

2021 Weed Control: Pulse Crops Dry Edible Beans, Field Peas, Chickpeas, and Lentils

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Weed competition can cause significant yield reduction in pulse crops. Pulse crops are weak competitors with weeds, therefore planning an effective weed control program is one of the keys to profitable production.

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 tolerance in crops used for food or feed.

There is no intent to specify product performance guarantee, 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 also stated. These rates have provided acceptable weed control under favorable conditions.

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. There may be additional tank-mixes for special situations.

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.

Abbreviations and Definitions

- **Early Preplant (EPP):** Surface applications usually two to six weeks before planting in no-till systems.
- **Preplant Incorporated (PPI):** Before the crop is planted, incorporated as directed.
- **Preemergence (PRE):** After planting, but before crop or weeds emerge.
- **Early Postemergence (EPOST):** After initial emergence of crop or weeds.
- **Postemergence (POST):** After the crop or weeds have emerged.

pt = pint
qt = quart
gal = gallon
lb = pound
lb/gal = pound per gallon
ae = acid equivalent
ai = active ingredient
gpa = gallons per acre
psi = pounds per square inch pressure
G = granule
L = liquid or flowable
DG, DF = dry flowable
ME = micro-encapsulated
COC = crop oil concentrate
NIS = non-ionic surfactant
28% N = 28% liquid nitrogen fertilizer
AMS = ammonium sulfate
MSO = processed seed oil
OM = organic matter
% v/v = percent volume per volume

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 before using.

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

Poison Control Center 1-800-222-1222

Water Protection. Water quality is a public concern. Preventing spills and accidents reduces risk of groundwater and surface water contamination. Mix 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.

Group Numbers Associated with Herbicide Sites or Modes of Action

Group Number	Site or Mode of Action	Examples
1	ACCCase inhibitor	fluazifop, sethoxydim, quizalofop
2	ALS inhibitor	imazamox, imazethapyr
3	Microtubule inhibitor	pendimethalin, trifluralin
4	Growth regulator	MCPB
5	Photosynthesis inhibitor (triazine)	metribuzin
6	Photosynthesis inhibitor (contact)	bentazon
8	Lipid synthesis inhibitor	trallate
9	EPSP inhibitor	glyphosate
13	Bleacher (isoxazolidinone)	clomazone
14	Cell membrane disrupter (PPO inhibitor)	fomesafen, flumioxazin, sulfentrazone
15	Seedling shoot inhibitor	metolachlor, dimethenamid
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WEED CONTROL in DRY EDIBLE BEANS

Dry edible beans are less capable of competing with weeds than other pulse crops. Early weed growth will reduce bean yield by competing for light, moisture, and nutrients. Heavy weed competition can also cause a buildup of disease and insect problems. Harvest loss and bean quality can also be affected by excessive weed pressure.

Cultivation is an option to control weeds in dry edible beans. A rotary hoe, spike-tooth harrow, or finger weeder can be used before the bean plant is 4 to 6 inches. Weed control is more effective and bean losses are reduced if cultivation is done on a hot day when bean plants are dry and slightly wilted. However, even under the best conditions, 5 to 10% plant loss can be expected. These losses increase when the plants are over 6 inches tall.

Row cropped beans should be cultivated at the 2 to 3 leaf stage and followed by a second cultivation in three weeks if necessary. Cultivation should be shallow to avoid damaging the shallow root system of the bean plants. Do not cultivate or harrow when bean foliage is wet as bacterial disease could be spread.

A combination of herbicides and tillage may be necessary to adequately control weeds for successful dry edible bean production.

Several types of beans are included. For the purpose of this guide, dry beans include pinto, navy, great northern, kidney, white, and pink beans. Use lower rates of herbicide on navy type dry beans as they generally have less tolerance to most herbicides. Rates may be adjusted if prior experience or research shows the higher rates to be safe. Special restrictions for these types of dry beans will be noted in the remarks and restrictions section. Other types of dry edible beans listed in this guide include lima, black turtle soup, and adzuki beans.

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

(\$3.00-13.20)

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

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

Grasses and some small-seeded broadleaf weeds controlled, such as pigweed and lambsquarters. Does not control mustard, nightshade, smartweed, or large-seeded annual broadleaves.

Use the low rate on coarser and the higher rate on finer soils or soils with high organic matter. Use lower rate range in areas receiving less than 20 inches total annual rainfall or irrigation. Rate range for guar, mungbean, lima and snap bean is 1-1.5 pt/A 4L or 5-7.5 lb/A 10G depending on soil texture and O.M. Consult label for sensitive crops rotated in 12 months.

PPI: Apply and incorporate in the spring before planting or in the fall from September 1 to December 31. Do not apply to frozen or snow covered ground. Incorporate within 24 hours.

SONALAN (ethalfluralin) *Site of Action: 3*

(\$9.95-21.60)

1.5-3 pt Sonalan 3L or 5.5-11.5 lb Sonalan 10G (0.56-1.125 lb ai)

Grasses and some broadleaf weeds. Use lower rates on coarse soils and the higher rates on finer soils. Use 3 to 4.5 pt/A or 11.5-17 lb/A to control nightshade and groundcherry; when using these high rates only rotate to crops on the Sonalan label. Consult label for sensitive crops rotated in 12 months. Two incorporation passes are necessary for Sonalan 10G. First incorporation should be as soon as possible (<48 hours). For best results, the second incorporation should be delayed for five days after the first.

FALL: Apply and incorporate in the fall between October 1 and December 31 prior to spring planting. Fall application of 3L may be applied with bulk fertilizer only. Use the higher rates for fall application.

PPI: Apply and incorporate in the spring before planting.

TANK-MIXES: Tank-mix combinations will control a broader spectrum of weeds than either product used separately. Refer to label of the tank-mix partner for specific restrictions.

3.5-4.5 pt Eptam 7L or 15-20 lbs Eptam 20G (3-4 lb ai)

Grass and some broadleaf weeds. Do not use on adzuki, lima, blackeyed, or mung beans. Do not exceed 3.5 pt (7L) or 15 lb (20G) per acre on small white or green beans grown on coarse soils. May apply 20 lbs (20G) on medium and fine soils. Eptam may be applied PPI as a directed lay-by application or in irrigation water. To avoid crop injury ensure Eptam can be used on your variety before applying. Do not feed or graze for 45 days.

PPI: Incorporate into the top 2 to 3 inches of soil with small-bladed tandem disk set to cut 4 to 6 inches deep, field cultivator or other suitable equipment. Second incorporation insures uniformity especially in wet, trashy conditions.

TANK-MIXES: Tank-mix combinations give broader spectrum control than either product used separately. Eptam can be tank-mixed with trifluralin, Sonalan, Dual II Magnum (s-metolachlor), Outlook, pendimethalin and others. Refer to label of tank-mix partner for specific restrictions.

PENDIMETHALIN PRODUCTS (pendimethalin) Site of Action: 3**1.2-3.6 pt pendimethalin 3.3L (0.5-1.5 lb ai)****2-3 pt pendimethalin 3.8L (0.95-1.43 lb ai)**

Pendimethalin is available in several brand name products; 3.3L products include **Acumen, Framework 3.3EC, PendiPro 3.3EC, Pin-Dee 3.3EC,** and **Stealth,** and 3.8L products include **AquaPen, Prowl H2O,** and **Satellite Hydrocap.** Other products may be available. Formulation and use may vary. Follow directions for product used.

Excellent control of most annual grasses and fair control of small-seeded annual broadleaves such as pigweed and lambsquarters. Doesn't control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Rates based on soil type and organic matter. Use higher rates for fine textured soils and soils with over 3% OM. Consult label for rotational restrictions. Do not apply preemergence after planting as serious crop injury can result. Do not apply more than once per cropping season.

FALL: 1.2-3.6 pt 3.3L or 2-3 pt 3.8L. Apply labeled rate based on soil type and organic matter and incorporate in late fall when soil temperatures are 45°F. or below, but before the ground freezes. May incorporate with rainfall, irrigation, or mechanically.

PPI: 2.4-3.6 pt 3.3L or 2-3 pt 3.8L. Apply up to 60 days before planting and incorporate within seven days. Adequate rainfall or mechanical incorporation required prior to planting.

TANK-MIXES: Tank-mix combinations give broader spectrum control than either product used separately. Refer to label of tank-mix partner alone for specific remarks and restrictions.

S-METOLACHLOR/METOLACHLOR PRODUCTS Site of Action: 15**1-2 pt Dual II Magnum, Brawl, Charger Basic, Cinch, EverpreX, Ladem, Medal, Moccasin II Plus, StreliaS II 7.6L (0.95-1.9 lb ai) s-metolachlor****1-2 pt Helmet SPC, Stalwart, Parallel PCS 8L (1-2 lb ai) metolachlor**

S-metolachlor and metolachlor are available in several brand name products. Formulation and use may vary. Follow directions for product used.

For annual grass and some broadleaf weeds. Use low rates on coarse textured soils. Use higher rates on fine textured and high organic matter soils. Do not cut for hay within 120 days and do not use for forage within 60 days following application. Do not apply more than 2 pt/A s-metolachlor or 3 pt/A metolachlor per crop year.

FALL: S-metolachlor products only. Apply to crop stubble after September 30 when the sustained soil temperature at a 4 inch depth is less than 55°F. and falling but before ground freezes. For minimum-till or no-till with soils having greater than 2.5% O.M. use 1.67-2 pt/A on medium textured soils and 2 pt/A on fine textured soils. NOTE: If a spring application is made, the total rate of the fall plus spring application must not exceed the maximum total rate for the specific crop or illegal residues may result. Do not incorporate deeper than 2 to 3 inches.

PPI or PRE: Rate depends on soil type and organic matter. Incorporation improves control with limited rainfall.

TANK-MIXES: Tank-mix combinations control a broader spectrum of weeds than either product used separately. May be tank-mixed with other herbicides including Eptam and trifluralin. Refer to the label of tank-mix partner for specific restrictions.

SEQUENCE (s-metolachlor + glyphosate) Site of Action: 15+9**(\$12.60-25.20)****2-4 pt Sequence 5.25L (0.75-1.5 + 0.56-1.13 lb ai)**

Controls labeled grasses and broadleaves. Apply to actively growing weeds for burndown. For improved weed control add AMS at 8.5-17 lb/100 gal. Do not apply more than 3.5 pt/A on coarse soils or 4 pt/A on medium soils (less than 3% O.M.) or fine soils. Make only one application per year. Do not cut for hay within 120 days of application. Do not graze or feed forage from treated areas.

EPP or PRE: Apply before crop emergence. Rate varies by weeds present and weed size.

TANK-MIX: May be tank-mixed with other labeled herbicides including Dual Magnum, Prowl, and glyphosate. Refer to label of tank-mix partner for restrictions.

PERMIT, HALOMAX 75, HERBIVORE (halosulfuron) Site of Action: 2**(\$9.15-15.75)****0.5-0.67 oz Permit, Halomax 75, Herbivore 75WDG (0.024-0.032 lb ai)**

Permit is a sulfonamide herbicide that controls annual broadleaf weeds. Provides very good to excellent control of cocklebur, sunflower, pigweed, velvetleaf, and common ragweed. Before application ensure your variety is tolerant. Do not harvest within 30 days of application. Do not apply more than two applications (2/3 oz) of Permit or 1 oz/A Herbivore or Halomax 75 per crop cycle and do not exceed 2 oz/acre per 12 month period.

PRE: Apply after planting but prior to soil cracking at a rate of 0.5-0.67 oz per acre uniformly with ground equipment. Lower rate is for lighter textured soils with low organic matter.

BETWEEN ROWS: May be applied at a rate of 0.5-1 oz per acre between rows of crop for control of nutsedge and some broadleaf weeds. Avoid contact of herbicide with the crop. If plastic is used on the planted row, adjust equipment to keep herbicide off the plastic. Reduce rate and spray volume in proportion to area actually sprayed.

POST: Permit only. Apply 0.5-0.67 oz when beans have one to three trifoliates but before flowering. Only one post application per season.

TANK-MIXES: Permit can be tank-mixed with other herbicides including Eptam. Refer to individual labels for restrictions.

OUTLOOK, SLIDER (dimethenamid-p) Site of Action: 15**(\$14.75-25.80)****12-21 oz Outlook, Slider 6L (0.56-1 lb ai)**

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. Outlook is registered for use on small white, navy, black turtle soup, pink, pinto, great northern, red Mexican, red kidney, and cranberry beans. May occasionally result in temporary browning or spotting of leaves, consult your local seed dealer (supplier) for application restrictions on specific varieties.

Outlook may be applied in a single or split application, rates are based on soil type and organic matter. Do not use more than 12 fl oz per acre on coarse soil with less than 1.5% O.M. for soil applications. In South Dakota see Sec. 24(c) label for list of vulnerable soil types where application is prohibited when ground water is within 30 feet from the surface. Do not apply more than 21 oz/A per season. Minimum carrier is 5 gpa for ground or 2 gpa for air. There are no crop rotation restrictions for labeled crops for the next season. Winter wheat can be planted four months after application. Dry beans cannot be harvested for 70 days after Outlook application.

PPI, PRE, or EPOST: Controls most annual grasses, certain annual broadleaf weeds and sedges. Early postemergence application should be made at the first to third trifoliolate leaf. Emerged weeds are not controlled.

TANK-MIXES: Tank-mix combinations control a broader spectrum of weeds than either product used separately. Refer to product label of tank-mix partner alone for specific restrictions. May be tank-mixed or applied sequentially in dry bean crops with one or more of the following herbicides according to the specific tank-mixing label instructions: Basagran, Gramoxone, Prowl, Pursuit, or glyphosate. Dual II Magnum may only be applied sequentially.

AIM (carfentrazone) Site of Action: 14**(\$3.20-12.70)****0.5-2 oz Aim EC 2L (0.008-0.031 lb ai)**

Aim is a contact herbicide often used to improve weed control with glyphosate (e.g. Roundup). It controls kochia (including ALS resistant), redroot pigweed, nightshade, and lambsquarters. Weeds should be small for best results, stressed or large weeds are affected less.

PREPLANT BURNDOWN: Rate is up to 2 oz/A alone or 0.5-1 oz/A with other labeled herbicide tank-mix partners prior to planting or within 24 hours after planting. Coverage is essential for good control. May plant immediately after application. Do not apply more than 2 fl oz/A prior to planting or more than 6.1 oz/A during the growing season.

HOODED SPRAYER APPLICATIONS: Aim may be used at rates up to 2 fl oz per acre applied with hooded sprayers to control labeled weeds between the rows of dry bean, field pea, chickpea, and lentil. Hooded sprayers must be designed, adjusted, and operated in a manner to totally enclose the spray pattern and prevent any spray deposition to green stem tissue, foliage, blooms, or fruit of crop. Add NIS (0.25% v/v), COC (1-2% v/v), or MSO (1-2% v.v) and either a liquid nitrogen fertilizer (2-4% v/v), or AMS (2-4 lb/A).

HARVEST AID: Rate is 1-6.1 oz/A. Apply to mature crop when at least 80 to 90% of the pods are yellow and only 30% of green leaves are left on plants. Minimum carrier is 15 gpa for ground or 5 gpa for air. Always add MSO or COC at 1-2% v/v (1-2 gal/100 gal). UAN (2-4% v/v) or AMS (2-4 lb/A) may also be added to enhance desiccation. Preharvest interval is zero days.

VIDA (pyraflufen) Site of Action: 14**(\$2.05-8.25)****0.5-2 oz Vida 0.208L (0.0008-0.003 lb ai)**

PREPLANT BURNDOWN: For broadleaf weed control up to 4 inches tall or 3 inches in diameter. Apply with other labeled herbicides. Use the higher rate for difficult weeds. Rotation interval is one day. Add NIS (0.25%) or COC (1%) for optimum weed control. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not exceed three applications or 5.5 oz/A per season.

PURSUIT, PRAXIS, THUNDER (imazethapyr) Site of Action: 2**(\$3.40-10.80)****2-3 oz Pursuit, Praxis, Thunder 2L (0.03-0.047 lb ai)**

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 pressure is expected, use Pursuit with another herbicide. Not satisfactory for common waterhemp.

May be applied to the following types of dry edible beans: navy, great northern, red kidney, black turtle, cranberry, pinto, lima, adzuki and small white. Some varieties may be more sensitive; check your variety before application. Do not apply Praxis or Thunder to Domino variety of black turtle beans. Pinto varieties UI-III and Olathe are more sensitive to Praxis or Thunder than other pinto varieties. Labeler assumes no risk for crop injury, loss, or damage when used on edible bean crops. The decision to use or not to use this product on edible legume crops is solely that of the grower. Crop injury and delayed maturity may occur. Do not make more than one application per year. Allow at least 60 days between application and harvest.

PPI: Apply within one week before planting. May be tank-mixed with a registered grass herbicide.

PRE: Apply immediately after, or up to three days after planting. May be applied in a tank-mix with a registered grass herbicide or applied preemergence following a preplant incorporated application of a registered grass herbicide.

EPOST: Apply after crop has at least one trifoliolate leaf or crop injury may result. The use of trifluralin prior to application may increase the likelihood and severity of crop injury. Add NIS at 2 pints per 100 gallons. Do not use crop oils, methylated seed oils, or petroleum oils. Do not apply post to lima beans.

TANK-MIXES: May be tank-mixed with Basagran to increase weed spectrum, however grass antagonism may occur. May include nitrogen-based fertilizer additive only when tank-mixing with Basagran. Refer to the Basagran label for additional application instructions and restrictions.

4 oz Raptor, Octivio, or Vulture 1L (0.03 lb ai)

Raptor controls several annual grasses and annual broadleaf weeds. Raptor is an imidazolinone herbicide with foliar and root uptake. Residual activity is less than for Pursuit; therefore, Raptor has potential where rotation restrictions must be minimized.

Raptor may be applied to the following types of dry beans: adzuki, Anasazi, black turtle, cranberry, great northern, lima (dry), navy, pink, pinto, red kidney, small red, and small white. Do not apply Raptor to snap beans, succulent peas, chickpeas (garbanzo beans), fresh limas, or lentils. Raptor applications may be made with or without the addition of 28% N or AMS to improve weed control. The addition of 28% N or AMS also increases the likelihood of dry bean response.

When 28% N and/or COC are used in the spray mixture, add Basagran 4L at the rate of 6 to 16 oz per acre to minimize crop response. Only one application of Raptor may be made during a season.

Crop rotational intervals are based on regional restrictions. Crop plant back intervals include: no restriction for Clearfield crops (canola, corn, lentil, wheat and sunflower), dry beans, dry peas, soybean, wheat (non-Clearfield) and alfalfa at three months; rye four months; non-Clearfield corn (field, pop, sweet and seed) at eight and a half months; lentil (non-Clearfield), sorghum, oat, and sunflower (non-Clearfield) at nine months; barley at nine to 18 months depending on pH, moisture and tillage; canola (non-Clearfield) at 18-26 months depending on region; and most other crops at 18 months.

POST: Apply to dry beans with at least one fully expanded trifoliolate leaf and before bloom stage. Delay application until the majority of the weeds are at the label recommended growth stage. Apply to weeds that are actively growing. Reduced crop growth, temporary yellowing, and delayed maturity may occur.

REZULT (bentazon + sethoxydim) Site of Action: 1+6**3.2 pt Rezult (1.6 pt bentazon 5L + 1.6 pt sethoxydim 1L) (1+0.2 lb ai)**

For postemergence control of many broadleaf and grass weeds. Tolerant bean types are adzuki, navy, pinto, pink, great northern, kidney, red, white, cranberry, black turtle soup, dry lima, and dry snap bean. Dry bean injury can be very pronounced. Even at the tolerant stages, yellowing, bronzing, speckling, or burning of leaves may occur under certain conditions. This injury is temporary and generally is outgrown without delaying podset or maturity or reducing yield. Using oil may increase injury and reduce yields.

Avoid applications during prolonged periods of cold weather (day temperatures below 75°F. and night temperatures below 55°F. for two to five days) as weed control may be reduced. Maximum rate is 3.2 pt Rezult per season. Do not apply more than 2 pt of Basagran or 2.9 pt of Poast per acre after an application of 3.2 pt of Rezult per acre in one season. Do not apply within 30 days of harvest.

EPOST: Apply to actively growing weeds before they reach maximum labeled size. Apply after the first trifoliolate leaf has fully expanded or severe crop injury may occur.

TANK-MIX: May be tank-mixed with other herbicides including Raptor or Pursuit. Refer to labels for rates and restrictions.

0.75-1 pt Reflex, Ringside, Top Gun, Shafen 2L or Agent 1.88, Battle Star 1.88L (0.19-0.25 lb ai)

Fomesafen is a postemergence contact herbicide for annual broadleaf weeds. Rates for use in South Dakota are limited to defined geographical areas (see label for regional maps). The maximum rate of 1 pt per acre in alternate years 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 east of Hwy 281 to Nebraska. In addition to the above area, a maximum of 0.75 pt per acre in alternate years may be applied east of Hwy 281.

Fomesafen has 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. Coverage is important. Minimum carrier is 10 gpa for ground or 5 gpa for air. Use 30 to 60 psi pressure. Apply with NIS at 0.25 to 0.5% v/v or oil adjuvant at 0.5 to 1% v/v. Do not use 28% N or AMS.

Small grains may be planted after four months; lima beans zero to four months (depending on product); corn or peas after 10 months; and alfalfa, sunflower, sorghum, and other crops not specified on the label after 18 months. Depending on the application region in South Dakota, a maximum of 0.75-1 pt Reflex or 0.19-0.25 lbs/A fomesafen from any source is allowed only in alternate years. Do not graze or harvest forage or straw from crop planted on treated areas. Do not graze or harvest dry beans for forage. Do not apply within 45 days of harvest.

EPP or PRE: Limited weed spectrum at this timing, may be tank-mixed with other labeled herbicides to broaden spectrum.

POST: Apply when beans have at least one fully expanded trifoliolate leaf. All labeled regions in South Dakota.

TANK-MIXES: Can be tank-mixed with several postemergence grass and broadleaf herbicides. Several programs include: Assure II, Basagran, Dual Magnum, Eptam, Poast, Prowl, Pursuit, Raptor, Select, Sonalan or Trellan. Tank mix applications can result in increased crop injury as compared to either product used alone.

For sequential applications allow two to three days after application of grass herbicide before applying fomesafen or fomesafen mixtures. If fomesafen is applied first, apply the grass herbicide when grassy weeds begin to develop new leaves (seven days).

1-2 pt Basagran, BashAzon, Broadloom 4L (0.5-1 lb ai)**0.8-1.6 pt Basagran 5L (0.5-1 lb ai)**

For selective postemergence control of certain broadleaf weeds and sedges. May be applied to adzuki, black turtle, cranberry, great northern, kidney, lima, navy, pink, pinto, snap and white beans. Even at tolerant stages, yellowing, bronzing, speckling or burning of leaves may occur under certain conditions. Temporary injury is generally outgrown without delaying podset. Basagran should be applied with either COC (1-2 pt/A), UAN (4-8 pt/A) or AMS (2.5 lb/A). Addition of an additive may cause bean injury. Use lower rate for adzuki beans. Canada thistle control requires a second application seven to 10 days later.

Basagran can be applied as sequential treatment. First application should be made before weeds are 0.5 to 4 inches tall depending on weed species. Refer to label for weed size. Apply Basagran 4L at 1 pt per acre and repeat application seven to 14 days later. Do not harvest within 30 days of application.

POST: Beans are tolerant to Basagran after first trifoliolate leaf has fully expanded.

TANK-MIX: May be tank-mixed with other herbicides including Outlook, Poast, Pursuit and Raptor.

VARISTO (bentazon + imazamox) Site of Action: 6+2**(\$22.10-29.00)****16-21 oz Varisto 4.187L (0.5-0.66 + 0.023-0.03 lb ai)**

May be applied to adzuki, anasazi, black, black turtle, cranberry, great northern, lima (dry), navy, pink, pinto, red kidney, small red, and small white beans. Apply to small, actively growing weeds. Application rate depends on weed size. May cause crop injury including; leaf burning, bronzing, and speckling; delayed maturity; and reduced yield. Some varieties are more sensitive; check variety before application. Minimum carrier is 10 gpa for ground or 5 gpa for air. Add MSO (1% v/v), COC (1-2% v/v), or NIS (0.25% v/v) and AMS (12-15 lb/100 gal) or UAN (2.5 gal/100 gal). COC or MSO may increase risk of injury.

Do not make more than one application with a maximum of 21 oz/A per season. Do not harvest for 30 days after application. Do not tank-mix with organophosphate or carbamate insecticides.

POST: Apply after the first trifoliolate is fully expanded to before bloom stage.

TANK-MIX: Can be used to control volunteer canola and mustards at 11 oz with Basagran 5L at 16.8 oz plus a grass herbicide. May also be tank-mixed or sequentially applied with Basagran 5L, Outlook, Poast, or Prowl H2O (sequential only).

POAST (sethoxydim) Site of Action: 1**(\$7.10-35.50)****0.5-2.5 pt Poast 1.5L (0.1-0.5 lb ai)**

Controls annual grasses and suppresses quackgrass. Do not apply more than 4 pt during the season. Add COC (2 pt) or MSO (1.5 pt). May also add AMS or UAN. Do not apply when air temperature exceeds 90° F. and relative humidity is 60% or greater. Do not apply within 30 days of harvest. No grazing or feeding restrictions. Refer to label for rotational crop guidelines.

POST: For best results apply when grasses are 2 to 6 inches and actively growing.

CLETHODIM PRODUCTS (clethodim) Site of Action: 1**(\$3.50-27.40)****9-32 oz Select Max, Intensity One, Tapout 0.97L (0.07-0.25 lb ai)****6-16 oz Arrow, Cleanse, Dakota, Clethodim, Intensity, Section, Select, Shadow, Volunteer 2L****4-10.67 oz Section Three, Shadow 3EC (0.09-0.25 lb ai)**

POST: For use on the following beans: dry, field, kidney, dry lima, navy, pinto, tepary, adzuki, moth, mung, rice, and urd. For control of annual grasses. Rates based on grass species and height. Use high rate for heavy grass pressure and or when grasses are at maximum height. Use COC (1 qt/A for ground or at least 1 pt/A for air) for the 2L or 3L products and NIS (0.25% v/v) for the 0.97L products. AMS or UAN are also recommended with some products; individual labels vary. Allow 14 days between sequential applications. Do not apply within 30 days of harvest.

ASSURE II, QUIZ, SE-CURE, TARGA (quizalofop) Site of Action: 1**(\$3.95-9.80)****5-12 oz Assure II, Quiz, Se-Cure, Targa 0.88L (0.035-0.08 lb ai)**

POST: For postemergence control of annual and perennial grass in dry beans. Rates based on weed species and size. Always use a nonphytotoxic petroleum based COC at 1 % v/v or NIS at 0.125 % v/v. COC is preferred in arid areas. Rainfall within one hour of application will reduce control. Do not use more than 24 oz/A of Assure II or Se-Cure or 28 oz/A of Targa or Quiz per season. Allow seven days between sequential applications. Do not apply within 30 days of harvest.

FUSILADE DX (fluazifop) Site of Action: 1**(\$6.95-13.85)****6-12 oz Fusilade DX 2L (0.09-0.188 lb ai)**

POST: For postemergence grass control. Rates vary depending on weed spectrum and weed size. May use up to 24 oz for perennial grass control. Add COC at 0.5-1% v/v or NIS at 0.25-0.5% v/v. For aerial application use 1 pt/A surfactant. Minimum carrier rate is 20 gpa for ground or 5 gpa for air. May make more than one application but allow 14 days between applications. Do not apply more than 24 oz/A per application or 48 oz/A per season. Do not harvest within 60 days of application.

DEFOL 5 (sodium chlorate)**(\$9.25)****4.8 qt Defol 5 (6 lb ai)**

HARVEST AID: Apply seven to 10 days prior to harvest and after pods are brown (extend harvest interval during cool conditions). Thorough coverage of plant is essential. Apply 5-10 gpa by air or 10-20 gpa by ground. Do not graze treated fields or feed treated fodder or forage to livestock.

FLUMIOXAZIN PRODUCTS (flumioxazin) Site of Action: 14**(\$7.50-16.40)****3 oz Valor SX, Flumi 51WDG, Flumi SX, Panther, Outflank 51WDG (0.096 lb ai)****3 oz Valor EZ, Panther SC 4L (0.094 lb ai)**

HARVEST AID: For use on dry bean as a harvest aid. Apply to mature crop when at least 80% of the pods are yellowing and mostly ripe with no more than 40% (bush type) or 30% (vine type) of leaves are green. Do not use more than 3 oz/A during a single application or during the growing season. Do not harvest within five days of application. To ensure thorough coverage, use 15-30 gal carrier per acre. Desiccation requires the addition of an approved adjuvant. Add MSO at 2% v/v. AMS or 28% N may also be used to enhance desiccation. Tank-mixing with glyphosate will increase control of emerged weeds and aid in harvest.

SHARPEN (saflufenacil) Site of Action: 14**(\$6.90-13.80)****1-2 oz Sharpen 2.85L (0.02-0.04 lb ai)**

HARVEST AID: For use on dry bean as a harvest aid. Apply to mature crop when at least 80% of the pods are yellowing and mostly ripe with no more than 40% (bush type) or 30% (vine type) of leaves are green. Do not harvest within two days of application, however for optimum desiccation allow up to 10 days. Do not use more than 2 oz/A per cropping season. Do not apply to dry edible beans grown for seed. Do not graze or feed treated hay or straw.

At rates up to 2 oz/A corn, sorghum, small grains, chickpea, and field pea can be planted anytime; edible pea and lentil after one month, soybean after one to one and a half months; sugarbeet, sunflowers, and most other crops after five months. This does not include the time while the soil is frozen. Consult label for higher rates and crops not specified.

PARAQUAT PRODUCTS (paraquat) Site of Action: 22 Restricted Use Pesticide**(\$2.30-5.15)****1.2-2 pt paraquat 2L (0.3-0.5 lb ai)****0.8-1.3 pt paraquat 3L (0.3-0.48 lb ai)**

Paraquat is available in several brand name products including **Gramoxone 2.0 or Cyclone 2SL, Bonedry, Gramoxone 3.0, Helmquat, Paraquat, Para-Shot, Parazone, or Purgatory 3SL**, and others. Follow specific label directions for product used.

HARVEST AID: For use on the following beans: adzuki, asparagus, black, broad, field, kidney, lablab, lima, moth, mung, navy, pinto, rice, snap, tepary, urd, and wax. Apply when at least 80% of the pods are yellowing and mostly ripe and when leaves are no more than 40% of bush type beans or 30% of vine type beans are green. Use single application of the higher rate for vining type or bush type bean with lush growth. May apply as split application to improve vine coverage. Do not make more than two applications or exceed a total of 2 pt per acre 2L or 1.3 pt per acre for 3L product. Minimum carrier is 20 gpa for ground or 5 gpa for air. Add NIS at 1 qt/100 gal spray mix. Do not harvest or graze treated fields for seven days after spraying. Follow handling precautions, as paraquat is toxic when ingested.

GLYPHOSATE PRODUCTS (glyphosate) Site of Action: 9

Glyphosate is a non-selective, translocated, foliage-applied herbicide used in reduced tillage systems. Glyphosate is applied before planting up to emergence, as a spot treatment, or as a harvest-aid desiccant in certain situations.

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

Glyphosate Concentration	Trade Names
3 ae, 4 ai	Credit 41 Extra, GlyStar Gold, Honcho Plus, Cornerstone Plus, Buccaneer (Plus)
4 ae, 5.4 ai	Cornerstone 5 Plus, Durango DMA
4.5 ae, 5.5 ai	Abundit Edge, Roundup PowerMax, Roundup WeatherMax
4.5 ae, 5.83 ai	Credit Xtreme
5 ae	Buccaneer 5, Touchdown HiTech

Some products require the addition of NIS; AMS products at the equivalent rate of 8.5 to 17 lb/100 gal are required for most formulations. Rates vary with weed spectrum and weed size. Check crop use rates and application directions on the product being used.

BURNDOWN: Not all products are labeled for burndown, check individual label. Weeds should be actively growing. Avoid tillage for one-day after treating annual weeds and three to seven days for perennials. Some products contain adequate surfactant; others require NIS additive. AMS at 8.5 to 17 lb/100 gal is required. Carrier is 3 to 40 gpa for ground and 3 to 15 gpa for air. Use caution to avoid droplet drift to non-target crops. Follow tank cleanup procedures to avoid crop damage from equipment contamination. A number of glyphosate products are labeled for dry bean burndown, refer to label for specific rate information depending on product formulation and concentration.

SPOT TREATMENT: Use a 2% solution, apply to perennial broadleaf weeds at or beyond the bud stage. Crop will be killed in treated areas. Allow a seven-day preharvest interval for spot treatment. Refer to label for specific glyphosate products, rates, and precautions.

PREHARVEST: Some products allow preharvest application, examples include: Roundup WeatherMax, Roundup PowerMax. Apply up to 22 oz per acre of Roundup WeatherMax at the hard dough stage or less than 30% grain moisture. Refer to specific product label for rate information depending on formulation and concentration. Ground or aerial application at 3 to 20 gpa carrier. Apply at least seven days before harvest. Make only one application per year, do not apply a spot treatment and preharvest spray on the same crop area. Do not apply to seed crop as germination and seed vigor reduction may occur. Do not feed or graze livestock with treated vines and hay. Do not apply to dry bean grain intended for livestock feed.

WEED CONTROL in FIELD PEAS

Field peas have slow early development and can allow weeds to get a headstart. Peas do not form a thick closed canopy like some of the more commonly grown crops.

Canada thistle at harvest is a special problem. Canada thistle reduces pea yield and flower buds are difficult to remove from the harvested crop, resulting in loss of crop quality.

Field peas can be harrowed with a tine harrow between seeding and crop emergence to control escaped weeds. Avoid harrowing immediately after crop emergence. Harrowing after emergence is generally less effective and may cause crop damage and variable field pea maturity. Damage is reduced with finger-type weeders or flexible harrows. Postemergence harrowing should be done on a dry, warm, sunny day. This provides the best opportunity to kill weeds and to reduce seedling damage and spread of disease.

Types of field peas in this publication are referred to in several main groups. Those groups include dry edible peas (the more common reference in South Dakota), English peas, green or succulent peas, and Southern peas (blackeyed, pinkeyed, crowder, and cow peas).

Not all pea varieties within these groups have been tested for tolerance to the labeled herbicides. Consult your seed dealer about specific variety and herbicide use.

FAR-GO or AVADEX MICROACTIV (trifluralin) Site of Action: 8

(\$18.85-24.25)

1.5 qt Far-Go 4L or 12.5-15 lb Avadex MicroActiv, Avadex MinTill 10G (1.5 or 1.25-1.5 lb ai)

For wild oat control. For spring application only. Do not use on pea-oat mixtures. Do not graze or use treated foliage for livestock feed.

PPI: Dry edible, green peas. Apply prior to seeding or before emergence. Pea shoot sprouts should not be over 1/4 inch long. Apply prior to wild oat germination. Some leaf crinkling and delayed maturity of peas may occur. Shallow incorporate within 48 hours, but do not disturb seed. Apply lower rate for coarse textured soils and higher rate for fine textured soils.

TRIFLURALIN PRODUCTS (trifluralin) Site of Action: 3

(\$3.00-13.20)

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

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

Controls grasses and some small-seeded broadleaf weeds such as pigweed and lambsquarters. Does not control mustard, nightshade, smartweed, or large-seeded annual broadleaves.

Use 1-1.5 pt 4L or 5-7.5 lb 10G for dry or English peas. Use 1 to 2 pt 4L or 5 to 10 lb 10G for Southern or other peas. Stunting may be observed when maximum labeled rate is applied. Use lower rate range in areas receiving less than 20 inches total rainfall. Apply only once during the season. Apply uniformly across the field, avoid overlapping. Use the lower rate on coarse textured soils and the higher rate on fine textured soils. Consult label for sensitive crops rotated in 12 months.

PPI: Apply and incorporate 1 to 2 inches deep within 24 hours in the spring before planting.

SONALAN (ethalfluralin) Site of Action: 3

(\$9.95-14.10)

1.5-2 pt Sonalan 3L or 5.5-7.5 lb Sonalan 10G (0.55-0.75 lb ai)

Dry edible peas. Controls certain grass and broadleaf weeds except groundcherry and nightshade. Do not exceed recommended rates as crop injury may occur. All pea varieties have not been tested for tolerance, consult your seed dealer for tolerance on a particular variety. Two incorporation passes are necessary for Sonalan 10G. First incorporation should be as soon as possible (<48 hours). For best results, the second incorporation should be delayed for five days after the first. Use incorporation equipment capable of thoroughly and uniformly mixing Sonalan 10G into the top 2 to 3 inches of the seedbed. Do not graze or use treated foliage for livestock feed. Consult label for sensitive crops rotated in 12 months.

FALL: Apply and incorporate between October 1 and December 31 prior to spring planting. Apply 3L only with bulk fertilizer. Use the higher rates for fall application.

PPI: Apply and incorporate in the spring before planting.

COMMAND (clomazone) Site of Action: 13**(\$27.80)****1.3 pt Command 3ME (0.5 lb ai)**

Succulent peas only. For control or suppression of annual grasses and broadleaf weeds. Has provided good kochia control in some tests. Make a single application in a minimum of 10 gpa. Temporary whitening and/or yellowing of the treated crop may occur. Do not allow livestock to graze on treated vines or feed vines to livestock.

PRE: Apply as soil applied treatment prior to seeding or after seeding but prior to crop emergence.

PENDIMETHALIN PRODUCTS (pendimethalin) Site of Action: 3**(\$4.55-19.70)****1.2-3.6 pt pendimethalin 3.3L (0.5-1.5 lb ai)****1.5-3 pt pendimethalin 3.8L (0.71-1.4 lb ai)**

Pendimethalin is available in several brand name products; 3.3L products include **Acumen, Framework 3.3EC, PendiPro 3.3EC, Pin-Dee 3.3EC,** and **Stealth,** and 3.8L products include **AquaPen, Prowl H2O,** and **Satellite Hydrocap.** Other products may be available. Formulation and use may vary. Follow directions for product used.

English, dry edible, garden, green, dwarf, Southern (cowpeas) and pigeon peas. 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. Do not apply preemergence surface treatment after planting as serious crop injury can result. Use low rate on coarse textured soils and higher rates on fine textured soils. Rates vary with pea type. Do not apply to peas, pea forage, pea silage, pea hay, or straw grown for livestock feed. Do not apply more than once per growing season.

FALL: Apply 1.2-3.6 pt/A 3.3L or 1.5-3 pt/A 3.8L based on soil type and organic matter and incorporate in late fall when soil temperatures are 45°F. or below, but before the ground freezes.

PPI: Apply 1.8-3.6 pt 3.3L or 1.5-3 pt 3.8L based on soil type and organic matter. May be applied 60 days prior to planting up to immediately before planting. Adequate rainfall or mechanical incorporation required prior to planting.

S-METOLACHLOR/METOLACHLOR PRODUCTS Site of Action: 15**(\$7.35-26.95)****1-2 pt Dual II Magnum, Brawl, Charger Basic, Cinch, EverpreX, Ladem, Medal, Moccasin II Plus, StreliaS II 7.6L (0.95-1.9 lb ai) s-metolachlor****1-2 pt Helmet SPC, Stalwart, Parallel PCS 8L (1-2 lb ai) metolachlor**

S-metolachlor and metolachlor are available in several brand name products. Formulation and use may vary. Follow directions for product used.

Peas; including English, Southern (black eye, pink eye, and crowder pea). (English peas are PRE only). 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. Do not cut for hay within 120 days and do not use for forage within 60 days following application. Do not apply more than 2 pt/A s-metolachlor or 3 pt/A metolachlor per crop year.

FALL: S-metolachlor products only. Apply after September 30 when the soil is less than 55°F but before the ground freezes. For minimum-till or no-till with soils having greater than 2.5% O.M., use 1.67-2 pt/A on medium textured soils and 2 pt/A on fine textured soils. Do not incorporate deeper than 2-3 inches. NOTE: If a spring application is made, the total rate of the fall plus spring application must not exceed the maximum total rate for the specific crop or illegal residues may result.

PPI or PRE: Incorporation improves control with limited rainfall. Rate depends on soil type and organic matter. Apply preemergence only on English peas.

SEQUENCE (s-metolachlor + glyphosate) Site of Action: 15+9**(\$12.60-25.20)****2-4 pt Sequence 5.25L (0.75-1.5 + 0.56-1.13 lb ai)**

Succulent or dry peas. Apply to actively growing weeds for burndown. For improved control of emerged weeds add AMS at 8.5-17 lb/100 gal. Controls labeled grasses and broadleaves. Do not apply more than 3.5 pt/A on coarse soils or 4 pt/A on medium soils (less than 3% O.M.) or fine soils. Make only one application per year. Do not cut for hay within 120 days of application. Do not graze or feed forage from treated areas.

EPP or PRE: Apply before crop emergence. Rate varies by weeds present and weed size.

TANK-MIXES: May be tank-mixed with other labeled herbicides including Dual Magnum, Prowl, or glyphosate. Refer to label of tank-mix partner for restrictions.

AUTHORITY ELITE, BROADAXE XC or SPARTAN ELITE (s-metolachlor + sulfentrazone) Site of Action: 15+14

19-38.7 oz Authority Elite, BroadAxe XC or Spartan Elite 7L (0.94-1.9 + 0.1-0.21 lb ai) (\$15.55-31.60)

Black-eyed, cowpea, crowder, southern, field pea, and pigeon peas. Controls some broadleaves and grasses. Rate depends on soil texture, organic matter and pH. Use lower rates on soils with pH >7.2. Do not apply to coarse soil with less than 1.5% O.M. or sand with less than 1% O.M. Adequate moisture (0.5-1 in.) is needed to activate the herbicide. Maximum use rate of 38.7 oz/A per year. Do not apply other sulfentrazone products during the same year. Do not apply after the crop emerges. Do not use for forage within 60 days or cut for hay within 120 days after application.

Dry shelled peas, soybeans, and sunflowers can be planted anytime. Rotation interval is four months for corn and potatoes; four and a half months for barley, rye, and wheat; 10 months for sorghum; 12 months for alfalfa, oat, and pearl or proso millet; 36 months for sugarbeets; and 12 months for most other crops with a successful bioassay.

FALL: Apply after harvest without incorporation when the soil temperature is 55°F or below but before the ground freezes. In South Dakota apply after September 30. May be tank-mixed with other labeled herbicides. Do not apply to frozen or snow covered soils.

EPP or PRE: Can be applied up to three days after planting if seedlings have not begun to crack the surface. A shallow incorporation may be needed if adequate moisture is not received within seven to 10 days after application. Tank-mix with Aim, glyphosate, or other labeled burndown herbicide to control emerged weeds.

PPI: Incorporate no deeper than 2 inches.

SPARTAN, ANTARES, BLANKET, HM-1512 AG, SULFIN (sulfentrazone) Site of Action: 14 (\$3.15-15.40)

2.25 to 8 oz Spartan, Antares, Blanket, HM-1512 AG, Sulfin 4SC 4F (0.07-0.25 lb ai)

Dry field pea. Spartan is a soil-applied herbicide with root and shoot activity. Spartan is used primarily for annual broadleaf weeds including pigweed, kochia (including ALS resistant), and black nightshade. Fair to good control of wild buckwheat and lambsquarters is possible under favorable conditions. Activity on biennial wormwood has been reported. Rates vary with soil texture, O.M. and pH. Lower rate is for coarse soil with low O.M. and pH > 7.0. Crop tolerance is very good.

Crop response may occur on coarse soils with less than 1.5% O.M. and pH ≥7.8. Do not use on soils classified as sand with <1% O.M. Minimum carrier is 10 gpa for ground equipment. Do not apply more than 8 oz per acre per year.

FALL: Do not mechanically incorporate or apply to frozen soil. Use a mid to high rate that is appropriate for your soil type. If weeds emerge prior to application, add glyphosate (e.g. Roundup) or paraquat (e.g. Gramoxone).

EPP or PRE: Apply up to three days after planting, before seedlings have emerged. Best results when applied greater than 14 days early preplant. The high rate is suggested for heavy soil, especially if applied long before planting. Requires precipitation for activation. Tank-mix with glyphosate or other labeled herbicide for broad spectrum weed control.

PPI: Incorporate no deeper than 2 inches.

SPARTAN CHARGE (carfentrazone + sulfentrazone) Site of Action: 14+14 (\$7.80-26.55)

3-10.2 oz Spartan Charge 3.5L (0.008-0.03 + 0.07-0.25 lb ai)

Spartan Charge controls broadleaf weeds. Rates vary with soil texture, O.M., and pH. Do not apply more than 10.2 oz/A Spartan Charge per year. Crop response may occur on coarse soils with less than 1.5% O.M. and pH ≥7.8. Spartan Charge should be used at reduced rates or not at all in these areas. Do not apply to sand soils with less than 1% O.M.

Dry shelled peas, soybeans, and sunflowers can be planted anytime. Rotation interval is four months for barley, field corn, dry shelled beans, potatoes, rye, and wheat; 10 months for sorghum; 12 months for alfalfa, and oats; 24 months for canola, crambe, and sugarbeets; and 12 months for most other crops with a successful bioassay.

FALL: Do not mechanically incorporate or apply to frozen or snow covered soil. Use a mid to high rate that is appropriate for your soil type and organic matter. If weeds emerge prior to application, add glyphosate (e.g. Roundup) or paraquat (e.g. Gramoxone).

EPP or PRE: Apply up to three days after planting. Do not apply after crop emergence. Best results when applied greater than 14 days early preplant on coarse soils. Adequate moisture (0.5-1 in.) is required for activation. Tank-mix with glyphosate or other labeled herbicide for broad spectrum weed control.

3.3-11.7 oz Authority Edge (0.07-0.25 + 0.04-0.14 lb ai)**4.3-15.4 oz Authority Supreme (0.07-0.25 + 0.07-0.25 lb ai)**

Dry field pea. Authority Edge contains 2.73 lb sulfentrazone and 1.52 lb pyroxasulfone per gallon and Authority Supreme contains 2.08 lb sulfentrazone and 2.08 lb pyroxasulfone per gallon. Control certain broadleaf, grass, and sedge weeds. Within seven to 10 days after application, 0.5-1 inches of rain is needed to activate herbicide. Rates vary depending on soil texture, O.M., and pH. Do not use on sand soils with less than 1% O.M. Do not apply after germination of crop. Before application ensure your variety is tolerant. Maximum use rate is 11.71 oz Authority Edge or 15.4 oz Authority Supreme per year. May apply two applications per year with seven days between applications. May plant dry shelled peas, soybeans or sunflowers anytime. Rotation varies by use rate for each crop, refer to label for other crop rotations.

FALL: Apply when the soil temperature is less than 55 degrees F. Do not apply to frozen or snow covered soils.

PPS, PPI, PRE: Apply up to three days after planting but before crop emergence. May be incorporated uniformly no deeper than 2 inches. For coarse textured soils with less than 1.5% O.M. wait seven to 14 days after application before planting.

DIMETRIC EXT (metribuzin) Site of Action: 5**(\$4.75-6.25)****0.25-0.33 lb Dimetric EXT 75DF (0.19-0.25 lb ai)**

Dimetric EXT has a 24(c) label for South Dakota. Provides excellent control of small-seeded annual broadleaves and fair to good control of certain large-seeded broadleaves. Use the higher rate for fine textured soils or high weed populations. Minimum carrier is 10 gpa for ground applications.

May cause some chlorosis or minor necrosis to the crop. Cold, wet soil conditions increase the risk of injury. Do not use on coarse-textured soils, sandy soils or soils with less than 1.5% O.M. Do not use on clay knobs or poorly covered subsoils.

PPS: Apply before planting. For optimum weed control; incorporation, by rainfall or mechanically (1-2 inches), is needed.

SHARPEN (saflufenacil) Site of Action: 14**(\$6.90-13.80)****1-2 oz Sharpen 2.85L (0.02-0.04 lb ai)**

Can be applied as a burndown early preplant to preemergence to dry field peas or can be applied preplant incorporated or preemergence to edible peas (sugar snap, succulent (English, garden, green) peas). For use as a burndown before crop emergence to control broadleaf weeds. Check seed variety for sensitivity to Sharpen before applying. Requires at least 0.5 inch of moisture for activation. Add MSO (1 gal/100 gal) and AMS (8.5-17 lb/100 gal) or UAN (1.25-2.5 gal/100 gal). Sequential applications can be made after 30 days. Do not apply more than 2 oz/A (edible peas) or 4 oz/A (dry field peas) per cropping season.

At rates up to 2 oz/A corn, sorghum, small grains, chickpea, and field pea can be planted anytime; edible pea and lentil after one month, soybean after one to one and a half months; sugarbeet, sunflowers, and other crops after five months. This does not include the time while the soil is frozen. Consult label for higher rates and crops not specified.

PPI: Edible peas only. Apply up to one week before planting. Incorporate at 3 inches or less.

PRE: Apply up to three days after planting but before crop emergence. Severe crop injury will occur if crop has reached cracking stage or emerged.

HARVEST AID: For use on dry pea as a harvest aid. Apply to mature crop when at least 80% of the pods are yellowing and mostly ripe with no more than 40% (bush type) or 30% (vine type) of leaves are green. Do not harvest within three days of application, however for optimum desiccation allow up to 10 days. Do not use more than 2 oz/A per cropping season. Do not apply to dry peas grown for seed. Pea vines may be grazed or fed to livestock.

OPTILL (imazethapyr + saflufenacil) Site of Action: 2+14**(\$13.15)****1.5 oz Optill 68WDG (0.047 + 0.017 lb ai)**

Dry field pea only. Optill controls grasses and broadleaves. Add MSO (1 gal/100 gal) and AMS (8.5-17 lb/100 gal) or UAN (1.25-2.5 gal/100 gal). Plant field pea at least 0.5 inch deep. Requires at least 0.5 inch of moisture for activation. Make only one application per season. May tank-mix with other labeled herbicides for additional weed control. Do not apply as a tank-mix or sequentially with other Group 14 herbicides within 30 days of planting. Do not feed or graze forage or hay for 65 days.

At 1.5 oz/A chickpeas and peas may be planted anytime, lentil may be planted after one month and barley after four months. Rotation intervals for rates up to 2 oz/A are zero to one month for soybeans; one month for Southern peas; three months for Clearfield wheat; four months for alfalfa, edible beans and peas (except Southern), and wheat; four to 18 months for rye; eight and a half months for field corn; nine and a half months for barley, Clearfield canola, and Clearfield sunflower; 18 months for oats, safflower, sorghum, and sunflower; 26 months for flax and potatoes; and 40 months for most other crops with a successful bioassay.

EPP: Apply up to 30 days before planting. Residual control may be reduced when applied more than 14 days before planting.

PPI: Apply up to one week before planting. Incorporate at 3 inches or less.

PRE: Apply up to three days after planting but before crop emergence. Severe crop injury will occur if crop has reached cracking stage or emerged.

TANK-MIX: May be tank-mixed or applied sequentially with other herbicides including Prowl H2O, Sharpen, and glyphosate. Do not apply more than 0.045 lb ai/A of saflufenacil or 0.047 lb ai/A of imazethapyr per season.

ANTHEM FLEX (pyroxasulfone + carfentrazone) Site of Action: 15 + 14**(\$15.10-27.40)****2.75-5 oz Anthem Flex 4L (0.08-0.15 + 0.006-0.01 lb ai)**

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

Do not apply to coarse soils. Allow 14 days between applications. May apply a maximum of three applications per year. Do not apply more than 0.266 lb ai/A of pyroxasulfone or 0.096 lb ai/A of carfentrazone per year.

FALL: Do not apply to frozen or snow covered soil.

EPP: Apply up to 30 days before planting.

PRE: Apply before cracking or emergence.

AIM (carfentrazone) Site of Action: 14**(\$3.20-12.70)****0.5-2 oz Aim EC 2L (0.008-0.031 lb ai)**

Aim is a contact herbicide often used to improve weed control with glyphosate (e.g. Roundup). It controls ALS or normal kochia, redroot pigweed, nightshade, and lambsquarters. Weeds should be small for best results, stressed or large weeds are affected less. Do not apply more than 2 fl oz/A prior to planting or more than 6.1 oz/A during the growing season.

PREPLANT BURNDOWN: Rate is up to 2 oz/A alone or 0.5-1 oz/A with other labeled herbicide tank-mix partners prior to planting or within 24 hours after planting. Coverage is essential for good control. May plant immediately after application.

HOODED SPRAYER APPLICATIONS: Aim may be used at rates up to 2 fl oz per acre applied with hooded sprayers to control labeled weeds between the rows of dry beans, field pea, chickpea, and lentil. Hooded sprayers must be designed, adjusted, and operated in a manner to totally enclose the spray pattern and prevent any spray deposition to green stem tissue, foliage, blooms, or fruit of crop. Add NIS (0.25% v/v), COC (1-2% v/v), or MSO (1-2% v/v) and either a liquid nitrogen fertilizer (2-4% v/v) or AMS (2-4 lb/A).

HARVEST AID: Rate is 1-6.1 oz/A. Apply to mature crop when at least 80 to 90% of the pods are yellow and only 30% of green leaves are left on plants. Minimum carrier is 15 gpa for ground or 5 gpa for air. Always add MSO or COC at 1-2% v/v (1-2 gal/100 gal). UAN (2-4% v/v) or AMS (2-4 lb/A) may also be added to enhance desiccation. Preharvest interval is zero days.

FLUMIOXAZIN PRODUCTS (flumioxazin) Site of Action: 14**(\$3.75-16.40)****1.5-3 oz Valor, Flumi 51WDG, Flumi SX, Outflank, Panther 51 WDG (0.047-0.096 lb ai)****1.5-3 oz Valor EZ, Panther SC 4L (0.047-0.094 lb ai)**

FALL BURNDOWN: Field pea. Apply 2-3 oz with labeled burndown herbicides for increased weed spectrum and residual of some weeds. Can be tank-mixed with 2,4-D and/or glyphosate. Do not apply to frozen or snow covered ground. Tillage following application will reduce residual control. Peas can be planted after three months with 2 oz and after four months with 3 oz.

HARVEST AID: For use on field pea as a harvest aid (Panther SC not labeled). Apply 1.5-2 oz to mature crop when at least 80% of the pods are yellow to tan and 20% are yellow. Do not harvest within five days of application. To ensure thorough coverage, use 15-30 gal carrier per acre. Desiccation requires the addition of an approved adjuvant. COC or MSO at 2% v/v may be used (MSO preferred). AMS or 28% N may also be used to enhance desiccation. Tank-mixing with glyphosate will increase control of emerged weeds and aid in harvest.

At rates up to 2 oz, corn (conventional tillage), sorghum, sunflower, and wheat can be planted after one month with 1 inch rainfall. Barley, dry bean, flax, peas, rye, and safflower after three months. Alfalfa, canola, clover, and oats after four months if soil is tilled before planting or eight months for no-till. Interval for lentil is six months. Most other crops are four months (if tilled) or eight months (no-till) and a successful soil bioassay. Consult label for rates greater than 2 oz/acre.

VIDA (pyraflufen) Site of Action: 14**(\$2.05-8.25)****0.5-2 oz Vida 0.208L (0.0008-0.003 lb ai)**

PREPLANT BURNDOWN: For broadleaf weed control up to 4 inches tall or 3 inches in diameter. Apply with other labeled herbicides. Use the higher rate for difficult weeds. Rotation interval is one-day. Add NIS (0.25%) or COC (1%) for optimum weed control. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not exceed three applications or 5.5 oz/A per season.

PURSUIT, PRAXIS, THUNDER (imazethapyr) Site of Action: 2**(\$3.40-10.80)****2-3 oz Pursuit, Praxis, Thunder 2L (0.03-0.047 lb ai)**

Pursuit may be applied to the following types of field peas: dry edible peas, English, and southern peas. 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. Not satisfactory for common waterhemp.

Do not apply Pursuit before crop is at least 3 inches in height or crop injury may result. Labeler assumes no risk for crop injury, loss or damage when used on edible legume crops. The decision to use or not to use this product on edible legume crops is solely that of the grower. Plant peas at least 0.5 inch deep. Do not make more than one application per year. Allow at least 30 days between application and harvest of English peas and southern peas, and 60 days for dry edible peas.

PPI: Apply up to 3 oz/A to dry edible peas and English peas, or up to 4 oz/A for southern peas only, within one week before planting. May be tank-mixed with a registered grass herbicide.

PRE: Apply up to 3 oz/A to dry edible peas and English peas, or up to 4 oz/A for southern peas only, immediately after or up to three days after planting. May be applied in a tank-mix with a registered grass herbicide or applied preemergence following a preplant incorporated registered grass herbicide.

EPOST: Apply up to 3 oz/A to dry edible peas and English peas, or up to 4 oz/A for southern peas only. Apply to peas at least 3 inches in height but prior to five nodes and before flowering. The use of trifluralin prior to application may increase the likelihood and severity of crop injury. NIS must be used at a rate of 2 pints per 100 gallons. Do not use crop oils, methylated seed oils, or petroleum oils.

TANK-MIX: May be tank-mixed with Basagran to control weeds not listed on the label. Addition of Basagran may cause antagonism, reducing control of grassy weeds. Nitrogen-based fertilizer may be included as a spray additive only when tank-mixed with Basagran. Refer to the Basagran label for application rates and restrictions.

RAPTOR, OCTIVIO, or VULTURE (imazamox) Site of Action: 2**(\$8.00-18.65)****3-4 oz Raptor, Octivio or Vulture 1L (0.023-0.03 lb ai)**

Raptor controls several grasses and annual broadleaf weeds. Raptor is an imidazolinone herbicide with foliar and root uptake action. Residual activity is less than for Pursuit; therefore Raptor has potential where rotation restrictions must be minimized.

Foxtail control has been very good. It also controls velvetleaf, cocklebur, sunflower, non-ALS kochia, mustard, and black nightshade. Raptor will suppress woolly cupgrass, wild proso millet, and sandbur. Perennials such as Canada thistle, common waterhemp, and ALS resistant weed biotypes are not controlled. Common ragweed control is variable. Lambsquarters should be treated when small.

Dry edible peas, southern peas (cow peas), English peas. Treat early when weed are 1 to 3 inches, unless otherwise indicated on label. Stress reduces crop tolerance; avoid application immediately after cold weather. Hot, humid weather may cause temporary crop response. Raptor may be applied with or without 28% N or AMS to improve weed control. Only one application of Raptor may be made per season. Do not apply Raptor to succulent peas, chickpeas (garbanzo beans), or lentils.

Crop rotational intervals are based on regional restrictions. Crop plant back intervals include: no restriction for Clearfield crops (canola, corn, lentil, wheat and sunflower), dry beans, dry peas, soybean, wheat (non-Clearfield) and alfalfa at three months; rye four months; non-Clearfield corn (field, pop, sweet and seed) at eight and a half months; lentil (non-Clearfield), sorghum, oat, and sunflower (non-clearfield) at nine months; barley at nine to 18 months depending on pH, moisture and tillage; canola (non-Clearfield) at 18-26 months depending on region; and most other crops at 18 months.

POST: 3 oz for English peas or 4 oz for dry or Southern peas. Apply to dry peas with at least three pair of leaves and prior to bloom. Apply to English peas at least 3 inches but before five nodes before flowering. For dry or Southern peas, always tank-mix with 6-16 oz Basagran 4L. For English peas, add Basagran 4L at 6-16 oz if adding nitrogen based fertilizers to minimize crop response.

THISTROL (MCPB) Site of Action: 4**(\$14.45-43.40)****2-6 pt Thistrol 2L (0.5-1.5 lb ai)**

POST: Dry edible peas. Controls certain broadleaf weeds, sedges, and Canada thistle. Apply from shoot emergence to three nodes before flowering. Typically at 6-to-12 node stage when targeting Canada thistle. Do not apply to peas later than three nodes prior to flowering or after flower buds appear. Do not apply to peas under moisture stress or when air temperatures exceeds 90°F. Do not graze or use treated foliage for livestock feed.

BASAGRAN, BASHAZON or BROADLOOM (bentazon) Site of Action: 6**(\$7.20-16.25)****1-2 pt Basagran, BashAzon, Broadloom 4L (0.5-1 lb ai)****0.8-1.6 pt Basagran 5L**

Dry edible, succulent, English, and Southern pea. Controls certain broadleaved weeds, sedges, and Canada thistle. Do not add COC. Do not apply within 10 days (succulent peas) or 30 days (dry peas) of harvest. Do not apply when peas are in bloom. Infurrow insecticide and nematicide treatments may increase risk of crop injury.

POST: Application made prior to three pair leaves or four nodes can cause pronounced pea injury. Yellowing, bronzing, speckling, or burning of leaves may occur under certain conditions even at tolerant crop stages. Peas usually recover without yield loss.

TANK-MIX: May be tank-mixed with other herbicides including Pursuit and Raptor. See label for application directions and restrictions.

VARISTO (bentazon + imazamox) Site of Action: 6+2**(\$22.10-29.00)****16-21 oz Varisto 4.187L (0.5-0.66 + 0.023-0.03 lb ai)**

Dry peas (other than English peas) or Southern peas. Apply to small, actively growing weeds. Application rate depends on weed size. May cause crop injury including; leaf burning, bronzing, and speckling; delayed maturity; and reduced yield. Some varieties are more sensitive; check variety before application. Minimum carrier is 10 gpa for ground or 5 gpa for air. Add COC (1-2% v/v), or NIS (0.25% v/v) and AMS (12-15 lb/100 gal) or UAN (2.5 gal/100 gal). COC may increase injury and reduce yield. Do not use MSO.

Do not apply when temperatures are above 90°F. Do not make more than one application with a maximum of 21 oz/A per season. Do not harvest for 30 days after application. Tank-mixes with organophosphate or carbamate insecticides may result in crop injury; allow seven days between applications. In-furrow insecticide and nematicide treatments may increase risk of crop injury.

POST: Apply to peas with three or more pairs of leaves to before bloom stage.

TANK-MIX: May apply at 11 oz with 16.8 oz of Basagran 5L for volunteer canola and mustard control. May be tank-mixed or applied sequentially with other herbicides including Basagran 5L, Poast, Prowl H2O (sequential only), and Sharpen (sequential only).

ASSURE II, QUIZ, SE-CURE, TARGA (quizalofop) Site of Action: 1**(\$3.95-9.80)****5-12 oz Assure II, Quiz, Se-Cure, Targa 0.88L (0.035-0.08 lb ai)**

POST: Dry or succulent peas. Controls annual grasses and quackgrass. Maximum rate is 14 oz per acre per season. Separate sequential applications by at least seven days. Minimum carrier is 10 gpa for ground application; do not apply through irrigation systems. Do not harvest for 60 days of harvest for dry peas or 30 days for succulent peas. Use nonphytotoxic petroleum based COC at 1 % v/v or NIS at 0.25 v/v.

POAST (sethoxydim) Site of Action: 1**(\$7.10-35.50)****0.5-2.5 pt Poast 1.5L (0.1-0.5 lb ai)**

POST: Dry edible, succulent peas. For annual and perennial grass, does not control sedges. Refer to label for rates according to weed size and species. Maximum rate per application is 2.5 pt per acre and maximum per season is 4 pt per acre. Do not apply when air temperature exceeds 90°F. and relative humidity is 60% or greater. Add COC (2 pt) or MSO (1.5 pt). May also add AMS or UAN. Do not harvest within 15 days for succulent peas or 30 days for dry peas following application. No grazing or feeding restrictions.

REZULT (sethoxydim + bentazon) Site of Action: 1 + 6**3.2 pt Result (1.6 pt sethoxydim 1L + 1.6 pt bentazon 5L) (0.2 + 1 lb ai)**

Result is a commercial premix that will discharge bentazon and sethoxydim in a ratio of 1:1. Refer to label for additive recommendations. Do not apply within 30 days of harvest. Do not apply more than 2 pt of Basagran or 2.9 pt of Poast per acre after an application of 3.2 pt of Result per acre in one season. Avoid applications during prolonged periods of cold weather (day temperatures below 75°F. and night temperatures below 55°F. for two to five days) as weed control may be reduced.

POST: Apply after dry peas have at least three pair of leaves or four nodes. Applications before this stage may result in severe crop injury.

CLETHODIM PRODUCTS (clethodim) Site of Action: 1**(\$2.40-13.70)****9-16 oz Select Max, Intensity One, Tapout 1L (0.07-0.12 lb ai)****6-8 oz Arrow, Cleanse, Clethodim, Dakota, Intensity, Select, Section, Shadow, Volunteer 2L****4-5.33 oz Section Three, Shadow 3EC (0.09-0.12 lb ai)**

POST: Dry and succulent peas. For control of annual grasses. Rates based on pea type and grass species and height. Use high rate for heavy grass pressure and/or when grasses are at maximum height. Do not apply within 21 or 30 days of harvest depending on type of field pea. Use COC (1 qt/A for ground or at least 1 pt/A for air) for the 2L or 3L products and NIS (0.25% v/v) for the 0.97L products. AMS or UAN are also recommended with some products; individual labels vary. Apply before bloom. Do not make more than one application per year.

For dry black-eyed, cowpea, southern, and crowder peas; may apply higher rates (9-32 oz 1L, 6-16 oz 2L, or 4-10.67 oz 3L). Allow 14 days between applications.

PARAQUAT PRODUCTS (paraquat) Site of Action: 22 Restricted Use Pesticide**(\$2.30-5.15)****1.2-2 pt paraquat 2L (0.3-0.5 lb ai)****0.8-1.3 pt paraquat 3L (0.3-0.48 lb ai)**

Paraquat is available in several brand name products including **Gramoxone 2.0 or Cyclone 2SL, Bonedry, Gramoxone 3.0, Helmquat, Paraquat, Para-Shot, Parazone, or Purgatory 3SL**, and others. Follow specific label directions for product used.

HARVEST AID: Dry peas, blackeyed peas, cow peas, crowder peas, and southern peas. Apply when at least 80% of the pods are yellowing and mostly ripe and when leaves are no more than 40% of bush type peas or 30% of vine type peas are green. Use single application of the higher rate for vining type or bush type peas with lush growth. May apply as split application to improve vine coverage. Do not make more than two applications or exceed a total of 2 pt per acre 2L or 1.3 pt per acre for 3L product. Minimum carrier is 20 gpa for ground or 5 gpa for air. Add non-ionic spreader at 0.25 %v/v. Do not harvest or graze treated fields for seven days after spraying. Follow handling precautions, as paraquat is toxic when ingested.

GLYPHOSATE PRODUCTS (glyphosate) Site of Action: 9

Glyphosate is a non-selective, translocated, foliage-applied herbicide used in reduced tillage systems. Glyphosate is applied before planting up to emergence, as a spot treatment, or as a harvest-aid desiccant in certain situations.

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

Glyphosate Concentration	Trade Names
3 ae, 4 ai	Credit 41 Extra, GlyStar Gold, Honcho Plus, Cornerstone Plus, Buccaneer (Plus)
4 ae, 5.4 ai	Cornerstone 5 Plus, Durango DMA
4.5 ae, 5.5 ai	Abundit Edge, Roundup PowerMax, Roundup WeatherMax
4.5 ae, 5.83 ai	Credit Xtreme
5 ae	Buccaneer 5, Touchdown HiTech

Some products require the addition of NIS; AMS products at the equivalent rate of 8.5 to 17 lb/100 gal are required for most formulations. Rates vary with weed spectrum and weed size. Check crop use rates and application directions on the product being used.

BURNDOWN: Not all products are labeled for burndown, check individual label. Weeds should be actively growing. Avoid tillage for one-day after treating annual weeds and three to seven days for perennials. Some products contain adequate surfactant; others require NIS additive. AMS at 8.5 to 17 lb/100 gal is required. Carrier is 3 to 40 gpa for ground and 3 to 15 gpa for air. Use caution to avoid droplet drift to non-target crops. Follow tank cleanup procedures to avoid crop damage from equipment contamination. A number of glyphosate products are labeled for dry bean burndown, refer to label for specific rate information depending on product formulation and concentration.

SPOT TREATMENT: Use a 2% solution, apply to perennial broadleaf weeds at or beyond the bud stage. Crop will be killed in treated areas. Allow a seven-day preharvest interval for spot treatment. Refer to label for specific glyphosate products, rates, and precautions.

PREHARVEST: Some products allow preharvest application, examples include: Roundup WeatherMax, Roundup PowerMax and others. Apply up to 22 oz per acre of Roundup WeatherMax at the hard dough stage or less than 30% grain moisture. Refer to specific product label for rate information depending on formulation and concentration. Ground or aerial application at 3 to 20 gpa carrier. Apply at least seven days before harvest. Make only one application per year, do not apply a spot treatment and preharvest spray on the same crop area. Do not apply to seed crop as germination and seed vigor reduction may occur. Do not feed or graze livestock with treated vines and hay. Do not apply to field (feed type) peas intended for livestock feed.

WEED CONTROL in CHICKPEAS (garbanzo beans)

Chickpea plants are short and have an open canopy. This allows weeds to be very competitive as they can grow above the crop. They are less able to suppress weeds compared to peas or lentils; therefore it is important to minimize weed problems before the crop is planted. The field's herbicide history is important to avoid crop injury from previous years' herbicides.

Chickpea should be planted only in fields which have few major weed problems, especially perennials such as quackgrass and Canada thistle. Early weed competition is more damaging to yield than later emerging weeds. Rotary hoeing and/or field cultivating in wider row spacings should be used as necessary. Avoid extensive damage to plants and cultivate when leaves and stems are dry to reduce spread of disease.

FAR-GO or AVADEX MICROACTIV (trilalate) Site of Action: 8

(\$18.85-24.25)

1.5 qt Far-go 4L or 12.5-15 lb Avadex MicroActiv, Avadex MinTill 10G (1.5 or 1.25-1.5 lb ai)

PPI: For wild oat. Apply prior to seeding or before emergence. Garbanzo bean sprouts should not exceed ¼-inch length. Apply prior to wild oat germination. Incorporate shallowly within 48 hours but do not disturb the seed. Apply lower rate for coarse and higher rate for fine textured soils. Do not graze livestock on treated crops.

TRIFLURALIN PRODUCTS (trifluralin) Site of Action: 3

(\$3.00-13.20)

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

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

Grasses and some small-seeded broadleaf weeds such as pigweed and lambsquarters are controlled. Does not control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Use lower rate on coarser and higher rate on finer soils or soil with higher organic matter. Use lower rate range in areas receiving less than 20 inches total annual rainfall or irrigation. Consult label for sensitive crops rotated in 12 months.

PPI: Apply and incorporate in the spring before planting or in the fall from September 1 to December 31. Do not apply to frozen or snow covered ground. Incorporate within 24 hours.

SONALAN (ethalfluralin) Site of Action: 3

(\$9.95-14.10)

1.5-2 pt Sonalan 3L or 5.5-7.5 lb Sonalan 10G (0.55-0.75 lb ai)

Controls certain grass and broadleaf weeds except groundcherry, nightshade, sunflower, cocklebur, and others. Use the higher rates for fall application. Use lower rates on coarse soils and higher rates on fine soils. Consult your seed dealer to make sure your pea variety is tolerant before making application. Crop injury and reduced yields may occur if applied to non-tolerant varieties. Two incorporation passes are necessary for Sonalan 10G. First incorporation should be as soon as possible (<48 hours). For best results, the second incorporation should be delayed for five days after the first. Consult label for sensitive crops rotated in 12 months. Do not graze or use treated foliage for livestock feed.

FALL: Apply and incorporate between October 1 and December 31 prior to spring planting. Apply 3L only with bulk fertilizer. Use the higher rates for fall application.

PPI: Apply and incorporate in the spring before planting.

PENDIMETHALIN PRODUCTS (pendimethalin) Site of Action: 3**(\$4.55-19.70)****1.2-3.6 pt pendimethalin 3.3L (0.5-1.5 lb ai)****2-3 pt pendimethalin 3.8L (0.95-1.43 lb ai)**

Pendimethalin is available in several brand name products; 3.3L products include **Acumen, Framework 3.3EC, PendiPro 3.3EC, Pin-Dee 3.3EC,** and **Stealth,** and 3.8L products include **AquaPen, Prowl H20,** and **Satellite Hydrocap.** Other products may be available. Formulation and use may vary. Follow directions for product used.

Excellent control of most annual grasses and fair control of small-seeded annual broadleaves such as pigweed and lambsquarters. Doesn't control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Use lower rate on coarse and higher rate on the fine textured soils. Do not apply preemergence surface treatment after planting as serious crop injury can result. Do not apply more than once per season.

FALL: 1.2 to 3.6 pts 3.3L or 2-3 pt 3.8L Apply based on soil type and organic matter and incorporate in late fall when soil temperatures are 45°F. or below, but before the ground freezes. May incorporate with rainfall, irrigation or mechanically.

PPI: 2.4-3.6 pt 3.3L or 2-3 pt 3.8L Apply up to 60 days before planting and incorporate within seven days. Adequate rainfall or mechanical incorporation required prior to planting.

S-METOLACHLOR/METOLACHLOR PRODUCTS Site of Action: 15**(\$7.35-26.95)****1-2 pt Dual II Magnum, Cinch, Brawl, Charger Basic, EverpreX, Ladem, Medal, Moccasin II Plus, StreliaS II 7.6L (0.95-1.9 lb ai) s-metolachlor****1-2 pt Helmet SPC, Parallel PCS, Stalwart 8L (1-2 lb ai) metolachlor**

S-metolachlor and metolachlor are available in several brand name products. Formulation and use may vary. Follow directions for product used.

For annual grass and some broadleaf weeds. Use low rates on coarse soils with less than 3% OM and higher rates on fine soils over 3% O.M. Do not cut for hay within 120 days or use for forage within 60 days following application. Maximum total rate is 2 pt/A (s-metolachlor) or 3 pt/A (metolachlor) per crop year.

FALL: S-metolachlor products only. Apply after September 30 when the soil is less than 55°F but before the ground freezes. For minimum-till or no-till with soils having greater than 2.5% O.M., use 1.67-2 pt/A on medium textured soils and 2 pt/A on fine textured soils. Do not incorporate deeper than 2-3 inches. NOTE: If a spring application is made, the total rate of the fall plus spring application must not exceed the maximum total rate for the specific crop or illegal residues may result.

PPI or PRE: Incorporation improves control with limited rainfall. Refer to label for specific rate information regarding soil texture and organic matter.

SEQUENCE (s-metolachlor + glyphosate) Site of Action: 15+9**(\$12.60-25.20)****2-4 pt Sequence 5.25L (0.75-1.5 + 0.56-1.13 lb ai)**

Controls labeled grasses and broadleaves. Rate varies by weeds present and weed size. Apply to actively growing weeds for burndown. For improved control of emerged weeds add AMS at 8.5-17 lb/100 gal. Do not apply more than 3.5 pt/A on coarse soils or 4 pt/A on medium soils (less than 3% O.M.) or fine soils. Make only one application per year. Do not cut for hay within 120 days of application. Do not graze or feed forage from treated areas. May be tank-mixed with other labeled herbicides.

EPP or PRE: Apply before crop emergence.

AUTHORITY ELITE, BROADAXE XC or SPARTAN ELITE (s-metolachlor + sulfentrazone) Site of Action: 15+14

19-38.7 oz Authority Elite, BroadAxe XC or Spartan Elite 7L (0.94-1.9 + 0.1-0.21 lb ai) (\$15.55-31.60)

BroadAxe XC controls some broadleaves and grasses. Rate depends on soil texture, organic matter and pH. Use lower rates on soils with pH >7.2. Do not apply to coarse soil with less than 1.5% O.M. Do not apply to sand soils with less than 1% O.M. Adequate moisture (0.5-1 in.) is needed to activate the herbicide. Maximum use rate of 38.7 oz/A per year. Do not apply other sulfentrazone products during the same year as BroadAxe XC. Do not apply after the crop emerges. Do not use for forage within 60 days or cut for hay within 120 days after application.

Dry shelled peas, soybeans, and sunflowers can be planted anytime. Rotation interval is four months for corn and potatoes; four and a half months for barley, rye, and wheat; 10 months for sorghum; 12 months for alfalfa, oat, and pearl or proso millet; 36 months for sugarbeets; and 12 months for most other crops with a successful bioassay.

FALL: Apply after harvest without incorporation when the soil temperature is 55°F or below but before the ground freezes. In South Dakota apply after September 30. May be tank-mixed with other labeled herbicides. Do not apply to frozen or snow covered soils.

EPP or PRE: Can be applied up to three days after planting if seedlings have not begun to crack the surface. A shallow incorporation may be needed if adequate moisture is not received within seven to 10 days after application. Tank-mix with Aim, glyphosate, or other labeled burndown herbicide to control emerged weeds.

PPI: Incorporate no deeper than 2 inches.

SPARTAN, ANTARES, BLANKET, HM-1512 AG, SULFIN (sulfentrazone) Site of Action: 14 (\$3.15-15.40)

2.25-8 oz Spartan, Antares, Blanket, HM-1512 AG, Sulfin 4SC 4F (0.07-0.25 lb ai)

Spartan is a soil-applied herbicide with root and shoot activity. Spartan is used primarily for annual broadleaf weeds including pigweed, kochia (including ALS resistant), and black nightshade. Fair to good control of wild buckwheat and lambsquarters is possible under favorable conditions. Activity on biennial wormwood has been reported. Rates vary with soil texture, O.M. and pH. Lower rate is for coarse soil with low O.M. and pH > 7.0. Crop tolerance is very good. Requires precipitation for activation. Minimum carrier is 10 gpa for ground equipment. Do not apply more than 8 oz per acre per year. Crop response may occur on coarse soils with less than 1.5% O.M. and pH ≥7.8. Do not apply to sand soils with less than 1% O.M.

FALL: Do not mechanically incorporate or apply to frozen soil. Use a mid to high rate that is appropriate for your soil type. If weeds emerge prior to application, add glyphosate (e.g. Roundup) or paraquat (e.g. Gramoxone).

EPP or PRE: Apply up to three days after planting before emergence with a closed furrow. The high rate is suggested for heavy soil, especially if applied long before planting. Tank-mix with glyphosate or other labeled herbicide for broad spectrum weed control.

PPI: Do not incorporate more than 2 inches.

SPARTAN CHARGE (carfentrazone + sulfentrazone) Site of Action: 14+14 (\$7.80-26.55)

3-10.2 oz Spartan Charge 3.5L (0.008-0.03 + 0.07-0.25 lb ai)

Spartan Charge controls broadleaf weeds. Rates vary with soil texture, O.M., and pH. Do not apply more than 10.2 oz/A Spartan Charge per year. Crop response may occur on coarse soils with less than 1.5% O.M. and pH ≥7.8. Spartan Charge should be used at reduced rates or not at all in these areas. Do not apply to sand soils with less than 1% O.M.

Dry shelled peas, soybeans, and sunflowers can be planted anytime. Rotation interval is four months for barley, field corn, dry shelled beans, potatoes, rye, and wheat; 10 months for sorghum; 12 months for alfalfa, and oats; 24 months for canola, crambe, and sugarbeets; and 12 months for most other crops with a successful bioassay.

FALL: Do not mechanically incorporate or apply to frozen or snow covered soil. Use a mid to high rate that is appropriate for your soil type and organic matter. If weeds emerge prior to application, add glyphosate (e.g. Roundup) or paraquat (e.g. Gramoxone).

EPP or PRE: Apply up to three days after planting. Do not apply after crop emergence. Best results when applied greater than 14 days early preplant on coarse soils. Adequate moisture (0.5-1 in.) is required for activation.

TANK-MIXES: Tank-mix with glyphosate or other labeled herbicide for broad spectrum weed control.

3.3-11.7 oz Authority Edge (0.07-0.25 + 0.04-0.14 lb ai)**4.3-15.4 oz Authority Supreme (0.07-0.25 + 0.07-0.25 lb ai)**

Authority Edge contains 2.73 lb sulfentrazone and 1.52 lb pyroxasulfone per gallon and Authority Supreme contains 2.08 lb sulfentrazone and 2.08 lb pyroxasulfone per gallon. Control certain broadleaf, grass, and sedge weeds. Within seven to 10 days after application, 0.5-1 inches of rain is needed to activate herbicide. Rates vary depending on soil texture, O.M., and pH. Do not use on sand soils with less than 1% O.M. Do not apply after germination of crop. Before application ensure your variety is tolerant. Maximum use rate is 11.71 oz Authority Edge or 15.4 oz Authority Supreme per year. May apply two applications per year with seven days between applications. May plant dry shelled peas, soybeans or sunflowers anytime. Rotation varies by use rate for each crop, refer to label for other crop rotations.

FALL: Apply when the soil temperature is less than 55 degrees F. Do not apply to frozen or snow covered soils.

PPS, PPI, PRE: Apply up to three days after planting but before crop emergence. May be incorporated uniformly no deeper than 2 inches. For coarse textured soils with less than 1.5% O.M. wait seven to 14 days after application before planting.

SHARPEN (saflufenacil) Site of Action: 14**(\$6.90-13.80)****1-2 oz Sharpen 2.85L (0.02-0.04 lb ai)**

EPP or PRE: For use as a burndown before crop emergence to control broadleaf weeds. Delayed emergence or stunting may occur if furrow is not closed and under certain environmental conditions. Check seed variety for sensitivity to Sharpen before applying. Requires at least 0.5 inch of moisture for activation. Add MSO at 1 % v/v and AMS (8.5-17 lb/100 gal) or UAN at 1.25-2.5 % v/v. Sequential applications can be made after 14 days (1 oz) or 30 days (2 oz). Do not apply more than 4 oz/A per cropping season in chickpeas. Supplemental labeling allows tank-mixing with Group 14 herbicides.

HARVEST AID: For use on chickpea (garbanzo bean) as a harvest aid. Apply to mature crop when at least 80% of the pods are yellowing and mostly ripe with no more than 40% (bush type) or 30% (vine type) of leaves are green. Do not harvest within two days of application, however for optimum desiccation allow up to 10 days. Do not use more than 2 oz/A per cropping season. Do not apply to dry edible beans grown for seed. Do not graze or feed treated hay or straw.

At rates up to 2 oz/A corn, sorghum, small grains, chickpea, and field pea can be planted anytime; edible pea and lentil after one month, soybean after one to one and a half months; sugarbeet, sunflowers, and other crops after five months. This does not include the time while the soil is frozen. Consult label for higher rates and crops not specified.

OPTILL (imazethapyr + saflufenacil) Site of Action: 2+14**(\$13.15)****1.5 oz Optill 68WDG (0.047 + 0.017 lb ai)**

Optill controls grasses and broadleaves. Add MSO at 1 % v/v and AMS (8.5-17 lb/100 gal) or UAN at 1.25-2.5 % v/v. Requires at least 0.5 inch of moisture for activation. Make only one application per season. May tank-mix with other labeled herbicides for additional weed control. Do not apply as a tank-mix or sequentially with other Group 14 herbicides within 30 days of planting. Do not feed or graze forage or hay for 65 days.

At 1.5 oz/A chickpeas and peas may be planted anytime, lentil may be planted after one month and barley after four months. Rotation intervals for rates up to 2 oz/A are zero to one month for soybeans; three months for Clearfield wheat; four months for alfalfa, edible beans and peas, and wheat; four to 18 months for rye; eight and a half months for field corn; nine and a half months for barley, Clearfield canola, and Clearfield sunflower; 18 months for oats, safflower, sorghum, and sunflower; 26 months for flax and potatoes; and 40 months for most other crops with a successful bioassay.

EPP: Apply up to 30 days before planting. Residual control may be reduced when applied more than 14 days before planting.

PPI: Apply up to one week before planting. Incorporate at 3 inches or less.

PRE: Apply up to three days after planting but before crop emergence. Severe crop injury will occur if crop has reached cracking stage or emerged.

ANTHEM FLEX (pyroxasulfone + carfentrazone) Site of Action: 15 + 14**(\$15.10-27.40)****2.75-5 oz Anthem Flex 4L (0.08-0.15 + 0.006-0.01 lb ai)**

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

Do not apply to coarse soils. Allow 14 days between applications. May apply a maximum of three applications per year. Do not apply more than 0.266 lb ai/A of pyroxasulfone or 0.096 lb ai/A of carfentrazone per year.

FALL: Do not apply to frozen or snow covered soil.

EPP: Apply up to 30 days before planting.

PRE: Apply before cracking or emergence.

PURSUIT, PRAXIS, THUNDER (imazethapyr) Site of Action: 2**(\$3.40-10.80)****2-3 oz Pursuit, Praxis, Thunder 2L (0.03-0.047 lb ai)**

For control of certain broadleaf weeds and some annual grasses. Allow 60 days between application and harvest. Do not make more than one application per year. Labeler assumes no risk for crop injury, loss, or damage when used on edible legume crops. The decision to use or not to use this product on edible legume crops is solely that of the grower.

PPI: Apply and incorporate within one week of planting.

PRE: Apply immediately after or up to three days after planting.

TANK-MIX: Pursuit may be applied in a tank-mix with a registered grass herbicide or applied preemergence following preplant incorporated application of a registered grass herbicide.

OUTLOOK, SLIDER (dimethenamid-p) Site of Action: 15**(\$14.75-25.80)****12-21 oz Outlook, Slider 6L (0.56-1 lb ai)**

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. Emerged weeds are not controlled.

May be applied in a single or split application, rates are based on soil texture and organic matter. May occasionally result in temporary spotting or browning of dry bean leaves. Consult with your seed dealer for restrictions on specific varieties to avoid potential injury due to sensitivity to Outlook. In South Dakota see Sec. 24(c) label for list of vulnerable soil types where application is prohibited when ground water is within 30 feet from the surface. Minimum carrier is 5 gpa for ground or 2 gpa for air. There are no crop rotation restrictions for the next season. Winter wheat can be planted four months after application. Garbanzo beans may be harvested 70 days after application.

PPS or PRE: Do not incorporate for garbanzo beans. Use a maximum of 12 fl oz per acre on coarse soils with less than 1.5% O.M.

TANK-MIXES: Tank-mix combinations control a broader spectrum of weeds than either product used separately. Refer to product label of tank-mix partner for specific restrictions. May be tank-mixed or applied sequentially in garbanzo beans with one or more of the following herbicides according to the specific tank-mixing label instructions: Gramoxone, Poast, Prowl, Pursuit, and glyphosate. The most restrictive labeling applies to tank-mixes. The following herbicide products may only be applied sequentially: Dual Magnum, Dual II Magnum.

AIM (carfentrazone) Site of Action: 14**(\$3.20-12.70)****0.5-2 oz Aim EC 2L (0.008-0.031 lb ai)**

Aim is a contact herbicide often used to improve weed control with glyphosate (e.g. Roundup). It controls ALS or normal kochia, redroot pigweed, nightshade, and lambquarters. Weeds should be small for best results, stressed or large weeds are affected less.

PREPLANT BURNDOWN: Rate is up to 2 oz/A alone or 0.5-1 oz/A with other labeled herbicide tank-mix partners prior to planting or within 24 hours after planting. Coverage is essential for good control. May plant immediately after application. Do not apply more than 2 fl oz/A prior to planting or more than 6.1 oz/A during the growing season.

HOODED SPRAYER APPLICATIONS: Aim may be used at rates up to 2 fl oz per acre applied with hooded sprayers to control labeled weeds between the rows of dry bean, field pea, chickpea, and lentil. Hooded sprayers must be designed, adjusted, and operated in a manner to totally enclose the spray pattern and prevent any spray deposition to green stem tissue, foliage, blooms, or fruit of crop. Add NIS (0.25% v/v), COC (1-2% v/v), or MSO (1-2% v/v) and either a liquid nitrogen fertilizer (2-4% v/v) or AMS (2-4 lb/A).

FLUMIOXAZIN PRODUCTS (flumioxazin) Site of Action: 14**(\$7.50-16.40)****3 oz Valor, Flumi 51WDG, Flumi SX, Outflank, Panther 51WDG (0.095 lb ai)****3 oz Valor EZ, Panther SC 4L (0.094 lb ai)**

Use 15-30 gpa to ensure thorough coverage. COC or MSO at 2% v/v may be used (MSO preferred). AMS or 28% N may also be used to enhance desiccation. Do not harvest within five days of application. Do not apply more than 3 oz/A in a single application or a growing season.

HARVEST AID: Apply up to 3 oz to mature crop when a minimum of 80% of the pods are yellowing and mostly ripe with no more than 40% green leaves.

TANK-MIX: Can be tank-mixed with glyphosate, paraquat, or other labeled burndown herbicide to increase control of emerged weeds.

VIDA (pyraflufen) Site of Action: 14**(\$2.05-8.25)****0.5-2 oz Vida 0.208L (0.0008-0.003 lb ai)**

PREPLANT BURNDOWN: For broadleaf weed control up to 4 inches tall or 3 inches in diameter. Apply with other labeled herbicides. Use the higher rate for difficult weeds. Rotation interval is one day for chickpea. Add NIS (0.25%) or COC (1%) for optimum weed control. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not exceed three applications or 5.5 oz/A per season.

POAST (sethoxydim) Site of Action: 1**(\$7.10-35.50)****0.5-2.5 pt Poast 1.5L (0.1-0.5 lb ai)**

POST: For annual and perennial grass control, does not control sedges. Refer to label for rates according to weed size and species. Maximum rate per application is 2.5 pt per acre and maximum per season is 4 pt per acre. Do not apply when air temperature exceeds 90°F. and relative humidity is 60% or greater. Add COC (2 pt) or MSO (1.5 pt). May also add AMS or UAN. Allow 30 days after application to harvest. No grazing or feeding restrictions.

ASSURE II, QUIZ, SE-CURE, TARGA (quizalofop) Site of Action: 1**(\$3.95-9.80)****5-12 fl oz Assure II, Quiz, Se-Cure, Targa EC 0.88L (0.035-0.08 lb ai)**

POST: Controls annual grasses and quackgrass. Maximum rate per season is 24 oz/A for Assure II or Se-Cure or 28 oz/A for Targa or Quiz. Minimum carrier is 10 gpa for ground application or 3 gpa for aerial application; do not apply through irrigation systems. Use COC (1% v/v ground, 0.5% v/v air) or NIS (0.25% v/v). May also add UAN (2 qt/A) or AMS (2 lb/A). Do not apply within 30 days of harvest. Allow seven days between applications.

CLETHODIM PRODUCTS (clethodim) Site of Action: 1**(\$3.50-27.40)****9-32 oz Select Max, Intensity One, Tapout 1L (0.07-0.25 lb ai)****6-16 oz Arrow, Cleanse, Clethodim, Dakota, Intensity, Shadow, Select 2EC, Section 2EC, Volunteer 2L****4-10.67 oz Section Three, Shadow 3EC (0.09-0.25 lb ai)**

POST: For control of annual grasses. Rates based on grass species and height. Use high rate for heavy grass pressure and/or when grasses are at maximum height. Use COC (1 qt/A for ground or at least 1 pt/A for air) for the 2L or 3L products and NIS (0.25% v/v) for the 0.97L products. AMS or UAN are also recommended with some products; individual labels vary. For repeat applications, allow a minimum of a 14-day interval. Do not apply within 30 days of harvest.

PARAQUAT PRODUCTS (paraquat) Site of Action: 22 Restricted Use Pesticide**(\$2.30-5.15)****1.2-2 pt paraquat (0.3-0.5 lb ai)****0.8-1.3 pt paraquat 3L (0.3-0.48 lb ai)**

Paraquat is available in several brand name products including **Gramoxone 2.0 or Cyclone 2SL, Bonedry, Gramoxone 3.0, Helmquat, Paraquat, Para-Shot, Parazone, or Purgatory 3SL**, and others. Follow specific label directions for product used.

HARVEST AID: Apply when at least 80% of the pods are yellowing and mostly ripe. May apply as split application to improve vine coverage. Do not make more than two applications or exceed a total of 2 pt per acre 2L or 1.3 pt per acre for 3L product. Minimum carrier is 20 gpa for ground or 5 gpa for air. Add non-ionic spreader at 0.25 % v/v. Do not harvest or graze treated fields for seven days after spraying. Follow handling precautions, as paraquat is toxic when ingested.

GLYPHOSATE PRODUCTS (glyphosate) Site of Action: 9

Glyphosate is a non-selective, translocated, foliage-applied herbicide used in reduced tillage systems. Glyphosate is applied before planting up to emergence, as a spot treatment, or as a harvest-aid desiccant in certain situations.

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

Glyphosate Concentration	Trade Names
3 ae, 4 ai	Credit 41 Extra, GlyStar Gold, Honcho Plus, Cornerstone Plus, Buccaneer (Plus)
4 ae, 5.4 ai	Cornerstone 5 Plus, Durango DMA
4.5 ae, 5.5 ai	Abundit Edge, Roundup PowerMax, Roundup WeatherMax
4.5 ae, 5.83 ai	Credit Xtreme
5 ae	Buccaneer 5, Touchdown HiTech

Some products require the addition of NIS; AMS products at the equivalent rate of 8.5 to 17 lb/100 gal are required for most formulations. Rates vary with weed spectrum and weed size. Check crop use rates and application directions on the product being used.

BURNDOWN: Not all products are labelled for burndown, check individual label. Weeds should be actively growing. Avoid tillage for one-day after treating annual weeds and three to seven days for perennials. Some products contain adequate surfactant; others require NIS additive. AMS at 8.5 to 17 lb/100 gal is required. Carrier is 3 to 40 gpa for ground and 3 to 15 gpa for air. Use caution to avoid droplet drift to non-target crops. Follow tank cleanup procedures to avoid crop damage from equipment contamination. A number of glyphosate products are labeled for dry bean burndown, refer to label for specific rate information depending on product formulation and concentration.

SPOT TREATMENT: Use a 2% solution, apply to perennial broadleaf weeds at or beyond the bud stage. Crop will be killed in treated areas. Allow a seven-day preharvest interval for spot treatment. Refer to label for specific glyphosate products, rates, and precautions.

PREHARVEST: Some products allow preharvest application, examples include: Roundup WeatherMax, Roundup PowerMax, and others. Apply up to 22 oz per acre of Roundup WeatherMax at the hard dough stage or less than 30% grain moisture. Refer to specific product label for rate information depending on formulation and concentration. Ground or aerial application at 3 to 20 gpa carrier. Apply at least seven days before harvest. Make only one application per year, do not apply a spot treatment and preharvest spray on the same crop area. Do not apply to seed crop as germination and seed vigor reduction may occur. Do not feed or graze livestock with treated vines and hay. Do not apply to chickpea grain intended for livestock feed.

WEED CONTROL in LENTIL

Lentils are a short crop with a sparse crop canopy, especially as seedlings. This makes it a poor competitor with most weeds. Yield losses due to weeds can be severe. Lentils are susceptible to weed problems that may not be important to other crops. Low growing weeds are very competitive and losses can be severe.

Harrowing or rotary hoeing after emergence is recommended only if there is a serious weed problem. Because of the slender early stem growth, the plants are easily damaged at this time. If harrowing or hoeing is planned, be sure to use the recommended seeding rates because the plant stand will be reduced slightly. Rotary hoeing is normally done seven to 10 days after seeding.

FAR-GO or AVADEX MICROACTIV (triallate) Site of Action: 8

(\$18.85-24.25)

1.5 qt Far-go 4L or 12.5-15 lb Avadex MicroActiv, Avadex MinTill 10G (1.5 or 1.25-1.5 lb ai)

PPI: For wild oat. Apply up to three weeks before seeding or after seeding before sprouts are ¼ inch long. Apply prior to wild oat germination. Incorporate shallowly within 48 hours, but do not disturb the seed. Apply lower rate for coarse and higher rate for fine textured soils. Do not graze livestock on treated crops.

PENDIMETHALIN PRODUCTS (pendimethalin) Site of Action: 3

(\$4.55-19.70)

1.2-3.6 pt pendimethalin 3.3L (0.5-1.5 lb ai)

1.5-3 pt pendimethalin 3.8L (0.71-1.43 lb ai)

Pendimethalin is available in several brand name products; 3.3L products include **Acumen, Framework 3.3EC, PendiPro 3.3EC, Pin-Dee 3.3EC,** and **Stealth,** and 3.8L products include **AquaPen, Prowl H20,** and **Satellite Hydrocap.** Other products may be available. Formulation and use may vary. Follow directions for product used.

Excellent control of most annual grasses and fair control of small-seeded annual broadleaves such as pigweed and lambsquarters. Doesn't control mustard, nightshade, smartweed, or large-seeded annual broadleaves. Use lower rate on coarse and higher rate on fine textured soils. Do not apply to lentils or lentil forage grown for livestock feed. Do not apply more than once per growing season. Do not apply preemergence surface treatment after planting as serious crop injury can result.

FALL: 1.2-3.6 pt 3.3L or 1.5-3 pt 3.8L Apply based on soil type and organic matter and incorporate in late fall when soil temperatures are 45°F. or below, but before the ground freezes. May incorporate with rainfall, irrigation or mechanically.

PPI: 1.8-3.6 pt 3.3L or 1.5-3 pt 3.8L Apply preplant and incorporate up to 60 days before planting. Adequate rainfall or mechanical incorporation required prior to planting.

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

(\$14.75-25.80)

12-21 oz Outlook, Slider 6L (0.56-1 lb ai)

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. Emerged weeds are not controlled.

May be applied in a single or split application, rates are based on soil texture and organic matter. May occasionally result in temporary spotting or browning of crop leaves. Consult with your seed dealer for restrictions on specific varieties to avoid potential injury due to sensitivity. In South Dakota see Sec. 24(c) label for list of vulnerable soil types where application is prohibited when ground water is within 30 feet from the surface. Minimum carrier is 5 gpa for ground or 2 gpa for air. There are no crop rotation restrictions for the next season. Winter wheat can be planted four months after application. Lentils may be harvested 70 days after application.

PPS or PRE: Do not incorporate for lentils. Use a maximum of 12 fl oz per acre on coarse soils with less than 1.5% O.M.

TANK-MIXES: Tank-mix combinations control a broader spectrum of weeds than either product used separately. Refer to product label of tank-mix partner for specific restrictions. May be tank-mixed or applied sequentially in lentils with one or more of the following herbicide products according to the specific tank-mixing label instructions: Gramoxone, Poast, Prowl, Pursuit, and glyphosate. The most restrictive labeling applied to tank-mixes. Dual II Magnum may only be applied sequentially with dimethenamid.

S-METOLACHLOR/METOLACHLOR PRODUCTS *Site of Action: 15***(\$7.35-26.95)****1-2 pt Dual II Magnum, Brawl, Charger Basic, EverpreX, Ladem, Medal, Moccasin II Plus, StreliaS II 7.6L (0.95-1.9 lb ai) s-metolachlor****1-2 pt Helmet SPC, Stalwart, Parallel PCS 8L (1-2 lb ai) metolachlor**

S-metolachlor and metolachlor are available in several brand name products. Formulation and use may vary. Follow directions for product used.

For annual grass and some broadleaf weeds. Use low rates on coarse soils with less than 3% O.M. and higher rates on fine soils over 3% O.M. Do not cut for hay within 120 days and do not use for forage within 60 days following application. Do not apply more than 2 pt/A s-metolachlor or 3 pt/A metolachlor per crop year.

FALL: S-metolachlor products only. Apply after September 30 when the soil is less than 55°F but before the ground freezes. For minimum-till or no-till with soils having greater than 2.5% O.M., use 1.67-2 pt/A on medium textured soils and 2 pt/A on fine textured soils. Do not incorporate deeper than 2-3 inches. NOTE: If a spring application is made, the total rate of the fall plus spring application must not exceed the maximum total rate for the specific crop or illegal residues may result.

PPI or PRE: Incorporation improves control with limited rainfall. Refer to label for specific rate information regarding soil texture and organic matter.

ANTHEM FLEX (pyroxasulfone + carfentrazone) *Site of Action: 15 + 14***(\$15.10-27.40)****2.75-5 oz Anthem Flex 4L (0.08-0.15 + 0.006-0.01 lb ai)**

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

Do not apply to coarse soils. Allow 14 days between applications. May apply a maximum of three applications per year. Do not apply more than 0.266 lb ai/A of pyroxasulfone or 0.096 lb ai/A of carfentrazone per year. Do not apply Sharpen or any other saflufenacil product before, after or with Anthem Flex on lentils.

FALL: Do not apply to frozen or snow covered soil.

EPP: Apply up to 30 days before planting.

PRE: Apply before cracking or emergence.

AIM (carfentrazone) *Site of Action: 14***(\$3.20-12.70)****0.5-2 oz Aim EC 2L (0.008-0.031 lb ai)**

Aim is a contact herbicide often used to improve weed control with glyphosate (e.g. Roundup). It controls ALS or normal kochia, redroot pigweed, nightshade, and lambsquarters. Weeds should be small for best results, stressed or large weeds are affected less.

PREPLANT BURNDOWN: Rate is up to 2 oz/A alone or 0.5-1 oz/A with other labeled herbicide tank-mix partners prior to planting or within 24 hours after planting. Coverage is essential for good control. May plant immediately after application. Do not apply more than 2 fl oz/A prior to planting or more than 6.1 oz/A during the growing season.

HOODED SPRAYER APPLICATIONS: Aim may be used at rates up to 2 fl oz per acre applied with hooded sprayers to control labeled weeds between the rows of dry bean, field pea, chickpea, and lentil. Hooded sprayers must be designed, adjusted, and operated in a manner to totally enclose the spray pattern and prevent any spray deposition to green stem tissue, foliage, blooms, or fruit of crop. Add NIS (0.25% v/v), COC (1-2% v/v), or MSO (1-2% v/v) and either a liquid nitrogen fertilizer (2-4% v/v) or AMS (2-4 lb/A).

FLUMIOXAZIN PRODUCTS (flumioxazin) Site of Action: 14**(\$3.75-10.95)****1.5-2 oz Valor, Flumi 51WDG, Flumi SX, Outflank, Panther 51WDG (0.047-0.06 lb ai)****1.5-2 oz Valor EZ, Panther SC 4L (0.047-0.06 lb ai)**

HARVEST AID: Apply to mature lentil when a minimum of 80% of the pods are yellow to tan and 20% are yellow. May see a reduction in seed quality if applied too early. Use 15-30 gpa to ensure thorough coverage. Add MSO at 1 qt/A (2% v/v for Outflank and Panther WDG). AMS (2-2.5 lb/A) or UAN (1-2 qt/A) may also be added. Do not harvest within five days of application. Do not apply more than 3 oz/A in a single application or a growing season. Can be tank-mixed with glyphosate or paraquat to increase control of emerged weeds.

At rates up to 2 oz, corn (conventional tillage), sorghum, sunflower, and wheat can be planted after one month with 1 inch rainfall. Barley, dry bean, flax, peas, rye, and safflower after three months. Alfalfa, canola, clover, and oats after four months if soil is tilled before planting or eight months for no-till. Interval for lentil is six months. Most other crops are four months (if tilled) or eight months (no-till) and a successful soil bioassay. Consult label for rates greater than 2 oz/acre.

DIMETRIC EXT (metribuzin) Site of Action: 5**(\$4.75-6.25)****0.25-0.33 lb Dimetric EXT 75DF (0.19-0.25 lb ai)**

Dimetric EXT has a 24(c) label for South Dakota. Provides excellent control of small-seeded annual broadleaves and fair to good control of certain large-seeded broadleaves. Use the higher rate for fine textured soils or high weed populations. Minimum carrier is 10 gpa for ground applications.

May cause some chlorosis or minor necrosis to the crop. Do not apply to Estin lentils. Cold, wet soil conditions increase the risk of injury. Do not use on coarse-textured soils, sandy soils or soils with less than 1.5% O.M. Do not use on clay knobs or poorly covered subsoils.

PPS: Apply before planting. For optimum weed control; incorporation, by rainfall or mechanically (1-2 inches), is needed.

SHARPEN (saflufenacil) Site of Action: 14**(\$5.20-13.80)****0.75-2 oz Sharpen 2.85L (0.016-0.04 lb ai)**

For green-type and red-type lentils. Do not apply to Spanish brown lentils. Rate depends on application timing. Sharpen provides broadleaf weed control. May cause crop injury (usually necrosis on leaf edges) depending on rainfall, soil type, seeding depth, or variety; however crop will recover without yield loss. Coarse textured and low organic matter soils are more likely to show lentil injury. Do not tank-mix or apply sequentially (within 30 days) with soil residual herbicides as it may increase crop sensitivity. Do not graze or feed forage for 65 days.

Allow a minimum of 14 days between sequential applications. Maximum rate is 2 oz/A per season. Minimum carrier is 5 gpa for ground and 3 gpa for air. For optimum burndown add MSO (1% v/v) and AMS (8.5-17 lb/100 gal) or UAN (1.25-2.5 gal/100 gal).

EPP or PRE: Apply 0.75 oz before crop emergence.

PPI: Apply 0.75-2 oz and incorporate.

VIDA (pyraflufen) Site of Action: 14**(\$2.05-8.25)****0.5-2 oz Vida 0.208L (0.0008-0.003 lb ai)**

PREPLANT BURNDOWN: For broadleaf weed control up to 4 inches tall or 3 inches in diameter. Apply with other labeled herbicides. Use the higher rate for difficult weeds. Rotation interval is one-day for lentils. Add NIS (0.25%) or COC (1%) for optimum weed control. Minimum carrier is 10 gpa for ground or 5 gpa for air. Do not exceed three applications or 5.5 oz/A per season.

PURSUIT, PRAXIS, THUNDER (imazethapyr) Site of Action: 2

(\$3.40-10.80)

2-3 oz Pursuit, Praxis, Thunder 2L (0.03-0.047 lb ai)

For control of certain broadleaf weeds and some annual grasses. Labeler assumes no risk for crop injury, loss, or damage when used on edible legume crops. The decision to use or not to use this product on edible legume crops is solely that of the grower. Allow at least 60 days between application and harvest. Do not make more than one application per year.

PPI: Apply preplant within one week of planting.

PRE: Apply immediately after or up to three days after planting.

TANK-MIX: Pursuit may be applied in a tank-mix with a registered grass herbicide or applied preemergence following a preplant incorporated application of a registered grass herbicide.

ASSURE II, QUIZ, SE-CURE, TARGA (quizalofop) Site of Action: 1

(\$3.95-9.80)

5-12 oz Assure II, Quiz, Se-Cure, Targa EC 0.88L (0.035-0.08 lb ai)

POST: Annual grass and quackgrass from 2 to 6 inches tall. Apply with COC at 1% v/v or NIS at 0.25% v/v. May also add UAN (2 qt/A) or AMS (2 lb/A). Maximum use rate per season is 14 oz/acre. Do not apply within 60 days of harvest. Application intervals should be greater than seven days apart to allow for regrowth.

POAST (sethoxydim) Site of Action: 1

(\$7.10-35.50)

0.5-2.5 pt Poast 1.5L (0.1-0.5 lb ai)

POST: Annual grasses (2-4 inches). Add COC (2 pt) or MSO (1.5 pt). May also add AMS or UAN. Apply to actively growing grasses. Do not apply when air temperature exceeds 90°F. and relative humidity is 60% or greater. Do not graze or hay vines for livestock feed. Allow 50 days from application before harvest. Maximum rate per application is 2.5 pt per acre and maximum rate per season is 4 pt per acre.

CLETHODIM PRODUCTS (clethodim) Site of Action: 1

(\$3.50-27.40)

9-32 oz Select Max, Intensity One, Tapout 1L (0.07-0.25 lb ai)

6-16 oz Arrow, Cleanse, Dakota, Intensity, Section, Select, Shadow, Volunteer 2L (0.09-0.25 lb ai)

4-10.67 oz Section Three, Shadow 3EC (0.09-0.25 lb ai)

POST: For control of annual grasses. Rates based on grass species and height. Use high rate for heavy grass pressure and/or when grasses are at maximum height. Use COC (1 qt/A for ground or at least 1 pt/A for air) for the 2L or 3L products and NIS (0.25% v/v) for the 0.97L products. AMS or UAN are also recommended with some products; individual labels vary. Do not apply within 30 days of harvest. For repeat applications allow a minimum of a 14-day interval.

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

(\$2.30-5.15)

1.2-2 pt paraquat 2SL (0.3-0.5 lb ai)

0.8-1.3 pt paraquat 3L (0.3-0.48 lb ai)

Paraquat is available in several brand name products including **Gramoxone 2.0 or Cyclone 2SL, Bonedry, Gramoxone 3.0, Helmquat, Paraquat, Para-Shot, Parazone, or Purgatory 3SL**, and others. Follow specific label directions for product used.

HARVEST AID: Apply when at least 80% of the pods are yellowing and mostly ripe and no more than 30% of the leaves are green. May apply as split application to improve vine coverage. Do not make more than two applications or exceed a total of 2 pt per acre 2L or 1.3 pt per acre for 3L product. Minimum carrier is 20 gpa for ground or 7 gpa (5 gpa for Purgatory) for air. Add non-ionic spreader at 1 qt/100 gal spray mix. Do not harvest or graze treated fields for seven days after spraying. Follow handling precautions, as paraquat is toxic when ingested.

GLYPHOSATE PRODUCTS (glyphosate) Site of Action: 9

Glyphosate is a non-selective, translocated, foliage-applied herbicide used in reduced tillage systems. Glyphosate is applied before planting up to emergence, as a spot treatment, or as a harvest-aid desiccant in certain situations.

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

Glyphosate Concentration	Trade Names
3 ae, 4 ai	Credit 41 Extra, GlyStar Gold, Honcho Plus, Cornerstone Plus, Buccaneer (Plus)
4 ae, 5.4 ai	Cornerstone 5 Plus, Durango DMA
4.5 ae, 5.5 ai	Abundit Edge, Roundup PowerMax, Roundup WeatherMax
4.5 ae, 5.83 ai	Credit Xtreme
5 ae	Buccaneer 5, Touchdown HiTech

Some products require the addition of NIS; AMS products at the equivalent rate of 8.5 to 17 lb/100 gal are required for most formulations. Rates vary with weed spectrum and weed size. Check crop use rates and application directions on the product being used.

BURNDOWN: Not all products are labelled for burndown, check individual label. Weeds should be actively growing. Avoid tillage for one-day after treating annual weeds and three to seven days for perennials. Some products contain adequate surfactant; others require NIS additive. AMS at 8.5 to 17 lb/100 gal is required. Carrier is 3 to 40 gpa for ground and 3 to 15 gpa for air. Use caution to avoid droplet drift to non-target crops. Follow tank cleanup procedures to avoid crop damage from equipment contamination. A number of glyphosate products are labeled for dry bean burndown, refer to label for specific rate information depending on product formulation and concentration.

SPOT TREATMENT: Use a 2% solution, apply to perennial broadleaf weeds at or beyond the bud stage. Crop will be killed in treated areas. Allow a seven-day preharvest interval for spot treatment. Refer to label for specific glyphosate products, rates, and precautions.

PREHARVEST: Some products allow preharvest application, examples include: Roundup WeatherMax, Roundup PowerMax, and others. Apply up to 22 oz per acre of Roundup WeatherMax at the hard dough stage or less than 30% grain moisture. Refer to specific product label for rate information depending on formulation and concentration. Ground or aerial application at 3 to 20 gpa carrier. Apply at least seven days before harvest. Make only one application per year, do not apply a spot treatment and preharvest spray on the same crop area. Do not apply to seed crop as germination and seed vigor reduction may occur. Do not feed or graze livestock with treated vines and hay. Do not apply to lentil grain intended for livestock feed.

CLEARFIELD LENTIL

BEYOND (imazamox) Site of Action: 2

(\$18.65-27.95)

4-6 oz Beyond 1L (0.031-0.047 lb ai)

Apply to actively growing weeds up to 3 inch broadleaf and 4-5 leaf grasses. Temporary crop stunting or chlorosis may occur but should disappear within one to two weeks. A NIS and nitrogen-based fertilizer must be added. Do not use COC or MSO. Do not apply more than 6 oz/A per growing season.

EPOST: Apply to Clearfield lentil varieties from the 2-leaf stage to before flower bud formation.

WEED RESPONSE to HERBICIDES for PULSE CROPS

WEED RESPONSE:

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 under 80%.	Usually satisfactory.
6	Fair.	70-80%	Sometimes under 70%.	Sometimes unsatisfactory.
5	Marginal.	50-70%	Seldom over 70%.	Seldom satisfactory.
1-4	Poor.	<50%	Usually under 50%.	Not effective.
0	None.		No control.	

HERBICIDE	WEED RESPONSE																				
	Black Nightshade	Wild Buckwheat	Canada Thistle	Common Cocklebur	Kochia	ALS Kochia	Common Lambsquarters	Wild Mustard	Redroot Pigweed	Prickly Lettuce	Common Ragweed	Russian Thistle	Pennsylvania smartweed	Common Sunflower	Barnyardgrass	Green Foxtail	Yellow Foxtail	Quackgrass	Wild Oats	Volunteer Wheat	
PPI/PRE:																					
Aim	7	6	4	6	7	7	6	8	7	6	6	7	5	6	0	0	0	0	0	0	
Command	5	4	0	6	8	8	5	4	5	0	6	7	5	5	6	8	7	0	0	4	
Dual II Magnum	7	4	0	0	4	4	4	0	7	4	4	5	4	0	8	9	8	0	4	4	
Eptam	8	5	0	0	4	4	6	0	6	0	5	5	4	0	9	10	10	6	9	5	
Far-go	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	0	9	0	
Dimetric EXT	4	6	2	5	6	6	7	9	8	8	7	7	8	6	4	6	5	2	3	4	
Outlook	7	4	0	0	4	4	5	0	7	4	4	6	4	0	8	9	8	0	4	4	
Prowl	0	4	0	0	6	6	6	0	8	4	4	6	4	0	9	10	9	0	4	4	
Pursuit	9	6	4	8	8	4	5	10	9	5	6	8	7	8	6	8	6	0	5	4	
Sonalan	5	5	0	0	7	6	7	0	9	4	4	8	4	0	9	10	9	0	6	4	
Spartan	8	5	0	4	8	8	7	0	9	0	4	6	6	0	4	5	4	0	0	4	
Trifluralin	0	5	0	0	6	6	6	0	9	4	4	7	4	0	9	10	9	4	5	4	
POST:																					
Assure II	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	10	10	9	9	10	
Basagran	6	6	9	9	5	5	6	9	4	6	7	5	8	7	0	0	0	0	0	0	
MCPB (sodium salt)	4	4	7	7	5	5	8	10	6	6	7	7	7	7	0	0	0	0	0	0	
Poast	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	10	10	8	8	10	
Pursuit	9	6	0	8	8	4	5	10	9	6	5	6	7	7	6	8	6	0	4	5	
Raptor	9	7	0	8	8	4	7	10	9	5	6	9	9	8	7	9	7	0	4	4	
Select Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	10	10	8	8	10	

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