or corn after 10 mo; and sunflower, sorghum, and other crops not specified on the label after 18 mo. Depending on the application region in South Dakota, a maximum of 0.75-1 pt Flexstar or 0.19-0.25 lbs ai/A fomesafen from any source is allowed only in alternate years. Do not graze or harvest forage or straw from small grain planted on treated areas. Do not graze or harvest soybeans for forage.

POST. Apply from emergence to before bloom stage.

PREMIX

Flexstar GT (fomesafen + glyphosate)

(\$15.70)

The application rate of 3 pt/A contains similar quantity of active ingredient as 28 fl oz Roundup WeatherMax (4.5 lb ae) and 1 pt Flexstar 2L. Observe geographic application restrictions described for Flexstar or Reflex. A maximum of 3 pt/A may be applied once every two years.

Add AMS at 8.5-17 lbs per 100 gal spray solution. Adjuvants are not necessary for most situations but may be added for difficult weeds or adverse growing conditions. Adjuvant options include NIS (0.25-0.5% v/v or 1-2 qt per 100 gal), or a COC or MSO (0.5-1% v/v or 2-4 qt per 100 gal). COC or MSO may reduce crop tolerance. Be sure to use adjuvants that do not antagonize glyphosate. Recommended carrier rate is 15-20 gpa for ground applications or 5 gpa for aerial applications.

Rotation restriction is 4 mo for wheat, barley, or rye; 10 mo for corn or peas; 18 mo for alfalfa, sunflowers, or sorghum. Do not graze or harvest treated areas for forage.

SPP or PRE. Provides control of lambsquarters, pigweed, nightshade, common ragweed, and others. Residual weed control may be reduced if adequate moisture (at least 0.25 in) is not received within 7 days after application.

POST. Glyphosate resistant soybeans only. Avoid applications when the crop is stressed from drought, extreme temperatures, excessive water, low humidity, low soil fertility, or mechanical/chemical injury.

Flexstar (continued . . .)

TANK-MIXES

Flexstar can be tank-mixed with several postemergence grass and broadleaf herbicides. Several programs include:

0.75 pt Flexstar 1.88L with 0.05 oz Harmony GT 75XP or 6 to 8 oz Fusion 2.66L or 0.33 oz Classic 25DF or 0.72 oz Pursuit 70DG or 2 oz Pursuit 4L or 4 to 8 oz Resource .86L or 1.5 pt Basagran 4L per acre.

POST. Fusion adds grass control. Classic, Pursuit, Resource, or Basagran expands the broadleaf spectrum.

RESOURCE (flumiclorac) Site of Action: 14

4-12 oz Resource .86L (0.027-0.08 lb ai)

(\$6.50-19.55)

POST. Resource is a foliar active herbicide used to control certain annual broadleaf weeds. It has contact activity; effects become apparent within 1 to 2 days. Resource is usually used in a tank-mix to provide broad spectrum control. Crop tolerance has been good.

Velvetleaf is one of the most sensitive weeds. Control has been very good to excellent in SDSU tests. Common ragweed is also sensitive. Rates are 4 oz for velvetleaf up to 6-leaf and ragweed up to 2-leaf; 6 oz for velvetleaf (8 lf), ragweed (4 lf), lambsquarters (2-3 lf); and 8 oz per acre for velvetleaf (10 lf), ragweed (6 lf), lambsquarters (3 lf), and cocklebur (3 lf). Rate of 12 oz per acre is used for velvetleaf up to 30 inches.

Use COC at 1 pt per acre when using Resource alone. Addition of 28% N at 2 gal/100 gal improves velvetleaf activity, especially on larger weeds. Minimum carrier is 15 gpa for ground; not labeled for air. Do not apply if rain is expected in 1 hour. Do not graze or harvest forage from treated fields. Allow 60 days between application and harvest. There are no crop rotation restrictions for the next season.

TANK-MIXES/SEQUENTIAL

Resource may be used as a sequential after most soil-applied herbicides; or in a tank-mix with Select for postemergence grass control. It may be used in tank-mixes listed below to improve weed spectrum. Refer to section and labeling for each product.

4 oz Resource .86L with 1 to 1.5 pt Basagran 4L + COC at 1 qt per acre, or 0.33 oz Classic 25DF + COC at 1 qt per acre, or 1.44 oz Pursuit 70DG or 4 oz Pursuit 2L + 1 qt COC + 28% N, or 6 to 10 oz Cobra 2L per acre.

POST. Provides very good control of velvetleaf, common waterhemp, and several other annuals. Use COC or MSO at 2 qt/100 gal; increase to 4 qt/100 gal in low humidity. The addition of 28% N at 2 gal/100 gal or AMS at 2.5 lb per acre improves results.

PREMIX

STELLAR (flumiclorac + lactofen) Site of Action: 14+14

5 to 7 oz Stellar 3.1L per acre.

POST. Stellar contains 0.7 lb flumiclorac (Resource) plus 2.4 lb lactofen (Cobra) per gallon.

TANK-MIX

5 to 7 oz Stellar with 6 to 8 oz Select per acre + COC + 28% N per acre.

POST. Provides added grass control.

CADET (fluthiacet-methyl) Site of Action: 14

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

(\$4.05-9.10)

Cadet is a PPO-inhibiting herbicide with a similar mechanism of action as Resource, Reflex, or Cobra. The standard rate range is 0.6-0.9 fl oz/A depending on the size of the weeds. When tank mixing with glyphosate, use 0.5 fl oz/A for many weed species or 0.4 fl oz/A for velvetleaf. 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. Some soybean leaf spotting or bronzing may occur.

Cadet (continued . . .)

Thorough coverage is important to optimize control. Minimum carrier is 15 gpa. Use up to 40 gpa if canopy is dense. Do not apply by air. May use NIS (0.25% v/v or 1 qt per 100 gallons), COC up to 2.5% v/v (recommended during dry conditions), or a silicone based surfactant (0.25% v/v or 1 qt per 100 gallons). May also add UAN at 1-2 qt/A or AMS. Do not irrigate or apply within 4 hours or precipitation. Do not feed treated foliage to livestock.

POST. Apply from the first trifoliolate to full flowering.

ASSURE II or TARGA (quizalofop) Site of Action: 1

5-10 oz Assure II 0.88L (0.03-0.06 lb ai)

(\$5.70-11.40)

POST. Good to excellent control of foxtail, volunteer corn, and wild proso millet. Corn, shattercane, and wild proso millet are controlled at the lower rates. Does not control broadleaves. Excellent crop tolerance. Weed growth is reduced soon after application. Symptoms usually appear in 1 to 2 weeks. Moisture stress reduces activity.

For volunteer corn, apply 4 oz for 1 – 12 in corn, 5 oz for 12 – 18 in corn, or 8 oz for 18 – 30 in corn. Supplemental label for sequential applications with glyphosate where 3 oz of Assure is applied at the 1 – 4 corn leaf stage and another 3 oz 10 to 21 days after the first application. For weeds, rates are 5 - 8 oz for shattercane (6-12 in), and wild proso millet (2-6 in); 7 - 8 oz for green, yellow, and bristly foxtail, giant foxtail, fall panicum, sandbur, wheat, barley, rye, oats, and wild oat (2-6 in); 8 - 10 oz for barnyardgrass and crabgrass (2-6 in); 9 – 10 oz for woolly cupgrass (2-4 in); 10 - 12 oz for downy brome (cheatgrass) and jointed goatgrass (2 – 6 in); and 10 – 12 oz per acre for quackgrass (6-10 in).

Add NIS at 1 qt/100 gal or non-vegetable base COC at 4 to 8 qt/100 gal for ground or 2 qt/100 gal for air. Crop oil preferred. Do not apply if rain is expected within 1 hour after application. Do not cultivate within 7 days before or after application.

Coverage is important. Minimum carrier is 10 gpa for ground and 3 gpa for air. Tank-mixing with other herbicides, except as noted on label, can reduce effectiveness. Do not apply within 80 days of harvest. Do not rotate to other crops for 120 days. Do not graze or harvest vines for feed.

TANK-MIX/SEQUENTIAL

Follow directions to reduce antagonism response. Allow at least 24 hours after applying Assure II before applying a broadleaf herbicide. If applying the broadleaf herbicide first, allow 7 days before applying Assure II. Reduced grass control can be expected due to antagonism with tank-mixes. Increase Assure II rate 2 oz from the rate used alone except for volunteer corn, shattercane, or giant foxtail.

5 to 12 oz Assure II .88L with 0.33 oz Classic 25DF or 0.75 to 1 qt Basagran 4L or 0.083 oz Harmony GT 75XP or 0.25 oz Synchrony STS per acre.

POST. Tank-mix or split application. Split application preferred. Additives for Assure II + Classic as for Assure II alone; for Assure II + Basagran use 1 qt COC for ground or 1 pt per acre for air. For Assure II + Harmony GT or Synchrony, use 1 to 2 pt NIS/100 gal. Refer to the section for Harmony GT for current labeling.

FUSILADE DX (fluazifop) Site of Action: 1

6-12 oz Fusilade DX 2L (0.1-0.2 lb ai)

(\$6.75-13.55)

POST. Good to excellent control of wild proso millet, wild cane, and volunteer corn. Fair to good control of annual grasses. Provides suppression of quackgrass. Does not control broadleaved weeds. Excellent crop tolerance.

Weeds show leaf yellowing or browning 10 to 14 days after treatment. Control of foxtail has been variable under stress conditions. Volunteer corn control is more consistent.

Use 6 oz for wild proso (4-8 in), wild cane (6-12 in), and volunteer corn (12-24 in); 8 oz for wild oat and volunteer small grain (2-6 in); and 12 oz for barnyardgrass (2-3 in), foxtail, woolly cupgrass, and witchgrass (2-4 in) per acre. For quackgrass (6-10 in), apply 12 oz and make a second application of 8 oz per acre 2 to 3 weeks after the first application if required.

Use 2 to 4 qt COC or 1 to 2 qt NIS/100 gal with all Fusilade ground applications. Use 1 pt COC or NIS per acre with air applications. Avoid cultivation for one week before and one week after application. Rain within one hour after application reduces effectiveness. Coverage is important. Do not use flood nozzles. Minimum carrier is 5 gpa for ground or aerial application. Use 40 to 60 psi. Tank-mixing with other herbicides can reduce effectiveness.

Fusilade DX (continued . . .)

Do not apply after soybeans begin to bloom or within 55 days of harvest. Do not plant crops other than soybeans for 60 days after application. Do not graze or harvest vines for feed.

TANK-MIXES/SEQUENTIAL

Refer to the section for each broadleaf herbicide used alone to determine weed size, rate, and application precautions. Fusilade DX 2L rates vary according to the tank-mix partner to allow for antagonistic reactions. Some combinations may also be used sequentially. Rates are for each herbicide used alone. For sequential use, allow 7 to 10 days time for grasses to resume growth and develop new leaves if Blazer is applied first. If Fusilade is applied first, allow 3 days for annuals and 5 days for perennials before applying Blazer.

6 to 12 oz Fusilade DX 2L with 1.5 pt Blazer 2L or 0.75 to 1 qt Basagran 4L or 1.44 oz Pursuit 70DG or 4 oz Pursuit 2L per acre.

POST. Refer to section for each used alone.

6 to 8 oz Fusilade DX 2L with 0.33 oz Classic 25DF per acre.

POST. Refer to section for each used alone.

FUSION (fluazifop + fenoxaprop) Site of Action: 1+1

0.38-0.75 pt Fusion 2.56L (0.12-0.25 lb ai)

(\$9.25-18.25)

POST. Fusion is a premix containing 2 lb fluazifop-butyl (Fusilade) + .56 lb fenoxaprop-ethyl per gal. Good to excellent control of foxtail, volunteer corn, and wild proso millet. Does not control broadleaves. Excellent crop tolerance.

Weed growth is reduced soon after application. Symptoms appear somewhat later. Moisture stress reduces activity. Rates are 0.38 pt for shattercane (6-12 in), volunteer corn (12-24 in), and wild proso millet (4-8 in); 0.5 pt for foxtail species, woolly cupgrass, sandbur, barnyardgrass (2-4 in), crabgrass (1-4 in), fall panicum, volunteer cereals, and wild oat (2-6 in).

For quackgrass, apply 0.75 pt per acre when quackgrass is 6 to 10 inches. Make a second application using 0.5 pt per acre 2 to 3 weeks later if required. Add COC at 2 to 4 qt/100 gal or NIS at 1 to 2 qt/100 gal for ground application. Add 1 pt per acre COC or NIS for air. In addition to COC or NIS, UAN can be added at 4 gal/100 gal. Do not apply more than 1.5 pt of Fusion per year. Coverage is important. Use a minimum of 40 psi and 5 gpa for ground or air. Increase carrier and pressure if grass is dense. Do not cultivate 7 days before or after application. Do not graze or harvest for forage or hay. Do not plant grass crops for 60 days after application. Do not spray after bloom. Rain within one hour reduces results.

SPOT TREATMENT. Use 1.5 tablespoons Fusion + 3 tablespoons COC or 1 tablespoon NIS per gal of water. Wet foliage thoroughly.

TANK-MIXES/SEQUENTIAL

Use Fusion at 0.38 to 0.5 pt for shattercane (6-12 in), volunteer corn (12-24 inches), and wild proso millet (4-8 in); 0.5 to 0.6 pt for foxtail species, barnyardgrass, sandbur, woolly cupgrass (2-4 in), crabgrass (1-4 in), fall panicum, volunteer cereals, and wild oat (2-6 in). Do not apply if weeds are stressed. Use additives as for Fusion alone. Follow restrictions, application directions, and requirements for tank-mix partner. Note carryover restrictions when tank-mixing with Classic or Pursuit. Fusion + Pursuit is for volunteer corn and shattercane only.

Growth stage of weeds determines sequence. When Fusion is used first, delay Basagran, Classic, Harmony, or Harmony + Classic 1 day; delay Blazer, Galaxy, Pursuit, or Basagran + Blazer 3 days. Delay Fusion for 1 day after Basagran, 7 days after Classic, Harmony, or Harmony + Classic; 10 days after Pursuit or until one new grass leaf opens after Blazer or Basagran + Blazer.

0.38 to 0.6 pt Fusion 2.66L with 1 to 2 pt Basagran 4L or 1 to 1.5 pt Blazer 2L or 0.33 oz Classic 25DF or 0.75 to 1 pt Flexstar 1.88L or 1.44 oz Pursuit 70DG or 4 oz Pursuit 2L per acre.

POST. Refer to section for each herbicide used alone.

POAST PLUS or POAST (sethoxydim) *Site of Action: 1*

0.75-2.25 pt Poast Plus 1L or 0.5-1.5 pt Poast 1.5L (0.1-0.3 lb ai)

(\$5.20-17.55)

POST. Very good to excellent control of annual grasses. Provides suppression of quackgrass. Does not control broadleaves. Excellent crop tolerance. Poast Plus contains 1 lb/gal ai plus activating agents to enhance herbicide uptake. Poast contains 1.5 lb/gal ai.

Rates for Poast Plus and maximum grass size are 0.75 pt for wild proso millet (10 in); 1.5 pt for green and yellow foxtail (8 in), barnyardgrass (8 in), wild oat (4 in), volunteer corn (20 in), and woolly cupgrass (8 in); 1.9 pt for sandbur (3 in); 2.25 pt for volunteer cereals (4 in), stinkgrass (6 in); and 3 pt for downy brome (3 in) per acre. For quackgrass, use 2.25 pt at 6 to 8 in and retreat with 1.5 pt per acre if necessary. Poast 1.5L rates are approximately 67% of Poast Plus 1L product rates.

COC at 1 qt per acre is required. AMS at 2.5 lb per acre or 0.5 to 1 gal 28% N may be used in addition to COC to improve control of quackgrass, volunteer corn and cereals, wild oat, or crabgrass. Avoid cultivation for one week before and one week following application. Rain within one hour after application reduces effectiveness. Control after drought stress is diminished.

Coverage is important. Use flat-fan or hollow-cone nozzles. Minimum carrier is 10 gpa for ground and 5 gpa for air. Tank-mixing with other herbicides, except as noted on the label, can reduce effectiveness. Pressure should be 40 to 60 psi. Do not apply within 75 days of harvest. Avoid drift to sensitive crops such as corn, sorghum, or cereals. Do not graze or ensile vines; soybean hay may be fed to livestock. Clean sprayer thoroughly before mixing.

TANK-MIXES/SEQUENTIAL

Several combination treatments are listed below. Refer to the section for each product alone.

0.75 to 2.25 pt Poast Plus 1L or 0.5 to 1.5 pt Poast 1.5L with 1 qt Basagran 4L.

POST. Sequential or tank-mix. May be tank-mixed if grasses and broadleaves are both at proper growth stage; however, for most weeds the rate of Poast Plus or Poast is increased to compensate for antagonistic reaction with the tank-mix. Use COC additive. AMS or 28% N may be used as suggested above for Poast Plus. Rates for Poast Plus in the tank-mix are 1.2 pt for wild proso (4-10 in); 1.5 pt for green foxtail and woolly cupgrass (3-8 in), and volunteer corn (1-12 in); and 2.25 pt for barnyardgrass and yellow foxtail (3-8 in) per acre. Use 0.67 of the Poast Plus 1L product rate to determine the amount of product for Poast 1.5L. Several more tolerant weeds such as quackgrass, sandbur, or volunteer crops are not controlled with the tank-mix; use sequential program. Allow at least 24 hours between applications, regardless of sequence.

PREPACK

REZULT (Poast Plus + Basagran) *Site of Action: 1+6*

1.5 pt each of Rezult G and Rezult B with duplex system.

POST. Rezult is available in plastic duplex jug or Prodigy mini-bulk system. The Prodigy system delivers Rezult at 1.6 pt Poast Plus + 1.6 pt Basagran 5L per acre. Provides higher Basagran rate with grass control. Add 1 pt COC + 1 to 2 qt 28% N per acre.

TANK-MIX

3.2 pt Rezult prepack with 0.33 oz Classic 25DF per acre.

POST. Add 1 to 2 qt 28% N per acre. Improves sunflower and pigweed control.

3.2 pt Rezult prepack with 5 to 10 oz Blazer 2L per acre.

POST. Add 1 to 2 qt 28% N per acre. Improves nightshade, pigweed, and ragweed control.

0.75 to 2.25 pt Poast Plus 1L or 0.5 to 1.5 pt Poast 1.5L with 1.5 pt Blazer 2L per acre.

POST. Sequential or tank-mix. Use 0.75 to 2.25 pt Poast Plus 1L or 0.5 to 1.5 pt Poast 1.5L with 1.5 pt Blazer 2L per acre.

0.75 to 2.25 pt Poast Plus 1L or 0.5 to 1.5 Poast 1.5L with 1 to 2 pt Basagran 4L + 0.5 to 1 pt Blazer 2L per acre.

POST. Sequential or tank-mix. If Blazer or Basagran + Blazer is applied first, allow time for grasses to resume growth and produce one new leaf. Usual interval is 7 to 10 days before Poast is applied. If Poast is applied first, allow at least 24 hours before applying the other herbicide. Sequential preferred. For the tank-mix, add COC at 1 qt with Blazer. Expect more leaf burn with COC in the tank-mix than with a sequential treatment where NIS is used with Blazer.

SELECT or SELECT MAX (clethodim) *Site of Action: 1***6-16 oz Select 2L or 12-32 oz Select Max 0.97L (0.09-0.25 lb ai)****(\$9.30-24.80)**

POST. Additional clethodim products include Intensity 2L, Volunteer 2L, Arrow 2EC, Clethodim 2E, Section 2EC, Shadow 2EC, and Intensity One 0.97L. Good to excellent control of several annual grasses and volunteer corn. Use high rates for quackgrass suppression. Excellent crop tolerance. Apply 6 to 8 oz/A of Select or 12-16 oz/A of Select Max for annual grasses (2-6 in) including foxtail, sandbur, wild oat, barnyardgrass, and volunteer cereals. Use the high rate for heavy weed pressure. Use 8 to 16 oz/A of Select or 16-24 oz/A of Select Max for quackgrass and retreat if necessary. For volunteer corn, use 4 oz Select or 8 oz Select Max/A for 4- to 12-inch corn, or 6 oz Select or 10 oz Select Max/A for 12- to 18-inch corn or 12 oz Select Max for 18-24 inch corn. Weed control has been consistent in SDSU tests. Symptoms appear 7 to 14 days after application.

Use COC at 1 gal/100 gal with Select or either COC or MSO with Select Max. Use 28% N at 1 to 2 qt per acre to speed activity. Avoid cultivation 1 week before or after application. Rain within an hour of application may reduce control. Apply in a minimum of 10 gpa carrier for ground or 3 gpa for air. Do not graze treated fields or feed treated forage to livestock. Do not apply within 60 days of harvest.

3 to 4 oz Select 2L tank-mixed with 0.5 lb 2,4-D ester or 2 to 4 oz Sencor 4L per acre.

BURNDOWN. For no-till. Tank-mixed. Prowl may be added at 2 pt of 3.3L per acre for residual. Follow planting restrictions.

SPOT TREATMENT. Mix 0.5% Select and 1% COC solution. Thoroughly wet foliage with hand-held equipment.

TANK-MIXES/SEQUENTIAL

Several combination treatments are listed below. Refer to the section for each broadleaf herbicide used alone to determine weed size, rate, and application directions. Select Max rates are 12 to 20 fl oz per acre for annual grasses, depending on tank-mix partner. High rates used to override antagonistic reaction. Higher Select Max rates are recommended for suppression of perennial grass. See label for proper COC rates for each tank-mix partner and for ground or air equipment.

A 24 hours delay before applying the broadleaf herbicide after applying Select and a 7 day delay for Select after applying a broadleaf herbicide is suggested to avoid grass control antagonism.

2-WAY TANK-MIXES**6 to 16 oz Select 2L with 1 to 1.5 pt Ultra Blazer or 6 to 12 oz Cobra 2L or 1.44 oz Pursuit 70DG or 4 oz Pursuit 2L per acre.****0.5 pt Select 2L with 1 to 2 pt Basagran 4L or 0.33 oz Classic 25DF per acre.****12 to 16 fl oz Select Max with 12.5 fl oz Cobra, 1 to 1.5 pt Blazer 2SL, 4 to 12 fl oz Resource, 1.44 oz Pursuit, 0.5 oz Synchrony STS, 0.3 oz FirstRate, or 4 to 5 fl oz Raptor.****16 to 20 fl oz Select Max with 1 to 2 pt Basagran 4SL or 0.5 to 0.75 Classic 25DG.**

POST: Combines grass control with broadleaf control. Refer to tank-mix section.

3-WAY TANK-MIXES**8-10 oz Select 2L with 6 to 8 oz Cobra 2L + 0.33 oz Classic 25DF or 1 to 1.5 pt Basagran 4L or 1.44 oz Pursuit 70DG or 2 oz Pursuit 2L per acre.****8 to 10 oz Select 2L with 4 oz Resource .86L with 1.44 oz Pursuit 70DG or 2 oz Pursuit 2L or 1 pt Basagran 4L or 0.33 oz Classic 25DF per acre.****6 to 8 oz Select 2L with 6 oz Cobra 2L + 4 oz Resource .86L per acre.****12 to 16 fl oz Select Max with 6 fl oz Cobra + 4 fl oz Resource, 6 to 8 fl oz Cobra + 0.3 oz FirstRate, 6 to 8 oz Cobra + 4 to 5 fl oz Raptor, or 4 to 8 fl oz Cobra + 0.5 oz Synchrony STS.****16 to 20 fl oz Select Max with 6 to 8 fl oz Cobra + 0.5 to 0.75 oz Classic 25DG, 6 to 10 fl oz Cobra + 1 to 1.5 pt Basagran 4SL, 6 to 10 fl oz Cobra + 1.44 oz Pursuit 70Dg, 4 fl oz Resource + 1.44 oz Pursuit DG, 4 fl oz Resource + 1 pt Basagran, or 4 fl oz Resource + 0.5 oz Classic.**

POST. Provides a 3-way combination using low rates of each. Refer to tank-mix section.

BUTYRAC 200 (2,4-DB) Site of Action: 4**0.7-0.9 pt Butyrac 200 2L (0.18-0.23 lb ae)****(\$3.70-4.75)**

2,4-DB may be applied alone or in tank-mixes. Intended to control emerged weeds including cocklebur, marestalk, or other annuals. Apply Butyrac in a minimum of 10 gpa for ground or 5 gpa for aerial equipment.

PRE: Apply to emerged weeds before planting to before soybeans emerge.

2,4-D Site of Action: 4**0.75-2 pt 2,4-D ester 3.8L or 0.75-2 pt 2,4-D amine 3.8L (0.38-1 lb ai)****(\$1.30-4.40)**

Provides no-till burndown of emerged annual broadleaf weeds, especially for marestalk, winter annual mustards, and prickly lettuce. Also controls top growth on broadleaf perennials prior to planting. Less effective for kochia when used alone. Apply no-till burndown as near as possible to planting; however, follow minimum time interval or injury risk increases. Ester forms preferred; interval to planting is less. Frequently mixed with glyphosate for grass. Check 2,4-D product for labeling. Plant seed at least 1.5 inches deep.

BURNDOWN. Application to planting interval for 0.75 to 1 pt of ester 4L per acre is 7 days or 15 days for amines. For rates of 1 to 2 pt, the interval is 30 days for both ester and amine forms.

TANK-MIXES**0.25 to 1 pt 2,4-D ester + 0.2 to 0.5 lb Sencor 75DF per acre.****0.25 to 1 pt 2,4-D ester + 12 oz Poast Plus 1L + 2 to 4 oz Sencor 75DF per acre.**

BURNDOWN. Tank-mix. Additional residual burndown.

GLYPHOSATE in CONVENTIONAL SOYBEANS Site of Action: 9**0.38-3.75 lb a.e./A**

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

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.

Formulation		Amount of Product for lb ae			
		0.38 ae	0.75 ae	1.5 ae	3 ae
3 lb ae (4 lb ai)	L	16 oz	32 oz	64 oz	128 oz
3.75 lb ae (5 lb ai)	L	13 oz	26 oz	51 oz	102 oz
4 lb ae (5.4 lb ai)	L	12 oz	24 oz	48 oz	96 oz
4.17 lb ae (----)	L	12 oz	23 oz	46 oz	92 oz
4.5 lb ae (5.5 lb ai)	L	11 oz	21 oz	43 oz	85 oz
5 lb ae (----)	L	10 oz	19 oz	38 oz	77 oz

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 is 16 oz per acre for most small annuals; 12 oz may be adequate for some situations. Use 20 to 24 oz for larger or more tolerant annuals or for post harvest stubble burndown. Rates of 32 to 64 oz are used for perennials.

Glyphosate is a non-selective, translocated, foliage-applied herbicide used in reduced tillage systems. Glyphosate is applied before planting up to emergence, used as a spot treatment, applied in special equipment, or used as a perennial treatment. **Refer to section for Herbicide Resistant Soybeans for in-crop glyphosate programs.**

Carrier is 3 to 40 for ground and 3 to 15 gpa for air. Maximum rate is 1 qt of 3 lb ae product. Use precaution to avoid droplet drift to non-target crops. Follow cleanup procedures to avoid damage from equipment contamination.

Glyphosate in Conventional Soybeans (continued . . .)

BURNDOWN. Weeds should be growing actively. Preharvest application is especially effective for perennials. Water having more than 500 ppm combined calcium, magnesium, or iron may reduce activity, especially at high carrier volumes. Daytime temperatures below 55° F may also reduce activity. Avoid tillage for one day after treating annuals; three to seven days for perennials.

SPECIAL APPLICATION EQUIPMENT. Glyphosate products applied with special wick or recirculation type equipment give very good control of volunteer corn or wild cane. Results with sunflower have been fair. Control of milkweed and hemp dogbane has been more erratic. The solution in the pipe or tank is mixed at a ratio of 1 gallon of glyphosate 3 lb ae to 2 gallons of water. One gallon of product will usually treat 50 to 100 acres.

Self-propelled "buggy" equipment is popular for treating individual weeds. A 5% solution (5 qt glyphosate 3 lb ae in 25 gal) is suggested for most equipment. Lower concentrations (3%) have been effective for volunteer corn if all plants are uniformly covered. Control is best if 1/3 to 1/2 of the plant is sprayed.

SPOT TREATMENT. Use 2 to 4 qt 3 lb ae per acre to control small patches of perennial weeds such as quackgrass or Canada thistle. Crop contacted by spray or drift will be damaged or killed.

PREHARVEST. Apply glyphosate 3 lb ae at 1 to 6 qt per acre preharvest to control annual and perennial weeds. Apply after soybean pods have lost all green color. Allow a minimum of 7 days before harvest. Do not apply more than 1 qt per acre by air. Not recommended for seed fields.

TANK-MIXES

Glyphosate products may be tank-mixed with many early preplant or preemergence herbicides labeled for use in soybeans. This combines the burndown herbicide with a soil-applied residual herbicide used in no-till programs. Follow directions for each herbicide.

GRAMOXONE (paraquat) *Site of Action: 22*

2-4 pt Gramoxone Inteon 2L (0.5-1 lb ai)

(\$8.95-17.85)

BURNDOWN. Paraquat is a non-selective, contact herbicide used to control emerged weeds at planting. May be applied preplant or preemergence. Rate range is 2-2.5 pt/A for weeds 1-3 inches tall, 2.5-3 pt/A for weeds 3-6 inches tall, or 3-4 pt/A for weeds 6 inches tall. Add NIS at a minimum of 0.125% v/v (1 pt/100 gallons) for ground application or 0.25% v/v for aerial applications or add COC at 1% v/v (1 gal/100 gal) for ground application or 1 pt/A for aerial application. Minimum carrier is 10 gpa for ground or 5 gpa for air. Thorough coverage is very important. Several tank mix options. Follow handling precautions as Paraquat is toxic if ingested. **Restricted Use Pesticide.**

8-16 oz Gramoxone Inteon 2L (0.13-0.25 lb ai)

(\$2.25-4.45)

HARVEST AID. Apply when at least 65% of the seed pods have reached a mature color or when seed moisture is under 30%. The purpose is to dry weeds to facilitate harvest. Less effective on large kochia than on other actively growing weeds. Contact action. Minimum carrier is 20 gpa for ground or 5 gpa for air. Add NIS at a minimum of 0.125% v/v (1 pt/100 gallons) for ground application or 0.25% v/v for aerial applications or add COC at 1% v/v (1 gal/100 gal) for ground application or 1 pt/A for aerial application. Do not graze treated soybean fields for 15 days after spraying, and remove livestock at least 30 days before slaughter. Follow handling precautions, as paraquat is highly toxic when ingested.

1-2 pt Gramoxone Inteon 2L (0.07-0.13 lb ai)

(\$4.45-8.95)

HOODED or DIRECTED SPRAY. Nonselective, non-residual treatment to control emerged weeds between the rows. Apply when weeds are actively growing and less than 6 inches tall. Severe damage or complete kill can occur if spray contacts soybean plants. Do not apply to soybeans less than 8 inches tall and do not exceed 30 psi nozzle pressure when using direct spray. Some visual crop speckling should be expected. Minimum carrier is 10 gpa for ground application. Add NIS at a minimum of 0.125% v/v or COC at 1% v/v. Do not graze or harvest forage or hay until 46 days after application.

TANK-MIXES

Gramoxone may be tank-mixed with several preemergence herbicides. Refer to the section for each herbicide or combination for rates and application/rotation restrictions.

AIM EC (carfentrazone) Site of Action: 14**0.25-1.5 oz Aim 2L (0.004-0.023 lb ai)****(\$1.70-10.35)**

Aim is a contact herbicide used to control certain broadleaf weeds. It controls ALS or normal kochia and velvetleaf; also gives control of redroot pigweed, nightshade, and lambsquarters. Weeds should be 1 to 4 inches. Minimum carrier is 10 gpa. Results on small, susceptible weeds has been very good; stressed weeds or large weeds are affected less.

PREPLANT BURNDOWN. Rate is 0.5 to 1.5 oz Aim 2L per acre. Add NIS at 2 pt/100 gal or COC at 1.5 to 2 pt per acre; 28% N at 2 to 4 gal/100 gal may also be added. Burndown of small weeds has been effective in SDSU tests. May tank mix 0.5-1 fl oz/A with glyphosate, glufosinate, or 2,4-D.

POST. Rate is 0.25 fl oz/A Aim 2L for Group 2.1-3.4 maturity soybeans. Do not apply to soybeans between emergence and V2, but apply between V3 and V10 soybean growth stages. Add NIS at 0.25% v/v (2 pt/100 gal). Soybeans may show some leaf burn or speckling, but plant may outgrow these symptoms. Do not apply when conditions are cool, high humidity, or foliage is wet.

DIRECTED. Rate is 0.5 to 1.5 oz Aim 2L per acre. Rates vary with weed species. Direct spray or use shields to avoid foliage contact on the crop. Use 10 to 20 gpa carrier. Add NIS at 0.25% v/v (2 pt/100 gal) alone or with liquid fertilizer at 2-4% v/v (2-4 gal/100 gal) in dry conditions.

HARVEST AID. Rate is 1 to 1.5 fl oz Aim 2L per acre. Apply when soybeans are mature and have begun to dry down. May desiccate broadleaf weeds such as morningglory, pigweed, and velvetleaf. Minimum spray volume is 10 gpa for ground application or 5 gpa for aerial applications. Add NIS at 0.25% v/v (2 pt/100 gal) or COC or MSO at 1-2% v/v (1-2 gal/100 gal). UAN (2-4% v/v) or AMS (2-4 lb/A) may be added to the NIS, COC, or MSO.

VIDA (pyraflufen) Site of Action: 14**0.5-2 oz Vida 0.2L (0.0008-0.0032 lb ai)****(\$1.60-6.30)**

Vida is a contact herbicide with a similar mode of action as Aim (carfentrazone). 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. Do not allow livestock to graze treated areas.

PREPLANT BURNDOWN. Apply 0.5-2 fl oz/A. Recommended adjuvants include NIS, COC, or MSO at 0.5-2% v/v. Minimum carrier is 10 gpa for ground application or 5 gpa for aerial application.

POST. Apply 0.4-0.75 fl oz/A from emergence to the V2 growth stage. Do not use COC or MSO. Minimum carrier rate is 10 gpa for ground application or 5 gpa for aerial application. Some temporary leaf speckling may occur.

HERBICIDE RESISTANT SOYBEANS

Herbicides for use only on herbicide resistant soybean seed stock are listed in this section. Herbicides listed for standard soybeans may also be used in weed control programs for herbicide resistant soybeans.

GLYPHOSATE PRODUCTS (Roundup Ready Soybeans) Site of Action: 9

Only glyphosate products licensed and labeled for use with glyphosate resistant seed may be used. Several products are listed below, representing amount (lbs) of acid equivalent (ae) and active ingredient (ai). Examples include:

3 ae, 4 ai: Alecto 41 UL (HL) (S), Buccaneer (Plus), Cornerstone (Plus), Credit (Duo) (Duo Extra) (Extra), GlyStar Original, GlyStar Plus, Gly-4 (Plus), Glyfos (X-Tra), Glyphogan, Glyphomax (Plus), Glyphosate 41 Plus, GlySupreme Plus, Honcho (Plus), MadDog (Plus), Makaze, Meychem 41%, Mirage (Plus), Rattler (Plus), Touchdown, WiseUp Plus. **3.75 ae, 5 ai:** Extra Credit 5. **4 ae, 5.4 ai:** Cinco, Durango (DMA), Duramax, GlyStar 5 (Extra), Glyphomax XRT. **4.17 ae:** Touchdown CT, Touchdown Total, Traxion. **4.5 ae, 5.5 ai:** Roundup Original Max, Roundup PowerMax, Roundup WeatherMax. **5 ae:** Touchdown Hi-Tech.

Glyphosate Products (continued . . .)

16 oz-64 oz glyphosate 3 lb ae (0.38-1.5 lb ae)	(\$1.40-5.50)
12 oz-48 oz glyphosate 4 lb ae (0.38-1.5 lb ae)	(\$1.40-5.60)
12 oz-46 oz glyphosate 4.17 lb ae (0.38-1.5 lb ae)	(\$1.30-7.10)
11 oz-43 oz glyphosate 4.5 lb ae (0.38-1.5 lb ae)	(\$1.65-9.15)
10 oz-38 oz glyphosate 5 lb ae (0.38-1.5 lb ae)	(\$1.55-5.85)

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.

		<u>Amount of Product for lb ae</u>			
<u>Formulation</u>		<u>0.38 ae</u>	<u>0.75 ae</u>	<u>1.5 ae</u>	<u>3 ae</u>
3 lb ae (4 lb ai)	L	16 oz	32 oz	64 oz	128 oz
3.75 lb ae (5 lb ai)	L	13 oz	26 oz	51 oz	102 oz
4 lb ae (5.4 lb ai)	L	12 oz	24 oz	48 oz	96 oz
4.17 lb ae (----)	L	12 oz	23 oz	46 oz	92 oz
4.5 lb ae (5.5 lb ai)	L	11 oz	21 oz	43 oz	85 oz
5 lb ae (----)	L	9 oz	19 oz	38 oz	77 oz

Apply postemergence through flowering. There is flexibility for timing burndown. Results in SDSU tests have been favorable. Split applications of glyphosate or a soil-applied herbicide followed by glyphosate have provided excellent weed control. Single postemergence applications have been effective in no-till where a burndown application was used. Single application will perform best when weeds emerge uniformly and the pressure is light. It's important to use an adequate rate for good control in the first application; a lower rate is adequate for later flushes. The initial application suggested is 1.5 to 2 pt glyphosate 3 lb ae followed by a low rate for new annual weeds or higher rates for perennials.

The maximum rate for any single in-crop application is 2 qt of 3 lb ae per acre. Allow 14 days from last application to harvest. Maximum rates for application timings are listed below:

Maximum Rates of Glyphosate Allowed for Glyphosate Resistant Soybean

<u>FORMULATION</u>	<u>PRE PREPLANT</u>	<u>CRACKING to FLOWERING</u>	<u>SINGLE APPLICATION</u>	<u>PREHARVEST</u>	<u>TOTAL/SEASON</u>
3 lb ae Products	5 qt	3 qt	2 qt	2 pt	8 qt
3.75 lb ae Products	4 qt	2.4 qt	1.6 qt	1.6 pt	6.5 qt
4 lb ae Products	3.7 qt	2.2 qt	1.5 qt	1.5 pt	6 qt
4.17 lb ae Products	3.6 qt	2.2 qt	1.5 qt	1.5 pt	5.8 qt
4.5 lb ae Products	3.3 qt	2 qt	1.3 qt	1.3 pt	5.2 qt
5 lb ae Products	3 qt	1.8 qt	1.2 qt	1.2 pt	4.8 qt

Narrow row or drill planted crop provides important early canopy to reduce late flushes; wide row planting may require a sequential treatment. Glyphosate rate can be adjusted to control most annual weeds. It is an effective option for perennials such as Canada thistle, quackgrass, field bindweed, and milkweed. It has performed well in SDSU tests for biennial wormwood and ALS resistant kochia. Sequential application is frequently required for weeds such as velvetleaf, black nightshade, woolly cupgrass, or waterhemp. Waterhemp control will be most consistent if initial application is made before weeds reach 6 to 8 inches. Perennials require 1 to 2 qt 3L ae per acre for control or suppression.

Use 5 to 20 gpa for ground or 3 to 15 gpa for air application. Be aware of wind conditions that may cause droplet drift. Follow other mixing and application directions for the product being used.

TANK-MIXES

The following herbicide tank-mix partners are labeled for use in glyphosate tank-mixes on Roundup Ready soybeans.

4 to 12 oz Resource + Harmony 75DF + Roundup Ultra Max.

POST. Supplemental label for Resource. Follow rates and application directions on product labels.

0.083 oz Harmony GT + Glyphosate.

POST. Supplemental label for Harmony GT. Apply after first trifoliolate to harvest. Some glyphosate products require additional surfactant. Follow rate and application directions on product labels.

Glyphosate Products (continued . . .)

**VOLUNTEER ROUNDUP READY CORN
TANK-MIX**

Glyphosate + 5-8 oz Assure II or 6-10 oz Fusion or 6-8 oz Fusilade or 6-8 oz Select per acre.

POST. Tank-mix for volunteer RR corn control. Application at 6 to 10 inches is more effective than treating later at 16 to 20 inches. Add AMS. Adding COC or MSO not required with the higher rates of the post grass herbicide. Adding COC or MSO may reduce glyphosate activity if the glyphosate rate is marginal for the other weed problems.

IGNITE 280 (Liberty Link Soybeans) Site of Action: 10

22 fl oz Ignite 280 (0.4 lb ai)

(\$9.15)

Ignite 280 (glufosinate) may only be applied to Liberty Link soybeans. Provides broad spectrum grass and broadleaf weed control. Relative to glyphosate in Roundup Ready soybeans, weed control from Ignite may be reduced slightly more by adverse weather conditions, such as drought or cool temperatures. Also, coverage is more important for Ignite as the recommended carrier rate is 15 gpa for ground applications or 10 gpa for aerial applications. Do not use nitrogen solutions as spray carriers. Do not use nozzles or pressures that result in coarse spray droplets. Although currently not a labeled requirement, consider adding AMS at 1.5-3 lbs/A.

Applying a preemergence herbicide is recommended to reduce weed competition. May make up to two Ignite applications per growing season totaling 44 oz/A. Sequential applications should be made 10-14 days apart. If Ignite was applied as a burndown treatment, do not apply Ignite postemergence. Do not apply to soybeans stressed from weather conditions such as drought, excessive rainfall, etc. Heavy dew or fog may reduce efficacy. Rainfast within 4 hours after application. Apply between dawn and 2 hours before sunset.

Several tank mix options, such as grass herbicides (Assure II, Select Max, Fusilade (DX), PPO-inhibiting herbicides (Cobra, Phoenix, Flexstar, Reflex, Resource, Ultra Blazer), ALS-inhibiting herbicides (Pursuit, Raptor, Harmony, FirstRate, Synchrony XP), and others.

POST. Apply from emergence up to but not including the soybean bloom growth stage.

SYNCHRONY XP (STS or STS/RR Soybeans) Site of Action: 2

0.375-0.75 oz Synchrony XP (thifensulfuron + chlorimuron) (0.007-0.013 ai)

(\$3.80-7.60)

Synchrony XP may be used at greater rates (0.375-1.125 oz/A) on STS herbicide resistant than standard soybeans (0.375 oz/A). Synchrony XP contains 6.9% thifensulfuron (Harmony GT) + 21.5% chlorimuron (Classic). The 0.375 oz rate provides the equivalent of 0.03 oz Harmony GT XP plus 0.33 oz Classic per acre. The 0.375 oz rate controls cocklebur, sunflower, and pigweed. Rates of 0.75 oz/A may provide control of buffalobur, velvetleaf, and common/giant ragweed.

Minimum carrier is 10 gpa for ground or 3 gpa for air. Add COC at 1 gal/100 gal solution plus 28% N at 2 to 4 qt or AMS at 2 to 4 lb per acre. Small grain may be planted after 3 mo; corn, alfalfa, sunflowers, and sorghum after 9 mo. Canola, flax, and lentil require an 18 month interval.

POST. Apply after first trifoliate leaf stage but 60 days before maturity.

TANK-MIX or SEQUENTIAL

Adding 0.075-0.3 oz/A FirstRate improves common ragweed and cocklebur control. For control of waterhemp up to 4 inches tall, add Flexstar (0.75-1.25 pt/A), Reflex (0.75-1.5 pt/A), Ultra Blazer (0.5-1.5 pt/A), or Cobra (4-6 fl oz/A).

Group Numbers Associated with Herbicide Sites of Modes of Action

WSSA Group Number	Site or Mode of Action	Examples
1	ACCase inhibitor	fluazifop, sethoxydim
2	ALS inhibitor	imazamox, cloransulam
3	Microtubule inhibitor	pendimethalin, trifluralin
4	Growth regulator	2,4-D
5	Photosynthesis inhibitor (triazine)	metribuzin
6	Photosynthesis inhibitor (contact)	bentazon
9	EPSP inhibitor	glyphosate
10	Glutamine synthetase inhibitor	glufosinate
13	Bleacher (isoxazolidinone)	clomazone
14	Cell membrane disrupter (PPO inhibitor)	carfentrazone, lactofen
15	Seedling shoot inhibitor	acetochlor, metolachlor
22	Cell membrane disrupter (PSI inhibitor)	paraquat

WEED RESPONSE to SOYBEAN 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 80%	Usually satisfactory
6	Fair	70-80%	Sometimes under 70%	Sometimes unsatisfactory
5	Marginal	50-70%	Seldom over 70%	Seldom satisfactory
4	Poor	<50%	Usually under 50%	Not effective
0	None		No control	

Herbicide	Green foxtail	Yellow foxtail	Barnyardgrass	Field sandbur	Woolly cupgrass	Wild buckwheat	Wild mustard	Horseweed	Kochia (ALS)	Common ragweed	Lambsquarters	Pigweed	Waterhemp	Smartweed	Nightshade	Cocklebur	Sunflower	Velvetleaf	Venice mallow
PPI/PRE:																			
Aim	0	0	0	0	0	6	8	2	7	6	6	7	6	5	7	6	6	9	7
Authority Assist	9	9	8	8	6	6	9	6	7	5	8	9	9	6	9	5	4	7	6
Authority First/ Sonic	5	4	4	4	4	4	5	8	8	9	8	9	9	8	9	7	7	9	9
Authority MTZ	5	4	4	4	4	5	9	7	8	8	8	9	9	8	8	7	4	7	7
Boundary	7	6	6	5	5	6	10	7	7	7	7	9	9	8	6	6	6	7	8
Command	8	7	7	7	6	4	4	4	8	6	7	5	5	7	5	6	5	10	9
Metolachlor	9	8	8	5	6	4	0	2	4	4	4	7	7	4	7	0	0	0	0
Outlook	9	8	8	5	6	4	0	2	4	4	5	7	7	4	7	0	0	0	0
Prefix	9	8	8	5	6	4	8	6	5	8	7	8	9	7	8	6	5	6	7
Gangster	6	5	5	4	4	6	10	8	8	9	8	10	9	8	10	6	6	9	10
Intro, Micro-Tech	9	5	8	5	6	4	0	2	4	4	5	7	7	4	7	0	0	0	0
OpTill	7	7	7	5	5	7	9	9	6	7	8	8	7	7	9	7	6	8	7
Pendimethalin	10	9	9	8	8	4	0	2	6	0	6	8	7	4	0	0	0	4	4
Pursuit Plus	9	9	8	8	6	4	10	5	6	6	7	9	7	7	9	5	6	8	4
Python	0	0	0	0	0	4	10	9	4	6	8	9	8	8	6	6	7	8	9
Sencor	6	5	4	4	4	6	10	7	6	8	7	8	7	8	4	5	6	6	8
Sharpen	0	0	0	0	0	7	7	9	6	7	7	6	6	7	7	6	6	7	7
Sonalan	10	9	9	8	8	5	0	2	6	0	7	9	7	4	5	0	0	4	4
Spartan	5	4	4	4	4	4	5	3	8	4	8	9	8	5	8	4	0	6	6
Trifluralin	10	9	9	8	8	5	0	2	6	0	6	9	7	4	0	0	0	0	0
Valor	5	4	5	4	4	6	8	4	8	7	7	9	8	5	9	4	0	6	8
POST:																			
Assure II	10	10	8	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Basagran	0	0	0	0	0	6	9	2	5	7	6	4	4	9	6	9	7	8	9
Blazer, Ultra	4	4	4	4	4	7	10	5	6	8	5	10	9	8	7	6	5	5	6
Cadet	0	0	0	0	0	4	5	3	4	5	7	8	8	4	7	5	4	9	4
Classic	0	0	0	0	0	5	10	6	4	7	4	9	7	8	4	9	9	6	5
Cobra/Phoenix	4	4	4	4	4	6	10	4	7	9	5	10	9	6	8	8	6	7	7
FirstRate/Amplify	0	0	0	0	0	4	9	9	4	9	4	4	5	8	4	9	10	8	9
Flexstar/Reflex	4	4	4	4	4	5	10	5	6	8	5	9	9	8	6	7	7	6	8
Fusilade DX	8	7	7	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fusion	10	8	9	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harmony GT	0	0	0	0	0	5	10	4	4	5	8	9	3	8	4	6	6	6	6
Ignite	9	9	9	9	9	7	10	8	9	9	8	7	7	7	8	8	9	7	9
Poast Plus	9	9	9	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pursuit	8	6	6	5	5	6	10	7	4	6	5	9	5	7	9	8	7	8	4
Raptor	9	7	7	6	5	7	10	7	4	6	7	9	6	7	9	9	8	9	4
Synchrony XP	0	0	0	0	0	4	10	4	4	7	8	9	6	8	4	9	10	7	5
Resource	0	0	0	0	0	4	5	5	4	6	6	6	5	4	4	6	4	9	--
Glyphosate	10	10	10	10	10	6	10	9	9	9	8	9	8	8	7	10	9	7	9
Select	10	10	9	9	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2,4-DB	0	0	0	0	0	4	10	5	4	6	7	4	4	5	4	8	6	4	4

**This publication and others can be accessed electronically from the SDSU College of Agriculture & Biological Sciences publications page, which is at <http://www.sdstate.edu/sdces/store/Publications/index.cfm>
The direct PDF download is at http://pubstorage.sdstate.edu/AgBio_Publications/articles/FS525B.pdf.**

**Partial funding of this publication was provided by the
South Dakota Soybean Research and Promotion Council**



South Dakota
Cooperative Extension Service

South Dakota State University, South Dakota counties, and U.S. Department of Agriculture cooperating. South Dakota State University is an Affirmative Action/Equal Opportunity Employer and offers all benefits, services, education, and employment opportunities without regard for race, color, creed, religion, national origin, ancestry, citizenship, age, gender, sexual orientation, disability, or Vietnam Era veteran status.

FS525B: 2500 printed at a cost of \$?.?? each. Revised December 2010.