

Legumes

Legumes — Snap Bean, Dry Bean, Lima Bean

Snap beans refers to edible, podded beans that are usually green (green beans) or yellow (wax beans). They are harvested while pods and seeds are still tender. Older varieties (string beans) had a fibrous “string” the length of the pod that was removed during preparation for eating. Flat-podded Romano beans are also harvested while pods and seeds are tender.

Dry beans refers to a wide variety of beans harvested after the seeds are mature and pods have dried down. Kidney, navy, black turtle, white, and pinto beans are examples.

Lima beans represent a different species than snap beans and dry beans. They can be harvested when completely dry (like dry beans) or as “baby limas” before the seed has matured (similar to the southern pea described below).

Legumes — Pea and Southern Pea or Cowpea

“Pea” has been commonly used to describe two distinctly different legume crops. English and Snow peas, both *Pisum sativum*, are cool-season crops grown for their immature edible seeds or pods. Snap peas are a type of English pea with tender, edible pods. Southern peas, or cowpeas, are *Vigna unguiculata* and include black-eyed peas, cream peas and crowder peas. These heat-loving crops are more commonly grown in southern states, although they can be grown in the north. They are grown for their immature shelled seeds and are well-accepted in markets where customers are familiar with them.

Spacing

Beans: Rows 18 to 36 inches apart, 5 to 7 seeds per foot of row. Larger inter-row spacing helps limit white mold development. Seed 70 to 100 pounds per acre.

Peas and Cowpeas: Rows 32 to 36 inches apart, 6 to 8 seeds per foot of row. Seed 100 to 150 pounds per acre.

Fertilizing

Lime: To maintain a soil pH of 6.0 to 6.8.

Preplant: N: for soils with more than 3 percent organic matter and following soybeans, alfalfa or a grass-legume hay crop no N is needed. For soils with less than 3 percent organic matter and the above rotation apply 20 pounds N per acre for peas, and 30 pounds N per acre for beans. Following corn, rye, oats, wheat, or a vegetable crop apply 40 pounds N per acre for peas, and 40 to 60 pounds N per acre for beans. P_2O_5 : 0 to 100 pounds per acre. K_2O : 0 to 100 pounds per acre. Adjust according to soil type, previous management, and soil test results for your state. Micronutrients: beans are prone to zinc deficiency. If the soil test shows zinc below 0.7 ppm, then prior to planting broadcast and incorporate 5 pounds of zinc per acre, or include 1 pound zinc per acre in the fertilizer band at planting.

At Planting: Apply 12 pounds N and 48 pounds P_2O_5 per acre in bands at least 2 inches below and 2 inches to the side of the row. Potassium (K) is not recommended in the band because peas and beans are sensitive to injury from fertilizer salts.

Sidedress N: None needed.

Pesticide Use in Greenhouses

Before using any pesticide, always read the product label for mention of greenhouse restrictions. See Selected Information About Recommended Fungicides (page 79), Selected Information About Recommended Herbicides (page 69), and Selected Information About Recommended Insecticides (page 54).

Disease Control

Rust, Anthracnose (dry beans and cowpeas)

Follow 2-3 year rotation schedules. Rust resistant varieties are available. Use seed free of the pathogen.

Recommended Products

Approach® at 6-12 fl. oz. per acre. 14-day PHI.

Aprovia Top® at 10.5-11 fl. oz. per acre. A spreader-sticker is recommended. 14-day PHI.

RR **Bravo**®, **Echo**®, and **Equus**® are labeled for use at various rates. 14-day PHI.

Fontelis® at 14-20 fl. oz. per acre. 21-day PHI.

Headline®, or **Headline SC**® at 6-9 oz. per acre. 21-day PHI.

Priaxor® at 4-8 fl. oz. per acre. 21-day PHI.

Proline 480SC® at 5.7 fl. oz. per acre. *Rust only*. 7-day PHI.

RR **Quadris**® at the following rates:

Anthracnose: 6.0-15.4 fl. oz. per acre.

Rust: 6.0 fl. oz. per acre.

14-day PHI.

Quadris Opti® at 1.6-2.4 pts. per acre. 14-day PHI.

Quilt® at 14 fl. oz. per acre 14-day PHI.

Quilt Xcel® at 10.5-14 fl. oz. per acre. 14-day PHI.

Tilt® at 4 fl. oz. per acre. 7-day PHI.

Topsin M WSB®. See labels for rates. *Anthracnose only*. 28-day PHI.

Vertisan® at 14-20 fl. oz. per acre. 21-day PHI.

Rust, Anthracnose (snap beans and other succulent beans — check labels)

Follow 2-3 year rotation schedules. Rust resistant varieties are available. Use seed free of the pathogen.

Recommended Products

RR **Bravo**®, **Echo**®, and **Equus**® are labeled for use at various rates. *Rust only*. 7-day PHI.

RR **Fontelis**® at 14-30 fl. oz. per acre. 0-day PHI.

RR **Headline**® at 6-9 oz. per acre. 7-day PHI.

Priaxor® at 4-8 fl. oz. per acre. 7-day PHI.

RR **Quadris**® at the following rates:

Anthracnose: 6.2-15.4 fl. oz. per acre.

Rust: 6.2 fl. oz. per acre.

0-day PHI.

Quilt® at 14 fl. oz. per acre. 7-day PHI.

Quilt Xcel® at 10.5-14 fl. oz. per acre. 7-day PHI.

Rally 40WSP® at 4-5 oz. per acre. *Rust only*. 0-day PHI.

Tilt® at 4 fl. oz. per acre. 7-day PHI.

Topsin 70W®, or **Topsin 4.5L**®. See labels for rates. *Anthracnose only*. 14-day PHI.

Bacterial Blights

Plant western-grown, certified disease-free seed. Practice a 2-year crop rotation and plow under bean stubble in the fall. Apply a fixed copper product such as Kocide®, Champ®, or Cuprofix® at 5-7 day intervals to reduce spread (0-day PHI) if weather conditions favor disease spread.

Fusarium Wilt

Use resistant cultivars. Rotate away from legumes for several years to avoid build up of the Fusarium fungus.

Seed Rot and Damping-off

Use pathogen-free seed. Purchase seed commercially treated with a product such as Apron Maxx®, Captan®, or Thiram®. If Pythium is a significant problem, apply Ridomil Gold SL® at 0.5-1.0 pt. per acre at planting.

White Mold and Gray Mold

Avoid fields with a history of white mold or with poor drainage.

Recommended Products

Approach® at 8-12 fl. oz. per acre. *White mold suppression only*. 14-day PHI.

Bravo®, **Echo**®, and **Equus**® are labeled for use at various rates. *Gray mold on snap bean only*. 7-day PHI.

Cannonball WG® at 7 oz. per acre. Do not exceed 28 oz. per acre per year. 7-day PHI.

BP  **Contans WG**® at 1-4 lbs. per acre for white mold on snap beans. See label for application methods.

RR **Endura 70WG**® at 8-11 oz. per acre. 7-day PHI for snap bean. 21-day PHI for dry beans.

RR **Fontelis**® at the following rates:

Gray mold: 14-30 fl. oz. per acre.

White mold: 16-30 fl. oz. per acre.

0-day PHI for succulent beans. 21-day PHI for dry beans.

Omega 500F® at 0.5-0.85 pt. per acre. Do not exceed 1.75 pts. per acre per season. 14-day PHI for edible podded and succulent beans. 30-day PHI for dry and lima beans.

Rovral 75WG® at 1.5-2 pts. per acre. 0-day PHI.

Proline 480 SC® at 5.7 fl. oz. per acre. *White mold on dry beans only*. 7-day PHI.

Switch 62.5WG® at 11-14 oz. per acre. 7-day PHI.

Topsin M WSB®. See labels for rates. 14-day PHI for snap beans. 28-day PHI for dry and lima beans.

Soybean Cyst Nematode (SCN)

Rotate at least 2-3 years with corn, small grains, alfalfa, or other non-host crops. Do not include soybeans in the rotation.

Bean Yellow Mosaic Virus (BYMV)

No adequate control measure is known. Eliminating overwintering host plants, such as wild sweet clover may reduce infection. Some tolerant varieties are available.

Weed Control

For specific weeds controlled by each herbicide, check Relative Effectiveness of Herbicides for Vegetable Crops (page 68).

Rates provided in the recommendations below are given for overall coverage. For band treatment, reduce amounts according to the portion of acre treated.

Burndown or Directed/Shielded Application Broadleaves and Grasses

Recommended Products

Glyphosate products at 0.75-3.75 lbs. acid equivalent (ae) per acre. Use formulations containing 3 lbs. ae per gal. (4 lbs. isopropylamine salt per gal.) at 1-5 qts. per acre, or formulations containing 4.5 lbs. ae per gal. (5 lbs. potassium salt per gal.) at 0.66-3.3 qts. per acre. Broadcast before seeding or apply between crop rows with wipers or hooded or shielded sprayers. Use low rate for annuals and higher rates for perennials. See label for suggested application volume and adjuvants. 14-day PHI.

Gramoxone SL 2.0® at 2-4 pts. per acre. *Lima bean, snap bean, and pea only.* Use 1 qt. of COC or 4-8 fl. oz. of NIS per 25 gals. of spray solution. Apply before seeding or after seeding but before crop emergence. *RUP.*

Spartan Advance®. See details below for Preemergence Broadleaves.

Burndown or Directed/Shielded Application Broadleaves

Aim EC® at 0.5-2 fl. oz. per acre. Apply prior to or within 24 hours after seeding, or apply between crop rows with hooded sprayer. Do not allow spray to contact crop. Use COC or NIS. Weeds must be actively growing and less than 4 inches tall. Do not exceed 6.1 fl. oz. per acre per season.

Optill®. See detail below for Preemergence Broadleaves.

Sharpen® at 1-2 oz. burndown before the crop emerges. *Chickpeas and dry peas only.* Surface apply early pre-plant through preemergence. Add MSO at 1 pt. per

acre when used as a pre-plant burndown. Do not apply group 14, E herbicides within 30 days of planting. Do not apply when legumes reach cracking stage.

Spartan Charge®. See details below for Preemergence Broadleaves.

Preemergence Broadleaves and Grasses Recommended Products

Command 3ME® at the following rates:

Peas and cowpeas: 1.3 pts. per acre.

Succulent lima beans and snap beans: 0.4-0.67 pt. per acre.

Broadcast before planting, or after planting before crop emerges. Not effective on muck soil. 45-day PHI for succulent and snap beans.

Dual Magnum®, or **Dual II Magnum**® at 1-2 pts. per acre. Use lower rates on coarse soils. *English peas:* apply after seeding before crop emerges. Do not incorporate. *Beans and southern peas (cowpeas):* apply and incorporate before planting, or apply after seeding but before crop emerges. Can be tank-mixed preplant incorporated with Eptam® or trifluralin. Do not use on muck soils.

Eptam 7E® at 3.5 pts. per acre, or **Eptam 20G**® at 15 lbs. per acre. *Dry beans and snap beans only.* Apply before planting and incorporate immediately, or apply as a directed spray at last cultivation. Check label for sensitive varieties. *Snap beans and navy beans on coarse soils:* Do not exceed 3.5 pts. per acre. *All other labeled crops:* Do not exceed 9.75 pts. per acre.

Lorox 50DF® at 1-2 lbs. per acre.

MicroTech® at the following rates:

Lima beans: 2.5-3 qts. per acre.

Red kidney types of dry bean in Illinois only: 2.5-3 qts. per acre.

Apply before planting and incorporate. *RUP.*

Outlook® at 10-21 fl. oz. per acre. *Dry beans only.* Use lower rate on coarse soils that low in organic matter. Apply before planting and incorporate, apply after planting before emergence, or apply after planting when beans have 1-3 trifoliolate leaves. Do not exceed 12 fl. oz. on coarse soils prior to emergence. 70-day PHI.

 This is a reduced-risk pesticide. See page 37 for details.

 This is a biopesticide. See page 37 for details.

 May be acceptable for use in certified organic production. Check with your certifier before use.

Pendimethalin for most legumes (black, chickpeas, garbanzo, great northern, red kidney, lentils, navy, pea, snap bean, etc.) products at the following rates:

3.3EC formulations: 1.2-3.6 pts. per acre.

Prowl H2O®: 1.5-3 pts. per acre.

Use low rates on coarse soils. Broadcast and incorporate before planting. Not effective on soils with high organic matter.

Sonalan® at 1.5-4.5 pts. per acre. *Dry beans only.*

Not for muck soils. Apply and incorporate before planting. Use higher rates to suppress eastern black nightshade.

Trifluralin products at 0.5-0.75 lb. a.i. per acre. Use 4EC formulations at 1-1.5 pts. per acre. Use lowest rate on coarse soils. Apply and incorporate before planting. Not effective on soils with high organic matter.

Preemergence Broadleaves

Recommended Products

Optill® at 1.5 oz per acre. *Field and English peas and chickpeas only.* English peas (green shelled, snap, or snow peas) are labeled only in Illinois, Iowa, Minnesota, and Wisconsin. Apply preplant, preplant-incorporated or preemergence (up to 3 days after planting before cracking). Plant English and sugar snap peas at least 1/2-inch deep to avoid injury. Apply before cracking. A sequential application of Sharpen® may be made with a minimum of 30 days between applications. Do not apply north of Highway 210 in Minnesota. Do not use on any *Phaseolus* bean species. Do not apply group 14, E herbicides within 30 days of planting.

Reflex® at 1 pt. per acre. *Succulent peas in Michigan only — applicators must have a 24(c) label.* See next Preemergence and Postemergence Broadleaves section (below) for uses on beans. Apply after seeding peas in a tank-mix with other herbicides. Use only once in 2 years on same soil. 18-month waiting period before planting most other crops. 46-day PHI.

Sharpen® at the following rates:

Peas in Illinois, Iowa, Michigan, Minnesota, and Wisconsin: 0.75 fl oz. per acre.

Lentils in Minnesota, or chickpeas in all states: 0.75-2.0 fl. oz. per acre

Apply 0.75 fl oz. per acre rate preplant incorporated or preemergence (in peas up to 3 days after planting before cracking) to suppress black nightshade, lambsquarters, pigweed, and velvetleaf. Higher rates in lentils and chickpeas

will provide more, but still limited, residual weed control. Plant legumes at least 1/2-inch deep to avoid injury. Do not apply group 14, E herbicides within 30 days of planting.

Spartan 4F® at 2.25-8 oz. per acre. *Dry peas and chickpeas only.* Labeled for Michigan, Minnesota, and Wisconsin. Fall- or spring-apply early-preplant, preplant-incorporated, or preemergence. Rate depends on soil texture, organic matter, and pH. Do not use on soils with less than 1% organic matter or apply after crop emerges.

Spartan Advance® at 16-57 oz. per acre *Dry peas and chickpeas only.* Labeled for Michigan, Minnesota, and Wisconsin. Fall- or spring-apply early-preplant, preplant-incorporated, or preemergence. Rate depends on soil texture, organic matter, and pH. Do not use on sand soils with less than 1% organic matter or apply after crop emerges.

Spartan Charge® at the following rates:

Dry peas and chickpeas: 3-10.2 oz. per acre.

Apply preplant-burndown, early-preplant, or preemergence. Do not use on coarse soils with less than 1% soil organic matter.

Dry beans in Minnesota only: 3.75-5.75 oz. per acre.

Apply early-preplant or preemergence. Do not use on soils with less than 1.5% organic matter.

Rate depends on soil texture, organic matter, and pH. Do not apply after crop emerges.

Preemergence and Postemergence Broadleaves

Recommended Products

Permit® on *dry beans only* at the following rates:

Preemergence and postemergence broadcast or postemergence directed sprays: 0.5-0.66 oz. per acre.

Row middle applications: 0.5-1 oz. per acre.

Use 0.5-1 pt. of NIS per 25 gals. of spray solution if emerged weeds are present. Apply after planting but prior to soil cracking. Row-middle applications with no crop contact may be used after crop emergence. Do not exceed 1 oz. per acre per crop cycle, or 2 oz. per acre per 12-month period.

Pursuit® products at the following rates:

Cowpeas: **Pursuit 2L**® at 4 fl. oz. per acre, or **Pursuit DG**® at 1.44 oz. per acre. In Minnesota north of Highway 210 and in Michigan on sandy or sandy loam soils do not apply more than 2 fl. oz. per acre of Pursuit 2L®, or 0.72 oz. per acre of Pursuit DG®.

Dry beans, lima beans, and peas: Pursuit 2L® at 3 fl. oz. per acre, or Pursuit DG® at 1.08 oz. per acre. In Minnesota north of Highway 210 and in Michigan on sandy or sandy loam soils do not apply more than 2 fl. oz. per acre of Pursuit 2L®, or 0.72 oz. per acre of Pursuit DG®.

Cowpeas, dry beans, lima beans, and peas: Apply and incorporate within 1 week of planting, or apply within 3 days after planting before crop emerges, or apply after beans have 1 fully expanded trifoliate leaf. Do not apply to fields treated with trifluralin or injury may occur. Use 8 oz. of NIS per 25 gals. of spray solution if emerged weeds are present. If N fertilizer is added to a postemergence application, Basagran® must be added to minimize crop injury. Refer to Basagran® label for rates. 30-day PHI for succulent peas and snap beans. 60-day PHI for all others.

Snap beans in Illinois, Indiana, Iowa, Michigan and Minnesota: Pursuit 2L® at 1.5 fl. oz. per acre. Apply and incorporate within 1 week of planting, or apply within 1 day after planting. Apply before July 31. 30-day PHI.

Reflex® on *dry beans and snap beans only* at the following rates:

Extreme southeast Missouri: 1.5 pts. per acre per year (Region 5).

Indiana and Illinois south of I-70: 1.5 pts. per acre in alternate years (Region 4).

Indiana and Illinois north of I-70; and the rest of Missouri: 1.25 pts. per acre in alternate years (Region 3).

Kansas east of Highway 281 and Michigan and Minnesota south of I-94 : 1 pt. per acre in alternate years (Region 4).

Minnesota south of Highway 2 and north of I-94: 0.75 pt. per acre in alternate years (Region 5).

Not for lima beans. Reflex® is labeled in all states participating in this publication except in Kansas west of Highway 281 and in Minnesota north of Highway 2. Preemergence applications are labeled for all stated including Kansas east of Highway 281 and in Minnesota south of Interstate 94. Postemergence applications include Minnesota south of Highway 2 and Kansas east of Highway 281. The spectrum of weeds controlled varies by application method. For postemergence applications, apply when dry beans or snap beans have at least one fully expanded trifoliate leaf, and use NIS, COC, or

other additives following label instructions. Do not use liquid nitrogen or ammonium sulfate as an additive. 30-day PHI for snap beans. 45-day PHI for dry beans.

Sandea® at the following rates:

Dry beans with preemergence and postemergence broadcast or postemergence directed sprays: 0.5-0.67 oz. per acre.

Dry beans with row middle applications: 0.5-1 oz. per acre.

Snap beans and lima beans preemergence or middle row applications: 0.5-1 oz. per acre.

Snap beans and lima beans postemergence: 0.5-0.67 oz. per acre.

Succulent cowpea, black-eyed pea, southern pea only, preemergence: 0.5 oz. per acre.

Succulent cowpea, black-eyed pea, southern pea only, postemergence: 0.5-1 oz. per acre. Directed sprays recommended.

Use 0.5-1 pt. of NIS per 25 gals. of spray solution if emerged weeds are present at time of preemergence application. Use lower rates on coarse soils with low organic matter. Apply after planting but prior to cracking. For postemergence applications, apply to dry beans after plants have 1-3 trifoliate leaves but before flowering; apply to snap beans or lima beans after the crop has 2-4 trifoliate leaves but before flowering (directed spray may limit injury); and to *Vigna* spp. as a directed spray when plants have 3-4 trifoliate leaves but before flowering. Not recommended when temperatures are cool due to potential for crop injury. Row-middle applications with no crop contact may reduce crop injury after crop emergence. Do not exceed 0.67 oz. per acre per crop-cycle for dry beans, or 1 oz. per acre per crop-cycle for snap beans and succulent pea (*Vigna* spp. only). Do not exceed 2 oz. per acre per 12-month period. 30-day PHI.

Postemergence Broadleaves and Grasses

Recommended Products

Glyphosate products. See details above for Burndown or Directed/Shielded Application Broadleaves and Grasses.

RR Raptor® at the following rates:

Dry beans (see label for specific types) and dry peas: 4 fl. oz. per acre. May add 1-2 gals. of COC, or 1 qt. of NIS plus 2.5 gals. of nitrogen or 12-15 lbs.

ammonium sulfate per 100 gals. of spray solution to improve weed control (but may increase crop injury). If using COC or N fertilizer on dry beans to improve weed control, add Basagran® at 6-16 fl. oz. per acre or Rezult® at 12-24 fl. oz. per acre to minimize crop injury. You must add Basagran® or Rezult® for dry peas regardless of additives. A reduced 2 oz. per acre rate of Raptor® tank-mixed with Rezult® is labeled for control of mustard species in Minnesota for dry bean and dry peas. Do not exceed 1 application of Raptor® per year.

Lima beans (succulent) (IL, IN, IA, MI, MN, boot heel of MO, WI): 4 fl. oz. per acre. Must be applied with Basagran® at 6-16 fl. oz. per acre to improve crop tolerance. Apply when lima beans are in the first or second trifoliolate and weeds are less than 3 inches. Do not apply during flowering. Must add NIS containing at least 80% active ingredient at 1 qt. per 100 gals. of spray solution. Do not exceed 1 application per year.

Snap beans (IL, IN, IA, MI, MN, WI): 4 fl. oz. per acre. Must be applied with Basagran® at 6-16 fl. oz. per acre to improve crop tolerance. Apply after the first trifoliolate is fully expanded and before bloom. Must add NIS containing at least 80% active ingredient at 1 qt. per 100 gals. of spray solution. Do not add crop oils. Do not exceed 1 application per year.

Succulent (English) peas (IL, IN, IA, MI, MN, WI): 3 fl. oz. per acre. Apply to peas at least 3 inches tall but prior to 5 nodes before flowering. Must add NIS containing at least 80% active ingredient at 1 qt. per 100 gals. of spray solution. Adding a nitrogen-based solution may improve weed control but may also increase crop injury. May add Basagran® at 6-16 fl. oz. per acre to improve crop safety and broadleaf weed control when using N-based fertilizer. The 3 oz. rate of Raptor® is weak on grasses. May use COC instead of NIS to improve activity on grasses, but always add Basagran® to improve crop safety when using COC. Using Raptor® on fields treated with trifluralin may increase the risk of injury. Do not exceed 1 application per year.

Postemergence Broadleaves

Recommended Products

Aim EC®. See details above for Burndown or Directed/ Shielded Application Broadleaves.

Basagran 4L® at 1.5 to 2.0 pts. per acre, or **Basagran 5L®** at 1.2-1.6 pts. per acre. Apply when weeds are small and

after peas have 3 pairs of leaves or first trifoliolate leaf of beans is fully expanded. Do not add COC for peas. Do not exceed 4 pts. of 4L per acre per season. Do not exceed 3.6 pts. of 5L per acre per season. 30-day PHI.

Thistrol® at 1-2 qts. per acre. *Peas only.* Controls Canada thistle. Apply when peas have 6-12 nodes. Do not apply later than 3 nodes before pea flowering or after pea flower buds appear. Do not apply when peas are stressed or when temperature exceeds 90°F.

Postemergence Grasses

Recommended Products

Assure II® at 5-12 fl. oz. per acre. *Dry beans, snap beans, and peas only.* Use 1 qt. of COC per acre. Apply to actively growing grass. Do not exceed 14 fl. oz. per acre. 30-day PHI for succulent peas and dry beans. 15-day PHI for snap beans. 60-day PHI for dry peas.

Clethodim products at the following rates:

Select Max® at 9-16 fl. oz. per acre. Use Select Max® with 8 fl. oz. of NIS per 25 gals. of spray solution (0.25% v/v). Do not exceed 64 fl. oz. of Select Max® per acre per season.

2EC formulations of clethodim products at 6-8 fl. oz. per acre. Use 2EC formulations with 1 qt. of COC per 25 gals. of spray solution (1% v/v). Do not exceed 32 fl. oz. of 2EC formulations per acre per season.

Use low rates for annual grasses, and use high rates for perennial grasses. Apply to actively growing grass. 21-day PHI for crops harvested before they dry down. 30-day PHI for dry beans, dry lima beans, and dry peas.

Fusilade DX 2E® at 8-12 fl. oz. per acre. *Dry beans only.* Include 1-2 pts. of COC or 0.5-1 pt. of NIS per 25 gals. of spray solution. Spray on actively growing grass. Wait at least 14 days between applications. Do not exceed 48 fl. oz. per acre per season. 60-day PHI.

Poast 1.5E® at 1-2.5 pts. per acre. Use 1 qt. of COC per acre. Spray on actively growing grass. Use high rate on quackgrass. Do not exceed 4 pts. per acre per season. 15-day PHI for succulent beans and peas. 30-day PHI for dry beans and dry peas.

Targa® at 5-12 fl. oz. per acre. *Dry beans, snap beans, and peas only.* Use 1 qt. of COC per acre. Apply to actively growing grass. Do not exceed 14 fl. oz. per acre. 30-day PHI for succulent peas and dry beans. 15-day PHI for snap beans. 60-day PHI for dry peas.

Herbicides for Legumes¹

Products (REI/PHI)	Common Name	Timing and Application Location Relative to Crop ²				Incorporated	Timing Relative to Weeds		Weed Groups Controlled			Crops ³				
		Before seeding	After seeding before emergence	Post emergence -between rows only	Postemergence		Preemergence	Postemergence	Annual grasses	Small-seeded broadleaves	Broadleaves	Dry Beans (<i>Phaseolus</i>)	Lima Beans	Snap Beans	Dry Peas	English Peas (including snap, snow)
Aim EC® (12h/-)	carfentrazone	X	X				X		X		X	X	X	X	X	X
Assure II® (12h/15d to 60d)	quizalofop				X		X		X		X	X	X	X	X	X
Basagran® (12h/30d)	bentazon						X		X		X	X	X	X	X	X
Command 3ME® (12h/45d)	clomazone	X	X				X		X		X	X	X	X	X	X
Dual Magnum® (12h/-)	napropamide	X	X			Variable	X		X		X	X	X	X	X	X
Eptam® (12h/-)	EPTC	X	X	X		Yes	X		X		X	X	X	X	X	X
Gramoxone® (12h to 24h/-)	paraquat	X	X				X		X		X	X	X	X	X	X
MicroTech®	alachlor	X				Yes			X		X			X		
Optill® (12h/0)	safufenacil + imazethapyr	X	X				X		X		X			X		
Outlook® (12h/70d)	dimethenamid-P	X	X		X	Yes	X		X		X			X		
Pendimethalin (-/0d)	pendimethalin	X				Yes	X		X		X			X		X
Permit® (12h/30 to 60d)	halosulfuron	X	X		X		X		X		X			X		X
Poast® (12h/15-30d)	sethoxydim				X		X		X		X			X		X
Pursuit® (12h/30d)	imazethapyr	X	X				X		X		X			X		X
Raptor® (4h/0-30d)	imazamox				X		X		X		X			X		X
Reflex® (12h/30d to 45d)	Fomesafen				X		X		X		X			X		X
Roundup®, others (12h/14d)	glyphosate	X	X				X		X		X			X		X
Sandea® (12h/30d)	halosulfuron		X	X			X		X		X			X		X
Select Max®, others (12h/21-30d)	clethodim				X		X		X		X			X		X
Sharpen® (12h/0d)	safufenacil	X	X				X		X		X			X		X
Sonalan®	ethalfluralin	X				Yes	X		X		X			X		X
Spartan 4F® (12h/-)	sulfentrazone	X	X				X		X		X			X		X
Spartan Advance® (12h/90d)	sulfentrazone + glyphosate	X	X				X		X		X			X		X
Spartan Charge® (12h/-)	sulfentrazone + carfentrazone	X	X				X		X		X			X		X
Targa® (12h/15d to 60 d)	quizalofop				X		X		X		X			X		X
Thistrol (24h/-)	MCPB				X		X		X		X			X		X
Treflan®, others (12h/-)	trifluralin	X				Yes	X		X		X			X		X

¹For effectiveness against specific weeds, see Relative Effectiveness of Herbicides for Vegetable Crops (page 68), and read label. This table does not include all label information. Be sure to read and follow all instructions and precautions on the herbicide label. Herbicides can cause serious crop injury and yield loss if not used properly.

²X=permitted for at least one crop.

³X= permitted on this crop in at least one state.

Insect Control

Aphids and Leafhoppers

Potato Leafhopper Thresholds

Seedlings

0.5 per sweep, or 2 per row foot

3rd Trifoliolate

1 per sweep, or 5 per row foot

Bud Stage

5 per row foot

Recommended Products

Admire Pro® (4.6F) at the following rates:

Soil applications: 7-10.5 fl. oz. per acre. Do not exceed 1 application per season. 21-day PHI.

Foliar applications: 1.2 fl. oz. per acre. Do not exceed 3 applications per season. 7-day PHI.

Asana XL® (0.66EC) at 5.8-9.6 fl. oz. per acre. Do not exceed 38.4 fl. oz. per acre per season. Do not feed or graze livestock on treated vines. 3-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

RR **Assail 30SG**® at 2.5-5.3oz. per acre. Do not exceed 3 applications per season. 7-day PHI.

Baythroid XL® (1EC) at 2.4-3.2 fl. oz. per acre. *Leafhoppers on dry beans and peas only. Dry beans:* Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI. *Southern peas:* Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI. Allow 14 days between applications for all labeled crops. *RUP*.

Brigade® (2EC) at 1.6-6.4 fl. oz. per acre (do not exceed 12.8 fl. oz. per acre per season), or **Brigade**® (WSB) at 4-16 oz. per acre (do not exceed 32 oz. per acre per season). 3-day PHI for succulent legumes. 14-day PHI for dry legumes. *RUP*.

Cruiser 5FS® or **Cruiser Maxx**®. Rates vary by seeding rate and spacing. See labels. Cruiser® provides against early season injury by pests.

Dimethoate 4E® or **Dimethoate 400**® at 0.5-1 pt. per acre. *Not for cowpeas.* Do not feed treated plants to livestock. Do not apply during bloom. 0-day PHI for Dimethoate 400® (mechanical harvest only). 2-day PHI for Dimethoate 4E®.

Lannate LV® (2.4WSL) at the following rates:

Aphids: 1.5-3 pts. per acre.

Leafhoppers: 0.75-3 pts. per acre.

Do not feed hay to livestock for 7 days. 1-day PHI for succulent peas and succulent beans at 0.75-1.5 pts. 3-day PHI for succulent beans at high rate. 14-day PHI for dry beans. *RUP*.

Movento HL® at 2-2.5 fl. oz. per acre. *Aphids only.* Do not exceed 5 fl. oz. per acre per season. 1-day PHI for succulent beans. 7-day PHI for dry beans.

 **M-Pede**® at 1-2% by volume. *Aphids only.* Must contact aphids to be effective. 0-day PHI.

Mustang Maxx® (0.8EC) at the following rates:

Aphids: 3.2-4.0 oz. per acre.

Leafhoppers: 2.72-4.0 fl. oz. per acre.

Do not exceed 0.15 lb. a.i. per acre per season. 1-day PHI for succulent beans. 21-day PHI for dry beans. *RUP*.

Movento® (2SC) at 4-5 fl. oz. per acre. *Aphids only.* Do not exceed 10 fl. oz. per acre per season. 1-day PHI for succulent beans. 7-day PHI for dry beans.

Orthene® (97S) at 0.5-1 lb. per acre. *Do not feed treated vines to livestock. Not for use on snap beans.* Do not exceed 2 1/8 lbs. per acre per season. 14-day PHI for dry beans. 1-day PHI for lima beans.

Sevin XLR PLUS® (4F) at 0.5-1 qt. per acre. *Not for aphids.* Do not exceed 6 qts. per acre per season. 3-day PHI for succulent legumes. 14-day PHI for forage. 21-day PHI for dry legumes.

Sivanto® (200SL) at 7-10.5 fl. oz. per acre. 7-day PHI.

Thimet 20G® at 4.5-7.0 oz. per 1,000 linear ft. of row at any spacing. Drill granules to the side of the seed. Do not place granules in direct contact with seed. *Do not feed bean foliage to livestock.* 60-day PHI. *RUP*.

Warrior II® (2.08CS) at 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

Caterpillars (Alfalfa Caterpillars, Armyworms, Corn Earworms, Cutworms, European Corn Borers, and Loopers)

Recommended Products

Asana XL® (0.66EC) at 5.8-9.6 fl. oz. per acre. Do not exceed 38.4 fl. oz. per acre per season. *Do not feed treated vines to livestock.* 3-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

RR This is a reduced-risk pesticide. See page 37 for details.

 May be acceptable for use in certified organic production. Check with your certifier before use.

Baythroid XL® (1EC) at 2.4-3.2 fl. oz. per acre. *Dry beans and peas only.* *Dry beans:* Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI. *Southern peas:* Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI. Allow 14 days between applications for all labeled crops. *RUP.*

Blackhawk® at 1.7-3.3 oz. per acre. Do not exceed 6 applications per season. 3-day PHI for succulent legumes. 28-day PHI for dry legumes.

Brigade® (2EC) at 1.6-6.4 fl. oz. per acre (do not exceed 12.8 fl. oz. per acre per season), or **Brigade**® (WSB) at 4-16 oz. per acre (do not exceed 32 oz. per acre per season). 3-day PHI for succulent legumes. 14-day PHI for dry legumes. *RUP.*

RR Coragen® (1.67SC) at 3.5-5 fl. oz. per acre. Do not exceed 15.4 fl. oz. per acre per season. 1-day PHI.

Entrust® (2SC) at 3-6 fl. oz. per acre. *Succulent beans and peas:* Do not exceed 29 fl. oz. per acre per season. 3-day PHI. *Dry beans and peas:* Do not exceed 12 fl. oz. per acre per season.. 28-day PHI.

Intrepid 2F® at 4-16 fl. oz. per acre. 7-day PHI.

Lannate LV® (2.4WSL) at 1.5-3 pts. per acre. Do not exceed 15 pts. per acre per crop. 1-day PHI for peas. 5-day PHI for forage. 14-day PHI for hay. *RUP.*

Mustang Maxx® (0.8EC) at 1.28-4.0 fl. oz. per acre. Do not exceed 0.15 lb. a.i. per acre per season. 1-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP.*

Orthene® (97S) at 0.75-1 lb. per acre. *Do not feed treated vines to livestock. Not for use on snap beans.* Do not exceed 2 1/8 lbs. per acre per season. 14-day PHI for dry beans. 1-day PHI for lima beans.

RR Radiant SC® (1SC) at 3-8 fl. oz. per acre. *Succulent beans and peas:* Do not exceed 28 fl. oz. per acre per season. 3-day PHI. *Dry beans and peas:* Do not exceed 12 fl. oz. per acre per season. 28-day PHI.

Sevin XLR PLUS® (4F) at 1-1.5 qts. per acre. Do not exceed 6 qts. per acre per season. 3-day PHI for fresh beans. 14-day PHI for forage. 21-day PHI for dry beans.

Warrior II® (2.08EC) at 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP.*

Cowpea Curculios, Pea Weevils (cowpeas)

Recommended Products

Asana XL® (0.66EC) at 4.8-9.6 fl. oz. per acre. *Dry legumes only.* Do not exceed 38.4 fl. oz. per acre per season. Do not feed treated vines to livestock. 21-day PHI. *RUP.*

Baythroid XL® (1EC) at the following rates:

Cowpea curculios: 1.6-2.4 fl. oz. per acre.

Pea weevils: 2.4-3.2 fl. oz. per acre.

Dry beans: Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI.

Southern peas: Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI.

Dry beans and peas only. Allow 14 days between applications. *RUP.*

Brigade® (2EC) at 2.1-6.4 fl. oz. per acre (do not exceed 12.8 fl. oz. per acre per season), or **Brigade**® (WSB) at 5.3-16 oz. per acre (do not exceed or 32 oz. per acre per season). 14-day PHI. *RUP.*

Mustang Maxx® (0.8EC) at 2.72-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI for succulent legumes. 21-day PHI for dried. *RUP.*

Sevin XLR PLUS® (4F) at 1.5 qts. per acre. Do not exceed 6 qts. per acre per season. 3-day PHI for succulent legumes. 21-day PHI for dry legumes.

Warrior II® (2.08EC) at 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP.*

Mexican Bean Beetles, Bean Leaf Beetles

Bean Leaf Beetle Threshold

1 beetle per foot of row

Mexican Bean Beetle Threshold

0.5 beetle per plant

Recommended Products

Asana XL® (0.66EC) at 2.9-5.8 fl. oz. per acre. *Mexican bean beetle only. Not for bean leaf beetles.* Do not exceed 38.4 fl. oz. per acre per season. Do not feed or graze livestock on treated vines. 3-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP.*

Baythroid XL® (1EC) at 2.4-3.2 fl. oz. per acre. *Dry beans and peas only. Dry beans: Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI. Southern peas: Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI. Allow 14 days between applications for all labeled crops. RUP.*

Brigade® (2EC) at 1.6-6.4 fl. oz. per acre (do not exceed 12.8 fl. oz. per acre per season), or **Brigade**® (WSB) at 4-16 oz. per acre (do not exceed 32 oz. per acre per season). *Not for Mexican bean beetles. 3-day PHI for succulent legumes. 14-day PHI for dry legumes. RUP.*

Cruiser 5FS® or **Cruiser Maxx**®. Rates vary by seeding rate and spacing. See labels. Cruiser® provides against early season injury by pests.

Dimethoate 4E® or **Dimethoate 400**® at 0.5-1 pt. per acre. *Not for cowpeas. Do not feed to livestock. Do not apply during bloom. 0-day PHI for Dimethoate 400® (mechanical harvest only). 2-day PHI for Dimethoate 4E®.*

Lannate LV® (2.4WSL) at 0.75-3 pts. per acre. *Not for bean leaf beetles. Do not feed hay to livestock for 7 days. 1-day PHI for succulent peas and succulent beans at 0.75-1.5 pts. 3-day PHI for succulent beans at high rate. 14-day PHI for dry beans. RUP.*

Mustang Maxx® (0.8EC) at 2.72-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI for succulent beans. 21-day PHI for dry beans. RUP.

Orthene® (97S) at 0.5-1 lb. per acre. *Do not feed treated vines to livestock. Not for use on snap beans. Do not exceed 2 1/8 lbs. per acre per season. 14-day PHI for dry beans. 1-day PHI for lima beans.*

Sevin XLR PLUS® (4F) at 0.5-1 qt. per acre. Do not exceed 6 qts. per acre per season. 3-day PHI for succulent legumes. 14-day PHI for forage. 21-day PHI for dry legumes.

Thimet 20G® at 4.5-7.0 oz. per 1,000 linear ft. of row at any spacing. Drill granules to the side of the seed. Do not place granules in direct contact with seed. *Do not feed bean foliage to livestock. 60-day PHI. RUP.*

Warrior II® (2.08CS) at the following rates:

Mexican bean beetle: 0.96-1.60 fl. oz. per acre.

Bean leaf beetle: 1.28-1.92 fl. oz. per acre.

Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. RUP.

Seed Corn Maggots

Plant seed that has been treated with a product containing diazinon, or Cruiser®.

Flies are attracted to rotting organic material and freshly plowed soil. Plow winter cover crop under early in the spring and thoroughly cover. Handle seeds carefully to prevent cracking.

Recommended Products

Capture LFR® at 0.2-0.39 fl. oz. per 1,000 ft. of row at planting. RUP.

Cruiser 5FS® or **Cruiser Maxx**®. Rates vary by seeding rate and spacing. See labels. Cruiser® provides against early season injury by pests.

Lorsban 4E® at 1.8 fl. oz. per 1,000 linear ft. of row. Apply at planting. RUP.

Spider Mites

Recommended Products

Acramite 50WS® at 1-1.5 lbs. per acre. Do not exceed 2 applications per season. 3-day PHI.

Agri-Mek 0.15EC® at 8-16 fl. oz. per acre. *Dry beans only. Do not exceed 48 fl. oz. per acre per season. 7-day PHI.*

Dimethoate 4E® or **Dimethoate 400**® at 0.5-1 pt. per acre. *Not for cowpeas. Do not feed to livestock. Do not apply during bloom. 0-day PHI for 400 (mechanical harvest only). 2-day PHI for 4E. 0-day PHI.*

Portal® (0.4EC) at 2 pts. per acre. *Snap beans only. 1-day PHI.*

Stink Bugs

Recommended Products

Baythroid XL® (1EC) at 2.4-3.2 fl. oz. per acre. *Dry beans and peas only. Dry beans: Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI. Southern peas: Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI. Allow 14 days between applications for all labeled crops RUP.*

Brigade® (2EC) at 2.1-6.4 fl. oz. per acre (do not exceed 12.8 fl. oz. per acre per season), or **Brigade**® (WSB) at 5.3-16 oz. per acre (do not exceed 32 oz. per acre per season). 3-day PHI for succulent legumes. 14-day PHI for dry legumes. RUP.

Mustang Maxx[®] (0.8EC) at 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

Sevin XLR PLUS[®] (4F) at 1.5 qts. per acre. Do not exceed 6 qts. per acre per season. 3-day PHI for succulent legumes. 21-day PHI for dried. *RUP*.

Warrior II[®] (2.08EC) at 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

Thrips (cowpeas)

Recommended Products

Admire Pro[®] (4.6F) at the following rates:

Soil applications: 7-10.5 fl. oz per acre. Do not exceed 1 application per season. 21-day PHI.

Foliar applications: 1.2 fl. oz. per acre. Do not exceed 3 applications per season. 7-day PHI.

RR **Assail 30SG**[®] at 4.5-5.3 oz. per acre. Do not exceed 3 applications per season. 7-day PHI.

Baythroid XL[®] (1EC) at 1.6-2.1 fl. oz. per acre. *Dry legumes only.* *Dry beans:* Do not exceed 6.4 fl. oz. per acre per season. 7-day PHI. *Southern peas:* Do not exceed 10.5 fl. oz. per acre per season. 3-day PHI. Allow 14 days between applications for all labeled crops. *RUP*.

Brigade[®] (2EC) at 2.1-6.4 fl. oz. per acre, or **Brigade**[®] (WSB) at 5.3-16 oz. per acre. Do not exceed 12.8 fl. oz. of 2EC per acre per season. Do not exceed 32 oz. of WSB per acre per season. 3-day PHI for succulent legumes. 14-day PHI for dry legumes. *RUP*.

Entrust[®] (2SC) at 4.5-6 fl. oz. per acre. *Succulent beans and peas:* Do not exceed 29 fl. oz. per acre per season. 3-day PHI. *Dry beans and peas:* Do not exceed 12 fl. oz. per acre per season. 28-day PHI.

Mustang Maxx[®] (0.8EC) at 3.2-4.0 fl. oz. per acre. Do not exceed 24 fl. oz. per acre per season. 1-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

RR **Radiant SC**[®] (1SC) at 5-8 fl. oz. per acre. *Succulent beans and peas:* Do not exceed 28 fl. oz. per acre per season. 3-day PHI. *Dry beans and peas:* Do not exceed 12 fl. oz. per acre per season. 28-day PHI.

Sevin XLR PLUS[®] (4F) at 1 qt. per acre. Do not exceed 6 qts. per acre per season. 3-day PHI for succulent legumes. 21-day PHI for dry legumes.

Warrior II[®] (2.08EC) at 1.28-1.92 fl. oz. per acre. Do not exceed 7.68 fl. oz. per acre per season. 7-day PHI for succulent legumes. 21-day PHI for dry legumes. *RUP*.

Wireworms

Recommended Products

Cruiser 5FS[®] or **Cruiser Maxx**[®]. Rates vary by seeding rate and spacing. See labels. Cruiser[®] provides against early season injury by pests.