

TABLE 5A –Weed Response to Herbicides in Dry Edible Beans*

| | SITE OF ACTION | CROP TOLERANCE** | ANNUAL BROADLEAVES | | | | | | | | ANNUAL GRASSES | | | | | | | PERENNIALS | | | | | | |
|---|----------------|------------------|--------------------|------------|---------------|-----------------------|----------|------------------|-----------|------------|----------------|---------------|-----------|---------------|---------------|----------------|--------------|------------|----------|------------------|------------------|----------------|------------|-----------------|
| | | | COCKLEBUR | JIMSONWEED | LAMBSQUARTERS | NIGHTSHADE (E. BLACK) | PIGWEEED | RAGWEED (COMMON) | SMARTWEED | VELVETLEAF | WILD MUSTARD | BARNYARDGRASS | CRABGRASS | GIANT FOXTAIL | GREEN FOXTAIL | YELLOW FOXTAIL | FALL PANICUM | WITCHGRASS | SANDBUR | BINDWEED (FIELD) | BINDWEED (HEDGE) | CANADA THISTLE | QUACKGRASS | YELLOW NUTSEDGE |
| Preplant Incorporated | | | | | | | | | | | | | | | | | | | | | | | | |
| DUAL MAGNUM/PARALLEL | 15 | 2 | N | N | P | F | G | P | P | N | P | E | E | E | E | E | G | G | F | N | N | N | N | G |
| EPTAM | 8 | 2 | P | P | G | F | F | F | F | F | F | E | E | E | E | E | E | E | G | N | N | N | F | F |
| OUTLOOK | 15 | 3 ^a | N | N | P | G | G | P | P | N | P | E | E | E | E | E | G | G | P | N | N | N | N | F |
| PROWL H ₂ O/PROWL | 3 | 1 | N | N | G | P | F | P | P | F | P | E | E | E | E | E | E | E | G | N | N | N | N | N |
| PURSUIT | 2 | 3 | F | F | P | E | E | P | F | F | G | P | P | F | F | F | P | P | P | N | N | N | N | F |
| SONALAN | 3 | 1 | N | N | G | F | G | P | P | N | P | E | E | E | E | E | E | E | G | N | N | N | N | N |
| TRIFLURALIN | 3 | 1 | N | N | G | N | G | N | P | N | P | E | E | E | E | E | E | E | G | N | N | N | N | N |
| Preemergence | | | | | | | | | | | | | | | | | | | | | | | | |
| DUAL MAGNUM/PARALLEL | 15 | 2 | N | N | P | F | G | P | P | N | P | E | E | E | E | E | G | G | F | N | N | N | N | F |
| OUTLOOK | 15 | 3 ^a | N | N | P | G | G | P | P | N | P | E | E | E | E | E | G | G | P | N | N | N | N | F |
| PERMIT/SANDEA | 2 | 3 | F | F | F | P | E | G | P | G | E | N | N | N | N | N | N | N | N | N | N | N | N | F |
| PURSUIT | 2 | 3 | P | P | P | E | E | P | F | P | G | P | P | F | F | F | P | P | P | N | N | P | N | F |
| REFLEX | 14 | 2 | P | P | G | E | E | G | G | P | E | N | N | N | N | N | N | N | N | N | N | N | N | N |
| SEQUENCE ^b | 9/15 | 2 | N | N | P | F | G | P | P | N | P | E | E | E | E | E | G | G | F | N | N | N | N | F |
| Postemergence | | | | | | | | | | | | | | | | | | | | | | | | |
| ASSURE II/TARGA | 1 | 1 | N | N | N | N | N | N | N | N | N | G | G | E | E | G | E | E | E | N | N | N | E | N |
| BASAGRAN/BROADLOOM ^c | 6 | 2 | E | G | F | P | P | F | E | G | E | N | N | N | N | N | N | N | N | N | N | G | N | G |
| FUSILADE DX | 1 | 1 | N | N | N | N | N | N | N | N | N | E | G | E | E | E | E | E | E | N | N | N | G | N |
| PERMIT | 2 | 3 | E | G | N | P | E | G | F | G | E | N | N | N | N | N | N | N | N | P | P | P | N | E |
| POAST | 1 | 1 | N | N | N | N | N | N | N | N | N | E | G | E | E | E | E | E | E | N | N | N | F | N |
| PURSUIT ^d | 2 | 3 | F | P | P | E | E | P | F | F | E | P | P | F | P | P | P | P | P | N | N | P | N | F |
| PURSUIT ^d + BASAGRAN | 2/6 | 2 | E | G | F | E | E | F | G | G | E | P | P | F | P | P | P | P | P | N | N | G | N | G |
| RAPTOR ^d | 2 | 3 | F | F | F | E | E | P | F | G | E | F | P | F | P | P | P | P | P | N | N | P | N | P |
| RAPTOR ^d + BASAGRAN 8 oz (4L) or 6.4 oz (5L) | 2/6 | 2 | G | F | F/ G | E | E | F | G | G | E | F | P | F | P | P | P | P | P | N | N | F | N | F |
| RAPTOR ^{de} + BASAGRAN 16 oz (4L) or 12.8 oz (5L) | 2/6 | 2 | E | G | G | E | E | F | E | G | E | P | P | F | P | P | P | P | P | N | N | G | N | F |
| REFLEX | 14 | 2 | P | F | P | G | G | E | P | P | E | N | N | N | N | N | N | N | N | N | N | N | N | N |
| REFLEX + BASAGRAN | 6/14 | 2 | E | G | F/ G | G | G | E | E | G | E | N | N | N | N | N | N | N | N | N | N | F | N | G |
| REFLEX + RAPTOR ^e | 2/14 | 3 | F | F | F | E | E | E | F | G | E | F | P | F | P | P | P | N | N | N | N | P | N | P |
| SELECT/SELECT MAX/ARROW | 1 | 1 | N | N | N | N | N | N | N | N | N | E | G | E | E | E | E | E | E | N | N | N | G | N |
| VARISTO | 2/6 | 2 | E | G | G | E | E | F | E | G | E | P | P | F | P | P | P | P | P | N | N | G | N | F |

Herbicide Site of Action: The site of action key is located on pages 15-16.

Herbicide Effectiveness: P = Poor; F = Fair; **G** = Good; **E** = Excellent; N = None

*The above ratings are a relative comparison of herbicide effectiveness. Weather conditions greatly influence the herbicide's effectiveness, and weed control may be better under favorable conditions or poorer under unfavorable conditions.

** Crop Tolerance: 1 = Minimal risk of crop injury; 2 = Crop injury can occur under certain conditions (soil applied — cold, wet; foliar applied — hot, humid); 3 = Severe crop injury can occur. Follow precautions under Remarks and Limitations and on the label; 4 = Risk of severe crop injury is high.

^a Crop tolerance for navy and black beans = 3. For other bean classes, crop tolerance = 2. Preplant incorporation will increase tolerance of navy and black beans to *Outlook*.

^b Sequence is a premixture of *Dual Magnum* and glyphosate and should be used to control existing vegetation prior to planting dry beans. See Remarks and Limitations section.

^c Control of **hairy nightshade** is good.

^d Control of **hairy nightshade** with *Pursuit* and *Raptor* is excellent.

^e **Common lambsquarters** will be controlled with this tank mixture **if** the weeds are less than 2 inches tall and **not** under drought stress.

TABLE 5B –Dry Edible Bean Herbicides – Remarks and Limitations

Dry Edible Beans – Preplant Incorporated Only

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|--------------------------------------|--|-------------------|------------------------------------|---|
| Annual grasses | EPTC (<i>Eptam</i>) | 2.25 | 1.25 qt 7EC | <ul style="list-style-type: none"> • Apply preplant incorporated only. • Refer to Table 5A for weed control and crop tolerance ratings. • Incorporate immediately after application. • <i>Eptam</i> suppresses common ragweed and wild mustard. • Prowl (pendimethalin), trifluralin, or Sonalan should be tank mixed with <i>Eptam</i> for additional broadleaf control, including lambsquarters. • <i>Pursuit</i> (2 oz) can be added to tank mixes with <i>Prowl</i>, <i>trifluralin</i>, or <i>Sonalan</i> for nightshade control. • <i>Pursuit</i> (2 oz) may also be applied preemergence after preplant incorporated applications of <i>Eptam</i> tank mixed with <i>Prowl</i>, <i>trifluralin</i>, or <i>Sonalan</i>. See remarks for <i>Pursuit</i>. • A postemergence application of <i>Basagran</i>, <i>Pursuit</i> or <i>Raptor</i> may be necessary for additional broadleaf control. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |
| Annual grasses Annual broadleaves | pendimethalin (<i>Prowl</i>) OR (<i>Prowl H₂O</i>) | 0.75 | 1.8 pt 3.3EC OR 1.6 pt 3.8CS | <ul style="list-style-type: none"> • Apply preplant incorporated only. • Refer to Table 5A for weed control and crop tolerance ratings. • Incorporate immediately after application. • <i>Prowl</i> provides better velvetleaf control than <i>trifluralin</i> or <i>Sonalan</i>. • Prowl should be tank mixed with <i>Eptam</i>. Other measures may need to be taken for additional broadleaf control. • Refer to label and Table 12 for crop rotation restrictions. |
| | ethalfuralin (<i>Sonalan</i>) | 0.75 | 2 pt 3EC | <ul style="list-style-type: none"> • Apply preplant incorporated only. • Refer to Table 5A for weed control and crop tolerance ratings. • Incorporate immediately after application. • Sonalan should be tank mixed with <i>Eptam</i>. Other measures may need to be taken for additional broadleaf control. • Refer to label and Table 12 for crop rotation restrictions. |
| | trifluralin (<i>many</i>) | 0.5 | 1 pt 4EC | <ul style="list-style-type: none"> • Apply preplant incorporated only. • Refer to Table 5A for weed control and crop tolerance ratings. • Incorporate immediately after application. • <i>Trifluralin</i> provides better pigweed control than <i>Prowl</i> or <i>Sonalan</i>. • Trifluralin should be tank mixed with <i>Eptam</i>. Other measures may need to be taken for additional broadleaf control. • Refer to label and Table 12 for crop rotation restrictions. |

Dry Edible Beans – Soil Applied

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|-----------------|--|-------------------|--|--|
| Annual grasses | s-metolachlor (Dual Magnum, EverpreX) OR (Dual II Magnum, Cinch) | 1.27 | 1.33 pt 7.62EC OR 1.33 pt 7.64EC | <ul style="list-style-type: none"> • May be applied preplant incorporated or preemergence. • Refer to Table 5A for weed control and crop tolerance ratings. • PREPLANT INCORPORATED <i>Dual Magnum</i> minimizes the danger of bean injury. • DO NOT apply if soil is cracking and beans are in the crook stage. • Reduce <i>Dual Magnum</i> rate to 1 pt/A on coarse-textured soils with low organic matter. • Preemergence applications require rainfall for incorporation. Rotary hoe if no rainfall occurs within 7 days. • <i>Dual Magnum</i> provides better yellow nutsedge control than <i>Outlook</i>. • <i>Prowl</i>, <i>trifluralin</i> or <i>Sonalan</i> can be tank mixed preplant incorporated for lambsquarters control. • <i>Pursuit</i> (2 oz) can be tank mixed for nightshade and additional broadleaf control. • A postemergence application of <i>Basagran</i>, <i>Pursuit</i> or <i>Raptor</i> may be necessary for additional broadleaf control. • DO NOT apply <i>Dual Magnum</i> within 60 days of harvest. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |
| | dimethenamid-P (<i>Outlook</i>) | 0.66 | 14 oz 6L | <ul style="list-style-type: none"> • May be applied preplant incorporated or preemergence. • Refer to Table 5A for weed control and crop tolerance ratings. • PREPLANT INCORPORATED <i>Outlook</i> minimizes the danger of bean injury. • DO NOT apply if soil is cracking and beans are in the crook stage. • Reduce <i>Outlook</i> rate to 12 oz/A on coarse-textured soils with low organic matter. • Navy and black beans are more sensitive to <i>Outlook</i> applications than to <i>Dual Magnum</i>. • Preemergence applications require rainfall for incorporation. Rotary hoe if no rainfall occurs within 7 days. • <i>Outlook</i> provides better pigweed and nightshade control than <i>Dual Magnum</i>. • <i>Prowl</i>, <i>trifluralin</i>, or <i>Sonalan</i> can be tank mixed preplant incorporated for lambsquarters control. • <i>Pursuit</i> (2 oz) can be tank mixed for nightshade and additional broadleaf control. • A postemergence application of <i>Basagran</i>, <i>Pursuit</i>, or <i>Raptor</i> may be necessary for additional broadleaf control. • DO NOT apply <i>Outlook</i> within 70 days of harvest. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |

(Continued on next page)

Dry Edible Beans – Soil Applied (continued)

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|--------------------|--|-------------------|--------------------------------------|--|
| <i>(continued)</i> | | | | |
| Annual grasses | metolachlor (Parallel PCS) | 1.3 | 1.33 pt 8EC | <ul style="list-style-type: none"> • May be applied preplant incorporated or preemergence. • <i>Parallel PCS</i> is a mix of the R and S-isomers of metolachlor. Limited research has shown that 1.33 pt/A of these products provide similar activity to s-metolachlor products at 1.33 pt/A. However, <i>Parallel PCS</i> may not provide the consistency, length of control or performance on more difficult to control weeds. Rates would need to be increased to 2.0 pt/A to provide the same amount of s-metolachlor (the more active isomer) in the 1.33 pt/A rate of <i>Dual Magnum/ Dual II Magnum/Cinch</i> (s-metolachlor). • Refer to Table 5A for weed control and crop tolerance ratings. • See remarks and limitations for <i>Dual Magnum</i>. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |
| | glyphosate + s-metolachlor (Sequence) + ammonium sulfate | 1.64 | 3 pt 2.25L + 17 lb/100 gal | <ul style="list-style-type: none"> • May be applied preplant or preemergence. • Sequence contains 0.9 lb a.e./A of glyphosate and 1.2 pt/A of <i>Dual Magnum</i>. • <i>Sequence</i> is best used to control existing vegetation prior to planting no-till dry beans with the residual control of <i>Dual Magnum</i>. • Refer to Table 5A for residual weed control and crop tolerance ratings. • DO NOT apply to emerged dry bean – severe injury will occur. • DO NOT apply more than 3.5 pt/A on coarse textured soils or 4 pt/A on medium and fine textured soils. • Apply only one application per crop year. • Refer to label and Table 12 for crop rotation restrictions. |
| Annual broadleaves | halosulfuron (Permit/Sandea) | 0.023 | 0.67 oz 75DG | <ul style="list-style-type: none"> • May be applied preplant incorporated or preemergence. • Refer to Table 5A for weed control and crop tolerance ratings. • Reduce the rate of <i>Permit/Sandea</i> to 0.5 oz/A on lighter textured soils with low organic matter. • <i>Permit/Sandea</i> can cause injury under cool and wet growing conditions. • Delayed maturity may result from applications of <i>Permit/Sandea</i>. • Dry bean varieties and classes vary in their tolerance to <i>Permit/Sandea</i>. From MSU research, CAUTION should be taken when applying <i>Permit/Sandea</i> to kidney and black beans. • <i>Permit/Sandea</i> can be tank mixed with <i>Eptam</i> for grass and additional lambsquarters control. • <i>Permit/Sandea</i> can be tank mixed with metolachlor products or <i>Outlook</i> for annual grass control. • <i>Permit/Sandea</i> will not control ALS-resistant weed species. • DO NOT plant SUGAR BEETS within 21 months of a <i>Permit/Sandea</i> application. • Refer to label and Table 12 for crop rotation restrictions. |

(Continued on next page)

Dry Edible Beans – Soil Applied (continued)

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|---------------------------|---------------------------------|-------------------|---------------|---|
| <i>(continued)</i> | | | | |
| Annual broadleaves | imazethapyr <i>(Pursuit)</i> | 0.031 | 2 oz 2L | <ul style="list-style-type: none"> • May be applied preplant incorporated or preemergence. • Refer to Table 5A for weed control and crop tolerance ratings. • DO NOT use on sands or loamy sand soils. • DO NOT apply <i>Pursuit</i> if cold and/or wet conditions are present or predicted to occur within 1 week of application. • Delayed maturity may result from applications of <i>Pursuit</i>. DO NOT apply if planting is delayed and frost is likely to occur prior to maturity. • On heavy soils with greater than 2% organic matter and heavy weed pressure, 3 oz of <i>Pursuit</i> may be applied. • <i>Pursuit</i> can be tank mixed and applied preplant incorporated with <i>Eptam</i> plus <i>trifluralin</i>; <i>Prowl</i> or <i>Sonalan</i>; or <i>Dual Magnum</i> or <i>Outlook</i>; or preemergence with <i>Dual Magnum</i> or <i>Outlook</i>. <i>Pursuit</i> in these mixes will control eastern black nightshade. • Preemergence applications require rainfall for incorporation. Rotary hoe if no rainfall occurs within 7 days. • <i>Pursuit</i> will NOT control common ragweed. • Dry bean varieties vary in their sensitivity to <i>Pursuit</i>. Use ONLY on navy, black turtle, pinto, kidney, and cranberry beans. DO NOT use on DOMINO black or OLATHE pinto beans. • DO NOT apply within 60 days of harvest. • DO NOT use if SUGAR BEETS, CUCUMBERS, CANOLA or TOMATOES are in the rotation; requires 40 months and a soil bioassay. • Refer to label and Table 12 for crop rotation restrictions. |
| | fomesafen <i>(Reflex)</i> | 0.25 | 1 pt 2L | <ul style="list-style-type: none"> • May be applied preplant surface or preemergence. • Refer to Table 5C for weed control and crop tolerance ratings. • <i>Reflex</i> will provide 4-5 weeks of control and/or suppression of broadleaf weeds. • Rainfall that splashes treated soil onto newly emerged seedlings can cause temporary crop injury. • Tank mixtures or sequential herbicide applications are needed to broaden the spectrum of weed control. • <i>Reflex</i> can be applied only in the Lower Peninsula of Michigan. • DO NOT apply <i>Reflex</i> or other fomesafen products to the same field in CONSECUTIVE years. • The maximum use rate of <i>Reflex</i> per field is 1 pint per acre. • Refer to Table 12 for crop rotation restrictions. |

Dry Edible Beans — Postemergence

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|---|--|-------------------|-------------------|---|
| Grasses | quizalofop-P-ethyl (<i>Assure II/Targa</i>) | 0.044 | 7 oz 0.88L | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Treat actively growing grasses (annual grasses up to 4 inches). • DO NOT apply to grasses under stress — poor weed control will result. • DO NOT cultivate within 5 days prior to and 7 days following application. • Allow 30 days between <i>Assure II/Targa</i> application and dry bean harvest. • <i>Assure II/Targa</i> can be tank mixed with <i>Basagran</i> for foxtails and barnyardgrass. Increase the <i>Assure II/Targa</i> rate by 2 oz. • Tank mixes with <i>Pursuit</i> and <i>Raptor</i> are not recommended — grass antagonism will occur. • <i>Assure II/Targa</i> (10 oz/A) plus crop oil concentrate (1% v/v) or nonionic surfactant (0.25% v/v) will control quackgrass 6-10 inches tall. A sequential application of 7 oz/A may be needed 14-21 days later. • Refer to label and Table 12 for crop rotation restrictions. |
| | + | | + | |
| | crop oil concentrate OR surfactant | | 1% OR 0.25% | |
| | fluzifop-P-butyl (<i>Fusilade DX</i>) | 0.188 | 12 oz 2L | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Apply 6 oz/A of <i>Fusilade DX</i> to control volunteer corn. • Allow 60 days between <i>Fusilade DX</i> application and dry bean harvest. • Two applications 7-14 days apart are usually needed for control of perennial grasses. • Tank mixes with <i>Pursuit</i> and <i>Raptor</i> are not recommended — grass antagonism will occur. • DO NOT apply more than 48 oz/A of <i>Fusilade DX</i> per season. • Refer to label and Table 12 for crop rotation restrictions. |
| + | + | | | |
| crop oil concentrate | 1% | | | |
| | sethoxydim (<i>Poast</i>) | 0.19 | 1 pt 1.5SC | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Reduced rates of <i>Poast</i> (12 oz/A) may be used when barnyardgrass, green and giant foxtail, and fall panicum are less than 4 inches tall and the target species. • DO NOT apply to grasses under stress — poor weed control will result. • DO NOT cultivate within 5 days prior to and 7 days following application. • Allow 30 days between <i>Poast</i> application and dry bean harvest. • <i>Poast</i> is generally less effective than other postemergence grass herbicides for perennial grass control. • Tank mixes with <i>Pursuit</i> and <i>Raptor</i> are not recommended — grass antagonism will occur. • Refer to label and Table 12 for crop rotation restrictions. |
| + | + | | | |
| crop oil concentrate + ammonium sulfate | 1 qt + 2.5 lb | | | |

(Continued on next page)

Dry Edible Beans — Postemergence (continued)

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations | |
|---------------------------|---|-------------------|------------------------------|--|--|
| <i>(continued)</i> | | | | | |
| Grasses | clethodim (<i>Select/Arrow</i>) | 0.094 | 6 oz 2EC | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Reduced rates of <i>Select/Arrow</i> (4-5 oz/A) or <i>Select Max</i> (6-8 oz/A) may be used when some grass species are small. • The addition of ammonium sulfate at 2.5 to 4 lb/A has been shown to improve control of difficult to control weeds, e.g., quackgrass, rhizome Johnsongrass, volunteer cereals, and volunteer corn. • DO NOT apply to grasses under stress — poor weed control will result. • DO NOT cultivate within 7 days prior to and 7 days following application. • Allow 30 days between application and dry bean harvest. • <i>Select/Arrow</i> or <i>Select Max</i> can be tank mixed with <i>Basagran</i>. Increase the <i>Select/Arrow</i> rate to 8-10 oz/A and the <i>Select Max</i> rate to 12 oz/A and apply with crop oil concentrate (1% v/v). • Tank mixes with <i>Pursuit</i> and <i>Raptor</i> are not recommended — grass antagonism will occur. • <i>Select/Arrow</i> (8-16 oz/A) plus crop oil concentrate (1% v/v) plus ammonium sulfate (2.5 lb/A) will control quackgrass 4-12 inches tall. A sequential application of 8 oz/A may be needed 14-21 days later. Sequential applications of <i>Select Max</i> (12 + 12 oz/A) are needed to control 4 to 12 inch quackgrass. • Refer to label and Table 12 for crop rotation restrictions. | |
| | + crop oil concentrate OR (<i>Select Max</i>) | 0.068 | 9 oz 0.97EC | | |
| + surfactant | | 0.25% | | | |
| + ammonium sulfate | | 2.5 lb | | | |
| Annual broadleaves | bentazon (<i>Basagran/Broadloom</i>) OR <i>Basagran 5L</i> | 0.75 | 1.5 pt 4L OR 1.2 pt 5L | | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Most effective on small weeds. Check dry bean label for specific rate and proper weed growth stage. • Beans MUST HAVE one fully expanded trifoliolate before application. • Use a minimum of 20 gal. water/A for adequate coverage. • DO NOT apply if dry beans are under stress from herbicide injury, cold or dry weather, or hail damage. • For improved velvetleaf control 28% liquid nitrogen (2-4 qt/A) or ammonium sulfate (2.5 lb/A) can be used INSTEAD OF crop oil concentrate. However, if common ragweed and common lambsquarters are present, a crop oil concentrate must also be included. • Split applications of 1 pt + 1 pt (4L) or 0.8 pt + 0.8 pt (5L) plus crop oil concentrate (1 pt + 1 pt) can be used for more consistent common ragweed and lambsquarters control. Make the first application when weeds are less than 1 inch tall, and make second application 10-14 days later. • For CANADA THISTLE and YELLOW NUTSEDGE control, apply sequential applications of 1.5 pt + 1.5 pt (4L) or 1.2 pt + 1.2 pt (5L) plus crop oil concentrate (1 qt + 1 qt) when Canada thistle is 6-8 inches tall and yellow nutsedge is 4-6 inches. Make second application 7-10 days later. • Allow 30 days between application and dry bean harvest. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |
| + crop oil concentrate | | | 1 qt | | |

(Continued on next page)

Dry Edible Beans – Postemergence (continued)

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|---------------------------|--|-------------------|--------------------------------|---|
| <i>(continued)</i> | | | | |
| Annual broadleaves | halosulfuron (<i>Permit</i>) + surfactant | 0.023 | 0.67 oz 75WG + 0.25% | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Most effective on small weeds (less than 2 inches). • Apply when beans have 1-3 trifoliolate leaves. • DO NOT apply if dry beans have begun to flower. • <i>Permit</i> can be tank-mixed with other herbicides for additional broadleaf and grass control. • Dry bean varieties and classes vary in their tolerance to <i>Permit</i>. From MSU research, CAUTION should be taken when applying to kidney and black beans. Under adverse conditions maturity of the treated crop can be delayed which can affect harvest date, yield, and quality. • DO NOT use on adzuki beans. • DO NOT plant SUGARBEETS within 21 months of <i>Permit</i> application. • Refer to Table 12 for crop rotation restrictions. |
| | imazethapyr (<i>Pursuit</i>) + surfactant | 0.031 | 2 oz 2L + 0.25% | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Most effective on small weeds (less than 2 inches). • Beans MUST HAVE one fully expanded trifoliolate before application. • DO NOT apply if dry beans have begun to flower. • Apply <i>Pursuit</i> with non-ionic surfactant (0.25% v/v). • DO NOT add 28% liquid nitrogen (2.5% v/v) or ammonium sulfate (2.5 lb/A) unless at least 8 oz of <i>Basagran</i> 4L is added to “safen” this application. • Increase the rate of <i>Basagran</i> 4L to 16 fl oz (4L) or 12.8 fl oz (5L) when tank mixed with <i>Pursuit</i> to control common cocklebur and jimsonweed. • Delayed maturity may result from applications of <i>Pursuit</i>. DO NOT apply if planting is delayed and frost is likely to occur prior to maturity. • DO NOT tank mix with postemergence grass herbicides – grass antagonism will occur. • Dry bean varieties vary in their sensitivity to <i>Pursuit</i>. Use ONLY on navy, black turtle, pinto, kidney, and cranberry beans. DO NOT use on DOMINO black or OLATHE pinto beans. • DO NOT apply within 60 days of harvest. • DO NOT use if sugar beets, cucumbers, canola or tomatoes are in the rotation; requires 40 months and a soil bioassay. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. |

(Continued on next page)

Dry Edible Beans – Postemergence (continued)

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations | |
|---------------------------|--|-------------------|----------------------------|---|--|
| <i>(continued)</i> | | | | | |
| Annual broadleaves | imazamox (<i>Raptor</i>) | 0.032 | 4 oz 1L | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Most effective on small weeds (less than 2 inches). • Beans MUST HAVE one fully expanded trifoliolate before application. • DO NOT apply if dry beans have begun to flower. • DO NOT apply if planting is delayed and frost is likely to occur prior to maturity. • Apply <i>Raptor</i> with crop oil concentrate (1% v/v) or a non-ionic surfactant (0.25% v/v). • At least 8 fl oz of <i>Basagran</i> 4L or 6.4 fl oz (5L) must be tank mixed with <i>Raptor</i>, if ammonium sulfate (12-15 lb/100 gal) or 28% liquid nitrogen (2.5% v/v) are added. <i>Basagran</i> “safens” this application. • Increase the rate of <i>Basagran</i> to the 16 fl oz (4L) or 12.8 fl oz (5L) when tank mixed with <i>Raptor</i> to control common cocklebur and jimsonweed, and to provide good control of common lambsquarters (less than 2 inch tall). • DO NOT tank mix with postemergence grass herbicides – grass antagonism will occur. • DO NOT apply within 60 days of harvest. • DO NOT use the combination of <i>Raptor</i> + <i>Basagran</i> on adzuki beans. <i>Basagran</i> causes significant injury to adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. | |
| | + bentazon (<i>Basagran</i>) | 0.25 | 8 oz 4L OR 6.4 oz 5L | | |
| | + crop oil concentrate | | + | | |
| | + ammonium sulfate | | + | | |
| | | | 2.5 lb | | |
| | fomesafen (<i>Reflex</i>) | 0.25 | 1 pt 2L | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • Most effective on small weeds; common ragweed 4-inches or less and eastern black nightshade 2-inches or less. • Common ragweed less than 4-inches will be controlled with 0.5 pt/A of <i>Reflex</i>. • Beans MUST HAVE one fully expanded trifoliolate before application. • A non-ionic surfactant at 0.25-0.5% v/v or a crop oil concentrate at 0.5-1.0% v/v must be included for effective control. • <i>Reflex</i> can be tank-mixed with <i>Basagran</i>, <i>Raptor</i>, or <i>Pursuit</i>. Include a COC when tank-mixing <i>Reflex</i> + <i>Basagran</i>. ONLY include a non-ionic surfactant when tank-mixing with <i>Raptor</i> or <i>Pursuit</i>. DO NOT add AMS or 28%N. • <i>Reflex</i> can be applied only in the Lower Peninsula of Michigan. • DO NOT apply <i>Reflex</i> or other fomesafen containing products to the same field in CONSECUTIVE years. • DO NOT apply within 45 days of harvest. • Refer to Table 12 for crop rotation restrictions. | |
| | + surfactant | | + | | |
| | | | 0.25% | | |
| | basagran + imazamox (<i>Varisto</i>) | 0.68 | 21 oz 4.18L | <ul style="list-style-type: none"> • Refer to Table 5A for weed control and crop tolerance ratings. • <i>Varisto</i> at 21 fl oz/A is equivalent to 21 fl oz (4L) or 16.8 fl oz (5L) of <i>Basagran</i> and 4 fl oz/A of <i>Raptor</i>. • Most effective on small weeds (less than 2 inches). • Beans must have one fully expanded trifoliolate before application. • DO NOT apply if dry beans have begun to flower. • DO NOT tank-mix with postemergence grass herbicides – grass antagonism will occur. • DO NOT apply within 30 days of harvest. • DO NOT use on adzuki beans. • Refer to label and Table 12 for crop rotation restrictions. | |
| | + crop oil concentrate | | + | | |
| | + ammonium sulfate | | + | | |
| | | | 2.5 lb | | |

Table 5C – Preharvest Treatments in Dry Edible Beans

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|-----------------|---|-------------------|---|---|
| Preharvest | glyphosate (<i>many</i>) + ammonium sulfate | 0.75 lb a.e. | See Table 10 + 17 lb/100gal | <ul style="list-style-type: none"> • Glyphosate should ONLY be used to control weeds that hinder harvest. • Not all glyphosate products are labeled for Preharvest application in dry edible beans. Consult product labels for legal applications. Roundup branded products, <i>Duramax</i>, <i>Durango DMA</i>, <i>Touchdown Total</i> and <i>Traxion</i> are some glyphosate products that are currently labeled. • DO NOT use glyphosate for vine desiccation — residues of glyphosate have been found in harvested beans if applications are made too early. • Glyphosate should be applied when beans are in the hard dough stage (30% moisture or less). • Some buyers will not purchase beans treated with glyphosate, consult your buyer prior to using glyphosate as a preharvest herbicide treatment. • Glyphosate applications should be made at least 7 days before harvest. • ONLY one application should be made per year. • DO NOT apply glyphosate to beans grown for seed. • DO NOT feed treated vines and hay from these crops to livestock. |
| | paraquat (<i>Gramoxone SL 2.0</i>) + surfactant | 0.3-0.5 | 1.2–2 pt 2SL + 0.25% | <ul style="list-style-type: none"> • <i>Gramoxone SL 2.0</i> is a restricted-use pesticide. • Apply when crop is mature, at least 80% of the pods are yellowing and mostly ripe and no more than 40% (bush-type beans) or 30% (vine-type beans) of the leaves are still green. • Always add a non-ionic surfactant at 0.25% v/v or a crop oil concentrate at 1% v/v. • Apply by air in 5 gal water/A or by ground in 20-40 gal of water/A. • If growth is lush and vigorous, make either a single application of the higher rate of <i>Gramoxone SL 2.0</i>; or split applications at the lower rates. Split applications may improve vine coverage. DO NOT exceed 2.0 pt/A of <i>Gramoxone SL 2.0</i>. • Do not harvest within 7 days of application. |
| | paraquat (<i>Parazone</i>) + surfactant | 0.5 | 1.33 pt 3SL + 0.25% | <ul style="list-style-type: none"> • <i>Parazone</i> is a restricted-use pesticide. • <i>Parazone</i> contains the same active ingredient as <i>Gramoxone SL 2.0</i> (paraquat), but is at a different concentration. • See the Remarks and Limitation section for <i>Gramoxone SL 2.0</i>. |
| | saflufenacil (<i>Sharpen</i>) + methylated seed oil + ammonium sulfate | 0.023 | 1 oz 2.85L + 1% + 17 lb/100 gal | <ul style="list-style-type: none"> • Apply when crop is mature – at least 80% of the pods are yellowing and mostly ripe and no more than 40% (bush-type beans) or 30% (vine-type) beans of the leaves are still green. • <i>Sharpen</i> can be applied at rates up to 2 oz/A. • Dry beans can be harvested 2 days after application. However, it generally takes 7 days to reach maximum desiccation activity. • <i>Sharpen</i> is an effective desiccant. • DO NOT apply to beans grown for seed. • DO NOT graze or feed desiccation-treated hay or straw to livestock. • Refer to label and Table 12 for crop rotation restrictions. DO NOT include time in the rotation interval when the ground is frozen. |

(Continued on next page)

Preharvest Treatments in Dry Edible Beans *(continued)*

| Weed Controlled | Herbicide | Rate lb/A a.i. | Formulation/A | Remarks and Limitations |
|--------------------|---|-------------------|-------------------------------------|--|
| <i>(continued)</i> | | | | |
| Preharvest | flumioxazin (<i>Valor</i>) OR (<i>Valor EZ</i>) + | 0.05 | 1.5 oz 51WG OR 1.5 oz 4L + | <ul style="list-style-type: none"> • Apply when crop is mature – at least 80% of the pods are yellowing and mostly ripe and no more than 40% (bush-type beans) or 30% (vine-type beans) of the leaves are still green. • <i>Valor/Valor EZ</i> can be applied at rates up to 2 oz/A. • Dry beans can be harvested 5 days after <i>Valor</i> application. However, it generally takes 7 to 14 days to reach maximum desiccation activity. • Dry bean desiccation is similar to that from <i>Gramoxone</i> and glyphosate; however, the spectrum of weed control is not as broad. • <i>Valor</i> provides residual activity that may reduce winter annual growth. • Follow sprayer clean-up instructions — residues of <i>Valor</i> can be trapped in poly-tanks and hoses if not adequately cleaned. • Crop rotation restrictions are dependent on rainfall, <i>Valor</i> use rate and tillage. • Rotation restrictions for 2 oz or less of <i>Valor/Valor EZ</i> are 1 month with 1 inch of rain for corn and winter wheat. Dry bean and barley may be planted after 3 months, and alfalfa, oats and sugar beets may be planted after 4 months if the ground is tilled prior to planting or 8 months if no tillage is performed. Note: In Michigan research trials, planting sugar beet no-till the spring following a <i>Valor</i> preharvest treatment resulted in major sugar beet stand reduction. Tillage reduced the effect of <i>Valor</i> on sugar beet; however, slight injury may occur on sandier soils. • Refer to label and Table 12 for crop rotation restrictions. |
| | methylated seed oil | | 1 qt | |
| | carfentrazone (<i>Aim</i>) + | 0.03 | 2 oz 2EC + | <ul style="list-style-type: none"> • Apply when crop is mature – at least 80% of the pods are yellowing and most ripe and no more than 40% (bush-type beans) or 30% (vine-type beans) of the leaves are still green. • <i>Aim</i> alone is not as effective as <i>Sharpen</i>, glyphosate, <i>Gramoxone</i>, or <i>Valor</i> for dry bean desiccation. • Tank mixtures with <i>Gramoxone</i> or glyphosate will improve dry bean desiccation and is needed to improve the spectrum of weed desiccation. • Thorough spray coverage is required – sequential applications may be needed. • The preharvest interval is 0 days for <i>Aim</i> alone. |
| | methylated seed oil | | 1% v/v | |