

Disease Control

Seed Treatment

For New Jersey Only. Dip seed in a solution containing 1 pint of Clorox per gallon of water for 1 to 2 minutes. Provide constant agitation. Use at the rate of 1 gallon of Clorox solution per 2 pounds of seed. Prepare a fresh solution for each batch of seed. Wash seed for 5 minutes in running water and dry thoroughly.

Fusarium Root Rot

For crown production, use treated seed and select a site where asparagus has never been grown.

For production fields, use disease-free crowns, transplants, or seed. Select well-drained fields where asparagus has never been grown. If this is not possible, select fields that have not been in asparagus for at least 8 years.

Phytophthora Crown and Spear Rot

In fields with poor drainage or extensive low areas, use 1.0 pt/A Ridomil Gold 4SL, 2.0 pt Ultra Flourish 2E/A, or 2.0 qt/A MetaStar 2E over the bed as follows:

Cutting fields: Apply 30 to 60 days before the first harvest and make a second application just prior to first cutting.

New plantings: Apply after planting seedlings or after covering crowns. This treatment will **not** control Fusarium root and crown rot.

Do not apply Ridomil Gold or MetaStar one day prior to harvest or illegal residues may result.

Purple Spot

Burn brush in winter to destroy overwintering sources of the fungus. Fungicide applications are not practical during the production season, because new spears emerge daily.

Once fernstalks are full size, scout on a weekly basis and apply the following and repeat every 2 to 4 weeks until frost:

Quadris--6.2-15.5 oz 2.08SC/A or chlorothalonil--2.0-4.0 pt 6F/A or OLF

Rotate between fungicides if more than 2 applications are needed.

Asparagus Rust

Control is necessary in 1- and 2-year beds, even with the use of resistant varieties. Traditionally sprays begin in mid-August. However, scout fields particularly noncutting beds, for disease beginning in late June. Rotate between the following fungicides every 7 days at the first sign of disease:

chlorothalonil--2.0-4.0 pt 6F/A or OLF, or Folicur--4.0-6.0 fl. oz 3.6F/A, or mancozeb--2.0 lb 75DF/A or OLF, or Rally--5.0 oz 40WSP/A plus an adjuvant (see label for specific details)

Use high rates under severe pressure from rust.

Rally and Folicur are FRAC code 3 fungicides and should not be used consecutively. Misuse of FRAC code 3 fungicides could lead to resistance development.

Varieties

Varieties ¹	DE	MD	NJ	PA	VA	WV
Snap Beans: Market (Green)						
Advantage	D					
Ambra					V	
Boone						WV
Bronco			N	P	V	WV
Caprice	D			P	V	WV
Carlo					V	
Charon		M	N	P	V	WV
Crockett						WV
Dusky					V	
Foremost	D					
Greencrop (flat, flavorful)				P		
Hialeah		M	N	P	V	WV
Hickok	D				V	
Inspiration	D					
Nash				P	V	
Pike				P	V	
Prevail	D					
Provider (early)	D	M		P		WV
Roma II (Italian flat pod)	D	M	N	P	V	WV
Secretariat					V	
Strike						WV
Shade				P	V	
Valentino	D				V	
Tema				P		WV
Snap Beans: Market (Wax)						
Eureka	D	M	N	P	V	WV
Golden Rod		M	N	P		
Goldrush	D	M	N	P		WV
Rocdor					V	
Uranus	D					
Snap Beans: Processing (Green)						
Brio	D		N	P		
Dandy (small sieve,3" pods)	D		N	P		
Hystyle	D		N	P		
Roma II	D	M	N	P		WV
Slenderette ²	D	M	N	P		WV
Snap Beans: Horticultural						
French Horticultural	D	M	N	P	V	WV
Supremo					V	
Volcano	D		N	P		
Maxibel						WV
Nickel						WV
Half-Runner (trellised)						
Volunteer (RR)					V	WV
Mountaineer					V	WV
State White Half-Runner					V	WV
Lima Beans, Fordhook Type						
Concentrated Fordhook	D				V	
Lima Bean, Baby Type						
Cypress (Race,D,E,DMR)	D	M	N	P	V	WV
184-85 (Race,E,DMR)	D	M	N	P		
Jackson Wonder (no resistance, speckled)	D				V	
C-elite Select (Race,D,E,DMR)	D	M	N	P		
M-15 (Race D, F, DMR)	D			P		

¹ Snap bean varieties listed alphabetically. Lima bean varieties listed by maturity, earliest first.

² Slenderette is more resistant to blossom drop at high temperatures than other varieties, and is suggested for plantings that mature between July 10 and August 10. Letters in parentheses indicate disease resistance possessed by varieties. See the "Abbreviations" section in front portion of this publication.

BEANS: SNAP AND LIMA

Recommended Nutrients Based on Soil Tests

Before using the table below, refer to important notes in Plant Nutrient Recommendations in Section B, Soil And Nutrient Information. These notes provide additional suggestions to adjust rate, timing and placement of nutrients depending on soil type cation exchange capacity and existing fertility levels.

Crop	Pounds N per Acre	Soil Phosphorus Level			Soil Potassium Level		
		Low Pounds P ₂ O ₅ per Acre	Med Pounds P ₂ O ₅ per Acre	Opt. Pounds P ₂ O ₅ per Acre	Low Pounds K ₂ O per Acre	Med Pounds K ₂ O per Acre	Opt. Pounds K ₂ O per Acre
Lima bean	60-80 ¹	100 ¹	60 ¹	20 ¹	140 ¹	100 ¹	60 ¹
Single crop	30-40 ²	100 ²	60 ²	20 ²	140 ²	100 ²	60 ²
	30 ³	50 ³	30 ³	10 ³	30 ³	15 ³	0 ³
	30-40 ³	0	0	0	0	0	0
After peas	20 ⁴	0	0	0	0	0	0
Snap bean	40-80 ¹	80 ¹	60 ¹	40 ¹	80 ¹	60 ¹	40 ¹
	20-40 ⁵	40 ⁵	40 ⁵	0 ⁵	40 ⁵	40 ⁵	0 ⁵
	20-40 ⁴	40 ⁴	20 ⁴	40 ⁴	40 ⁴	20 ⁴	40 ⁴
After peas	0-20 ⁶	0	0	0	0	0	0

¹Total amount nutrient recommended; growers producing vegetables on soils with high clay contents should reduce the recommended nitrogen and potassium rates by 20% and increase the phosphorus rate by 25%.

²Broadcast and disk-in, (or) Band-place with planter

³Band-place with planter followed by a sidedress with 30-40 lbs of N 3-5 weeks after emergence

⁴Band-place with planter

⁵Broadcast and disk-in

⁶Sidedress at prebloom stage

Apply 1-2 pounds of boron (B) per acre every 3 years on most soils. See Table B-10 for more specific boron recommendations.

Seed Treatment

Use treated seed to prevent disease. See the Disease Control section in this Chapter for more specific information. Rough handling of seed greatly reduces germination.

Planting Dates

<i>Planting</i>	<i>Harvest</i>
Market snap--Apr. 10-Aug. 10	June 20-Oct. 20
Processing snap--Apr. 20-Aug. 10	July 1-Oct. 20
Fordhook lima--May 15-July 10	Aug. 1-Oct. 20
Baby lima--May 15-July 20	Aug. 1-Oct. 30

In Pennsylvania and normally cooler areas, delay start of planting by 10 days and stop planting 14 days sooner than indicated in the above table.

Spacing

Snap Beans. Rows 30 to 36 inches apart, 6 to 10 plants per foot. Plant 50 to 75 pounds seed per acre depending on seed size. Narrow rows increase yields but render late-season tillage difficult. Plant in rows 18 to 24 inches apart with 5 to 7 plants per foot. Plant 75 to 120 pounds of seed per acre, depending on seed size (smaller = lower rate). Calibrate planter according to seed size. Sow 1 to 1½ inches deep in light sandy soil; shallower in heavier soil.

Lima Beans, Fordhook Type. Rows 30 to 36 inches apart, 2 plants per foot. Plant 85 pounds per acre, 1½ inches deep.

Lima Beans, Baby Types. Rows 30 to 36 inches apart, 3 to 4 plants per foot. Plant 50 pounds per acre, 1½ inches deep (deeper if soil is dry). For irrigated fields: Rows 18 to 30 inches apart, 4 to 5 inches between plants; plant 96 pounds per acre at close spacing and 78 pounds per acre at wider spacing.

Weed Control

Section 18 Emergency Label requests may be submitted to supplement weed control recommendations in snap beans and lima beans.

Identify the weeds in each field and select recommended herbicides that control those weeds. See Tables E-2 and E-3.

Match preplant incorporated and preemergence herbicide rates to soil type and percent organic matter in each field.

Apply postemergence herbicides when crop and weeds are within the recommended size and/or leaf stage.

Find the herbicides you plan to use in the Herbicide Resistance Action Committee's (HRAC) **Herbicide Site of Action Table E-7** and follow the recommended good management practices to minimize the risk of herbicide resistance development by weeds in your fields.

No-Till

Give consideration to bean variety, date of planting, soil fertility practices, insect control, planting equipment, mulch, and weed species in the field.

Preemergence

S-metolachlor--0.63-1.91 lb/A. Apply 0.66 to 2 pints per acre Dual Magnum 7.62E after seeding and before emergence. Tank-mix with Glyphomax Plus, Roundup Ultra Max 4SC, Touchdown, Gramoxone Max 3SC or Gramoxone Inteon 2SC to control emerged weeds. Bentazon, postemergence, may be required for adequate broadleaf weed control. A modified fertility program may be necessary, especially for nitrogen (such as early sidedressing). Do not use on black turtle soup beans. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Clomazone (snap beans only)--0.094-0.188 lb/A. (See the following "clomazone" paragraph in conventional tillage).

Glyphosate--0.75-1.1 lb acid equivalent/A. Apply 1.6 to 2.4 pints per acre Roundup Ultra Max, 2 to 3 pints per acre Touchdown, or 2 to 3 pints per acre Glyphomax Plus after seeding and before emergence. Tank-mix with Dual Magnum 7.62E for residual weed control. Roundup Ultra Max 4SC controls many perennial weeds as well as annuals if applied when the weed is actively growing and has reached the stage of growth listed on the label.

Paraquat--0.6-1 lb/A. Apply 2.4 to 4.0 pints per acre Gramoxone Inteon 2SC a or OLF after seeding but before emergence, or as a split application before and after seeding to control emerged annual weeds. Do not exceed the maximum total labeled rate when using the split application. Tank-mix with Dual Magnum 7.62E for residual weed control.

Conventional Tillage

Preplant Incorporated

EPTC (snap beans only)--2.5-3 lb/A. Apply 3 to 3.5 pints Eptam 7E or 15 pounds of Eptam 20G. Useful for nutsedge control, annual grasses, and some broadleaf weeds. Incorporate by disking twice into 3 to 4 inches of soil immediately after application. Tank-mix with Treflan to improve control of common lambsquarters. Combining Eptam with Dual Magnum may improve weed control but may increase the risk of crop injury when weather conditions are adverse.

Imazethapyr (lima beans)--0.024-0.031 lb/A. Apply 1.5 to 2 fluid ounces per acre Pursuit 2SC. Shallow, thorough incorporation improves consistency of performance when dry weather follows application. Primarily controls broadleaf weeds. Combine with another herbicide to control annual grasses. Pursuit residues persist in the soil after harvest and may affect following crops. DO NOT exceed 2 fluid ounces per acre of Pursuit 2SC at planting or make more than one application per acre per year. Follow label instructions pertaining to following crops.

S-metolachlor--0.63-1.91 lb/A. Apply 0.66 to 2 pints per acre Dual Magnum 7.62E. Incorporate 2 to 3 inches deep by disking twice with blades set 4 to 6 inches deep. Primarily controls annual grasses and nutsedge. Do NOT use on black turtle soup beans. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Pendimethalin (lima beans)--0.48 lb/A. Apply 1 pint of Prowl H₂O or OLF per acre and incorporate to mix thoroughly with the top 2 to 3 inches of soil. Primarily controls annual grasses and certain broadleaf weeds. Do not use when soils are cold and/or wet soil conditions are anticipated during emergence, or crop injury may result. **Not recommended in New Jersey.**

Trifluralin--0.5-0.75 lb/A. Apply 1 to 1.5 pints per acre of Treflan 4E or 10 to 15 pounds per acre of Treflan 5G. Incorporate it into 2 to 3 inches of soil within 8 hours after application. Primarily controls annual grasses and a few broadleaf weeds. Treflan may be applied up to 4 weeks prior to planting. Do not use or reduce the rate used when cold, wet soil conditions are expected, or crop injury may result.

Preemergence

Clomazone (snap beans only)--0.094-0.188 lb/A. Apply 4 to 8 fluid ounces per acre Command 3ME to control annual grasses and many broadleaf weeds including common lambsquarters, velvetleaf, spurred anoda, and jimsonweed. Mustards, morningglory species, and pigweed species will not be controlled. Use the lower rate on coarse-textured soils low in organic matter and higher rates on fine-textured soils and on soils with high organic matter. Combine with Dual Magnum 7.62E to control yellow nutsedge and pigweed. Some temporary crop injury (partial whitening of leaf or stem tissue) may be apparent after crop emergence. Complete recovery will occur from minor early injury without affecting yield or earliness.

WARNING: Command spray or vapor drift may injure sensitive crops and other vegetation up to several hundred yards from the point of application. Do not apply when wind or weather conditions favor herbicide drift. Do not

apply to fields adjacent to horticultural, fruit, vegetable, or other sensitive crops (see label). Drift injury from offsite Command movement is extremely apparent; therefore, do not use Command on fields near sensitive locations.

Herbicide residues may limit subsequent cropping options when Command is used for weed control in snap beans. See planting restrictions on the label or consult your local Cooperative Extension office for information regarding subsequent cropping options when Command is used.

DCPA (snap bean only)--6-10.5 lb/A. Apply 8 to 14 pints per acre Dacthal 6F. Primarily controls annual grasses and a few broadleaf weeds, including common purslane. Results have been most consistent when used in fields with coarse-textured soils low in organic matter and when the application was followed by rainfall or irrigation.

Halosulfuron--0.024-0.047 lb/A. Apply 0.5 to 1.0 dry ounces of Sandea75 DF preemergence to control or suppress yellow nutsedge and many annual broadleaf weeds. Results have been most consistent when the application was followed by rainfall or irrigation. Use the lower rate on coarse-textured (sandy) soils low in organic matter, and the higher rate on fine-textured (silt and clay) soils. Observe a thirty (30) day preharvest interval (PHI). Do NOT apply Sandea to crops treated with a soil applied organophosphate insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application.

Imazethapyr (lima beans)--0.024-0.047 lb/A. Apply 1.5 to 3 fluid ounces per acre Pursuit 2SC. Weed control may be inconsistent when dry weather follows application. Primarily controls broadleaf weeds. Combine with another herbicide to control annual grasses. Pursuit residues persist in the soil after harvest and may affect following crops. DO NOT apply more than 3 fluid ounces of Pursuit 2SC per acre per year. Follow label instructions pertaining to following crops.

S-metolachlor--0.63-1.91 lb/A. Apply 0.66 to 2 pints per acre Dual Magnum 7.62E. Primarily controls annual grasses and a few broadleaf weeds. Do NOT use on black turtle soup beans. **Other generic versions of metolachlor and s-metolachlor may be available, and may or may not be labeled for use in the crop.**

Postemergence

Bentazon--0.5-1 lb/A. Apply 1 to 2 pints per acre Basagran 4SC when beans have fully expanded first trifoliate leaves. Use lower rate to control common cocklebur, mustards, and jimsonweed and the higher rate to control yellow nutsedge, common lambsquarters, common ragweed, and Canada thistle. Temporary, pronounced crop injury may be observed that can result in delayed maturity. The use of oil concentrate may increase the risk and severity of crop injury. To reduce the risk of crop injury, omit additives or switch to a nonionic surfactant when weeds are small and soil moisture is adequate. Do not spray when temperatures are over 90°F (32.2°C).

Clethodim--0.094-0.125 lb/A. Apply 12 to 16 fluid ounces of Select Max 0.97EC with nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control many annual and certain perennial grasses, including annual bluegrass. Select will not consistently control goosegrass. Control may be reduced if

grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within 2 to 3 days of any other pesticide unless labeled, as the risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 21 days.

Fomesafen (snap beans only)—0.125-0.188 lb/A. Apply 0.5 to 0.75 pints per acre of Reflex 2SC when snap beans have one to two fully expanded trifoliolate leaves. The recommended rate is lower than the labeled rate to reduce the risk of crop injury. Use the lower recommended rate when weeds are small or when plentiful soil moisture, high humidity, and warm cloudy weather cause “soft” growing conditions. Add nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of spray). Tank-mix with bentazon (Basagran) to improve the control of common lambsquarters. Lima beans and most other vegetables are sensitive to fomesafen. Observe labeled plantback restrictions. Do NOT apply to any field more than once every two years.

Halosulfuron--0.024-0.031 lb/A. Apply 0.5 to 0.66 dry ounces of Sandea 75DF plus nonionic surfactant to be 0.25 percent of the spray solution (1 quart per 100 gallons of spray solution) postemergence to control yellow nutsedge and certain annual broadleaf weeds. Use only the lower rate when treating snap beans. Applications should be sprayed when the crop has 2 to 3 trifoliolate leaves and annual weeds are less than 2 inches tall. Treatments applied when beans are younger increases the risk of temporary stunting, and applications after the 3 trifoliolate leaf stage increases the risk of a split set. Susceptible broadleaf weeds usually exhibit injury symptoms within 1 to 2 weeks of treatment. Typical symptoms begin as yellowing in the growing point that spreads to the entire plant and is followed by death of the weed. Injury symptoms are similar when yellow nutsedge is treated but may require 2 to 3 weeks to become evident and up to a month for the weed to die. Occasionally, slight yellowing of the crop may be observed within a week of Sandea application. When observed, recovery is rapid with no effect on yield or maturity. Sandea is an ALS inhibitor. Herbicides with this mode of action have a single site of activity in susceptible weeds. The risk of the development of resistant weed populations is high when herbicides with this mode of action are used continuously and exclusively to control a weed species for several years or in consecutive crops in a rotation. Integrate mechanical methods of control and use herbicides with a different mode of action to control the target broadleaf weeds when growing other crops in the rotation. Observe a thirty (30) day preharvest interval (PHI). Do NOT apply Sandea to crops treated with a soil applied organophosphate insecticide, or use a foliar applied organophosphate insecticide within 21 days before or 7 days after a Sandea application.

Imazamox (lima bean only) -0.031 lb/A. Labeled and recommended for use in DE, MD, and VA only. Apply 4 fluid ounces of Raptor 1SC per acre to control annual broadleaf weeds when the crop has one to two fully expanded trifoliolate leaves. Add nonionic surfactant to be 0.25% of the spray solution (1 quart per 100 gallons of

spray). Add one half to 1 pint of bentazon (Basagran) to reduce the expression of injury symptoms. Strictly observe all plantback restrictions. Raptor is an ALS inhibitor. Herbicides with this mode of action have a single site of activity in susceptible weeds. The risk of the development of resistant weed populations is high when herbicides with this mode of action are used continuously and exclusively to control a weed species for several years or in consecutive crops in a rotation. Integrate mechanical methods of control and use herbicides with a different mode of action to control the target broadleaf weeds when growing other crops in the rotation. ALS resistant weeds are present in the mid-Atlantic region and will not be controlled.

Quizalofop-P-ethyl (snap beans only)--0.04-0.08 lb/A. Apply 6 to 12 fluid ounces per acre Assure II/Targa 0.88EC postemergence to control most annual and perennial grasses. Add with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) or nonionic surfactant to be 0.25 percent of the spray solution (1 quart per 100 gallons of spray solution). For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, and broadleaf weeds will not be controlled. Do not tank-mix with other pesticides unless labeled, as the risk of crop injury may be increased or reduced control of grasses may result. Observe a minimum preharvest interval of 15 days and apply no more than 14 fluid ounces per acre in one season.

Sethoxydim--0.2-0.3 lb/A. Apply 1 to 1.5 pints per acre Poast 1.5EC with oil concentrate to be 1 percent of the spray solution (1 gallon per 100 gallons of spray solution) postemergence to control annual grasses and certain perennial grasses. **The use of oil concentrate may increase the risk of crop injury when hot or humid conditions prevail.** To reduce the risk of crop injury, omit additives or switch to nonionic surfactant when grasses are small and soil moisture is adequate. Control may be reduced if grasses are large or if hot, dry weather or drought conditions occur. For best results, treat annual grasses when they are actively growing and before tillers are present. Repeated applications may be needed to control certain perennial grasses. Yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. Do not tank-mix with or apply within one week before or after Basagran or any other pesticide unless labeled. The risk of crop injury may be increased, or reduced control of grasses may result. Observe a minimum preharvest interval of 15 days and apply no more than 4 pints per acre in one season.

Postharvest

Paraquat--0.6 lb/A. **A Special Local-Needs 24(c) label has been approved for the use of Gramoxone Inteon 2SC or OLF for postharvest desiccation of the crop in Delaware, New Jersey and Virginia.** Apply 2.4 pints per acre Gramoxone Inteon 2SC or OLF as a broadcast spray after the last harvest. Add nonionic surfactant according to the labeled instructions. See the label for additional information and warnings.

Insect Control

NOTE: Copies of specific insecticide product labels can be downloaded by visiting the websites www.CDMS.net or www.Greenbook.org. Also, specific labels can be obtained via web search engines.

Seed Maggot

bifenthrin + indole butyric acid (Empower²)
 chlorpyrifos (Lorsban ST – **commercially applied seed treatment only**)
 thiamethoxam (Cruiser 5FS – **commercially applied seed treatment only**)

Cutworms (See the "Cutworms" section in Soil Pests-- Their Detection and Control.)

acephate (Orthene 97S or OLF)
 bifenthrin (Brigade EC, Sniper, or OLF)
 carbaryl (Sevin 80S, Sevin 5%Bait, or OLF)
 esfenvalerate (**snap beans only**) (Asana XL)
 flubendiamide (Belt SC)
 gamma-cyhalothrin (Proaxis)
 lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
 lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
 methomyl (Lannate LV or OLF)
 zeta-cypermethrin (Mustang MAX, Respect or OLF)
 zeta-cypermethrin + bifenthrin (Hero EC)

Thrips

Treatments should be applied if thrips are present from cotyledon stage to when the first true leaves are established and/or when first blossoms form.

bifenthrin + imidacloprid (Brigadier)
 endosulfan (Thionex 3EC or OLF)
 gamma-cyhalothrin (Proaxis)
 imidacloprid (soil–Admire Pro; foliar–Nuprid 1.6F, Provado 1.6F or OLF)
 lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
 lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
 methomyl (Lannate LV or OLF)
 spinetoram (Radiant 2SC)
 spinosad (Entrust 80W, SpinTor 2SC or OLF)
 zeta-cypermethrin (Mustang MAX, Respect or OLF)
 zeta-cypermethrin + bifenthrin (Hero EC)

Mites

Spot-treat areas along edges of fields when white stippling along veins on underside of leaves is first noticed and 20 mites per leaflet are present.

bifenthrin (Brigade EC, Sniper, or OLF)
 dimethoate (Dimate 4EC or OLF)
 zeta-cypermethrin + bifenthrin (Hero EC)

Aphids

Treat only if aphids are well distributed throughout the field (50 percent or more of terminals with five or more aphids), when weather favors population increase, and if beneficial species are lacking.

acephate (Orthene 97S or OLF)
 acetamiprid (Assail 30SG or OLF)
 bifenthrin + imidacloprid (Brigadier)
 dimethoate (Dimate 4EC or OLF)
 endosulfan (Thionex 3EC or OLF)
 imidacloprid (soil–Admire Pro; foliar–Nuprid 1.6F, Provado 1.6F or OLF)
 methomyl (Lannate LV or OLF)

Leafminers

dimethoate (Dimate 4EC or OLF)
 spinetoram (Radiant 2SC)
 spinosad (Entrust 80W, SpinTor 2SC or OLF)

Leafhoppers

Treat only if the number of adults plus nymphs exceeds 100 per 20 sweeps during prebloom, 250 per 20 sweeps during bloom, or 500 per 20 sweeps during pod development. Acephate treatments timed for European corn borer control will reduce leafhopper populations.

acephate (Orthene 97S or OLF)
 acetamiprid (Assail 30SG or OLF)
 bifenthrin (Brigade EC, Sniper, or OLF)
 bifenthrin + imidacloprid (Brigadier)
 carbaryl (Sevin 80S or OLF)
 dimethoate (Dimate 4EC or OLF)
 esfenvalerate (**snap beans only**) (Asana XL)
 gamma-cyhalothrin (Proaxis)
 imidacloprid (Admire Pro, Nuprid 1.6F, Provado, OLF)
 lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
 lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
 methomyl (Lannate or OLF)
 thiamethoxam (Cruiser 5ST–**commercially applied seed treatment only**)
 zeta-cypermethrin (Mustang MAX, Respect or OLF)
 zeta-cypermethrin + bifenthrin (Hero EC)

Stink bugs, Tarnished Plant Bug (TPB)

Treat only if the number of adults and/or nymphs exceeds 15 per 50 sweeps from the pin pod stage until harvest.

bifenthrin (Brigade EC, Sniper, or OLF)
 dimethoate (Dimate 4EC or OLF)
 gamma-cyhalothrin (Proaxis)
 lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
 lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
 methomyl (**TPB only**) (Lannate LV or OLF)
 zeta-cypermethrin (Mustang MAX, Respect or OLF) (**TPB only**)
 zeta-cypermethrin + bifenthrin (Hero EC)

Mexican Bean Beetle

Treat if defoliation exceeds 20 percent during prebloom or 10 percent during podding and there is a population potential for further defoliation. These levels of defoliation may result in earlier maturity of the crop. Wait until hatch or adult emergence when eggs and pupae are present. On farms with a succession of bean plantings, the release of the larval parasitoid, *Pediobius foveolatus*, may provide effective biological control.

acetamiprid (Assail 30SG or OLF)
 azadirachtin (Azatin, Ecozin, Neemix **for larvae only**)
Note: activity is enhanced when a pyrethrin is added.
 carbaryl (Sevin 80S or OLF)
 dimethoate (Dimate 4EC or OLF)
 endosulfan (Thionex 3EC or OLF)
 esfenvalerate (**snap beans only**) (Asana XL)
 gamma-cyhalothrin (Proaxis)
 lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)

lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
zeta-cypermethrin (Mustang MAX, Respect or OLF)
zeta-cypermethrin + bifenthrin (Hero EC)

Bean Leaf Beetle

(Use the same treatment guidelines as for Mexican bean beetle.)

acetamiprid (Assail 30SG)
bifenthrin (Brigade EC, Sniper, or OLF)
bifenthrin + imidacloprid (Brigadier)
carbaryl (Sevin 80S or OLF)
dimethoate (Dimate 4EC or OLF)
gamma-cyhalothrin (Proaxis)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
thiamethoxam (Cruiser 5ST - **commercially applied seed treatment only**)
zeta-cypermethrin (Mustang MAX, Respect or OLF)
zeta-cypermethrin + bifenthrin (Hero EC)

Beet Armyworm

Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)
chlorantraniliprole (Coragen 1.67SC)
flubendiamide (Belt SC)
methoxyfenozide (Intrepid 2F)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)

Cabbage Looper

Treat if the total number of any worm pests averages 30 per 3 feet of row.

acephate (Orthene 97S or OLF)
Bacillus thuringiensis (Biobit, Dipel, Dipel 2X, Javelin, XenTari or OLF)
bifenthrin (Brigade EC, Sniper, or OLF)
esfenvalerate (**snap beans only**) (Asana XL)
flubendiamide (Belt SC)
gamma-cyhalothrin (Proaxis)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
methoxyfenozide (Intrepid 2F)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
zeta-cypermethrin (Mustang MAX, Respect or OLF)
zeta-cypermethrin + bifenthrin (Hero EC)

European Corn Borer (ECB)--Processing Snap Beans

The most critical times for corn borer treatment are at the bloom and pin stages. Begin treatment when moths are first detected in local blacklight traps. The first application should be applied during the bud-early bloom stage and the second application during the late bloom-early pin stage. After the pin spray, the following thresholds and spray intervals should be used:

Number ECB Moths(BLT)/5 Days Spray Interval (Days)	
Less than 10	No spray
11-25	7
26-50	6
51-75	5
76-250	4
250+	3

European Corn Borer (ECB)--Fresh Market Snap Beans

As a general guideline, treatment should begin when blacklight trap catches average five or more per night. Treatments should be applied on a 7-day schedule from the pin stage until harvest. In general, one to three applications will be needed.

acephate (Orthene 97S or OLF)
bifenthrin (Brigade EC, Sniper, or OLF)
chlorantraniliprole (Coragen 1.67SC)
esfenvalerate (**snap beans only**) (Asana XL)
flubendiamide (Belt SC)
gamma-cyhalothrin (Proaxis)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)
lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
methomyl (Lannate LV or OLF)
spinetoram (Radiant 2SC)
spinosad (Entrust 80W, SpinTor 2SC or OLF)
zeta-cypermethrin (Mustang MAX, Respect or OLF)
zeta-cypermethrin + bifenthrin (Hero EC)

Whiteflies

acephate (Orthene 97S or OLF)
acetamiprid (Assail 30SG or OLF)
imidacloprid (soil--Admire Pro; foliar--Nuprid 1.6F, Provado 1.6F or OLF)
insecticidal soap (M-Pede)

Corn Earworm (CEW)

In snap beans, treat every 5 to 7 days if CEW catches in local blacklight traps average 20 or more per night and most corn in the area is mature.

For Fordhook lima beans, treat when CEW populations exceed two per 6 feet of row up to 4 weeks from harvest or three per 6 feet of row thereafter.

For baby limas, treat when CEW populations exceed one per 6 feet of row from the late flat pod stage to harvest.

For both lima bean types, treatment should be timed when 50 percent or more of the CEW populations reaches a length of 1/2 inch or longer. Treating too early for young CEW populations will eliminate natural control and may result in additional sprays for reinfestations. See "How to Improve Pest Control" for insect sampling techniques. Consult your pest management specialist for more refined decision-making.

bifenthrin (Brigade EC, Sniper, or OLF)
chlorantraniliprole (Coragen 1.67SC)
esfenvalerate (**snap beans only**) (Asana XL)
flubendiamide (Belt SC)
gamma-cyhalothrin (Proaxis)
imidacloprid (soil--Admire Pro; foliar--Nuprid 1.6F, Provado 1.6 or OLF)
lambda-cyhalothrin (Lambda-Cy, LambdaT, Silencer, Warrior II or OLF)

lambda-cyhalothrin+chlorantraniliprole (Voliam xpress)
 methomyl (Lannate LV or OLF)
 spinetoram (Radiant 2SC)
 spinosad (Entrust 80W, SpinTor 2SC or OLF)
 zeta-cypermethrin (Mustang MAX, Respect or OLF)
 zeta-cypermethrin + bifenthrin (Hero EC)

Pesticide	Use Category ¹	Hours to Reentry ²	Days to Harvest
INSECTICIDE			
acephate	G	24	Lima: 0 Snap:14
acetamiprid	G	12	7
azadirachtin	G	4	0
<i>Bacillus thuringiensis</i>	G	4	0
bifenthrin	R	12	3
bifenthrin + imidacloprid	R	12	7
bifenthrin + indole butyric acid	R	see label	3
carbaryl	G	12	3
chlorantraniliprole	G	4	1
dimethoate	R	48	0
esfenvalerate	R	12	3
fluendiamide	G	12	1
gamma-cyhalothrin	R	24	7
imidacloprid (soil/foliar)	G	12	21/7
insecticidal soap	G	12	0
lambda-cyhalothrin	R	24	7
lambda-cyhalothrin + chlorantraniliprole	R	24	7
methomyl ³	R	48	1/3
methoxyfenozide	G	4	7
spinetoram	G	4	3
spinosad	G	4	3
zeta-cypermethrin	R	12	1
zeta-cypermethrin+bifenthrin	R	12	3
FUNGICIDE (FRAC code)			
chlorothalonil (snap bean only) (Group M5)	G	12	7
Contans WG (biological)	G	4	0
copper, fixed (Group M1)	G	24	0
Endura (Group 7)	G	12	7
Folicur (Group 3) (snap bean)	G	12	7
Forum (Group 40)	G	12	0
Headline (Group 11)	G	12	7
iprodione (Group 2)	G	24	0
Omega (Group 29)	G	48	14
ProPhyt (Group 33)	G	4	0
Quadris (Group 11)	G	4	0
Rally (Group 3) (snap bean)	G	24	0
Ridomil Gold (Group 4)	G	48	3
Ridomil Gold Copper (4 + M1)	G	48	5
thiophanate-methyl (Group 1)	G	12	14
Switch (Groups 9 + 12)	G	12	7

See Table D-6.

¹ G = general, R restricted

² Chemicals with multiple designations are based on product and/or formulation differences. CONSULT LABEL.

³ Days to harvest depends on rate. CONSULT LABEL.

Nematode Control

See Chapter E – Pest Management "Nematodes" section of Soil Pests-Their Detection and Control. Use fumigants listed in the "Soil Fumigation" section or Mocap 15G at 13-20 lb/A (0.9 to 1.4 pound per 1000 linear feet of row) in a 12 in. band over the row Do not use as an in-furrow treatment.

Races 1,2, and 5 of the soybean cyst nematode (SCN) have been identified in Delaware recently. Snap beans are susceptible, but baby lima beans are resistant to SCN. Resistance was confirmed in 2010 by testing a number of widely planted baby lima bean cultivars for resistance to the

most prevalent race 1 population in DE. Growers who rotate snap beans with soybeans should be alert to the possibility of problems in infested fields. Snap beans and lima beans are very susceptible to root knot nematodes. Soil sampling fields in the fall for SCN and root knot nematode is highly recommended.

Disease Control

Seed Treatment

Use seed treated with Allegiance or Apron XL LS (0.16-0.64 fl oz/100 lb seed) for Pythium control plus either Maxim 4FS (0.08-0.16 fl oz/100 lb seed) for Rhizoctonia and Fusarium control or Dynasty (azoxystrobin--0.15-0.76 fl oz/100 lb seed) for Rhizoctonia control.

Rough handling of seed greatly reduces germination.

IMPORTANT: Do not use treated seed for food or feed.

Anthracnose and Web Blight (Rhizoctonia)

Use western-grown seed and rotate to allow 2 years between bean plantings. When disease appears and/or environmental conditions favors disease development, use the following:

Quadris--6.2–15.5 oz 2.08SC/A , or
 Headline--6.0-9.0 fl oz 2.1EC/A

Pythium blight (Cottony leak)

Select varieties with good plant architecture that keep the pods off the soil. Narrow row spacing may help keep plants erect and pods from touching the soil. Select fields with good drainage and do not overwater.

Section 24(c) registrations in DE, MD, and VA are in effect for the use of Ridomil Gold Copper 65WP (2.0 lb/A). Other states should check with their pesticide authority or chemical supplier for updates.

Bacterial Blight

Use western-grown seed. Fixed copper (1.0 lb ai/A) is of some value in reducing spread where incidence is low. See label for rates.

Bacterial Brown Spot

This seed-borne disease occurs primarily on lima beans and is more troublesome in irrigated fields and during wet seasons. Fixed copper (1.0 lb ai/A) is of some value in reducing spread where incidence is low. See label for rates.

Common Bean Rust (*Uromyces appendiculatus*) of Snap Bean

Rust is a problem only during late summer/early fall. Plant resistant varieties whenever possible. For susceptible varieties, spray when the disease first appears, and repeat every 7 days.

Quadris--6.2–15.5 fl oz 2.08SC/A, or
 Rally--4.0-5.0 oz 40WSP/A, or
 Folicur--4-6 fl oz 3.6F/A, or
 Headline--6.0-9.0 fl oz 2.1EC/A, or
 chlorothalonil--2.0-4.0 pt 6F/A or OLF

Materials with different modes of action (i.e. FRAC code) should be alternated

Root Rots

Rotate beans with non-legume crops. Avoid poorly drained soils. Plow under previous crop residue rather than discing. Root rot is caused by a complex of soilborne fungi including *Rhizoctonia*, *Pythium* and *Fusarium*. The primary cause of root rot in the mid-Atlantic region is *Pythium* spp. *Pythium* causes extensive damage in July and August during periods of warm, humid weather. *Pythium* can also cause extensive pod rot on snap beans. Select varieties that set high in the plant and use a close row spacing to avoid pod contact with the soil to reduce disease incidence. Apply one of the following at planting:

Ridomil Gold--0.5-1.0 pt 4SL/A. Apply in a 7-inch band over the row at seeding. (for *Pythium* only)

To provide control of root rot caused by *Pythium* and *Rhizoctonia*, apply the following:

Ridomil Gold PC--12.0 oz 11G/1,000 foot of row. Adjust application equipment so that granules are uniformly applied in the furrow at planting.

To provide control of root rot caused by *Rhizoctonia*, apply the following in a band up to 7 inches wide:

Quadris--0.4-0.8 fl oz 2.08SC/1000 ft of row.

Lima Bean Downy Mildew

Races B, D, E, and F have been found in the mid-Atlantic area during the past 10 years. **Race F has been the only race detected in DE since 2006.** Use resistant varieties where possible. Conditions for disease are favorable when fields receive 1.2 inches or more of rain within 7 days and when the average daily temperature during this period is 78°F (25.6°C) or less. If a period of 90°F (32.2°C) occurs during this period, the cycle is broken, and an additional 7-day period with the above weather conditions is necessary to start infection. Periods of fog or heavy dew can lower the amount of rain necessary for infection to occur. Since environmental conditions vary from field to field and in different locations within a field, use the above information as a guideline. Fields that are not rotated and planted to susceptible varieties should be scouted regularly for disease occurrence. When weather conditions are favorable for disease use the following:

copper, fixed (Champ DP, 2.0b58DF/A, Kocide 3000),--1.25 lb DF/A or OLF, or
Forum--6.0 fl oz 4.17SC/A, or
Headline--6.0-9.0 fl oz 2.1 EC/A, or
ProPhyt 3-4 pts/A or other labeled phosphonate fungicide, or
Ridomil Gold Copper--2.0 lb 65WP/A.

If lima bean downy mildew is observed in the field apply either Ridomil Gold Copper or ProPhyt or other labeled phosphonate fungicide.

Lima Bean Pod Blight (*Phytophthora capsici*)

Rotate away from other susceptible crops such as peppers, cucurbits or tomatoes. Avoid heavy irrigation and irrigating at night. In fields with a history of *Phytophthora* blight applications of Ridomil Gold Copper 2.0 lb 65WP/A or Forum when applied for downy mildew control may suppress the disease.

White Mold (*Sclerotinia*) and Gray Mold (*Botrytis*)

Preplant: For white mold only. Apply 3 to 4 months prior to the onset of disease to allow the active agent to reduce levels of sclerotia inoculum in the soil. Following application, incorporate to a depth of 1 to 2 inches but **do not plow** before seeding beans to avoid untreated sclerotia in lower soil layers from infesting the upper soil layer.

Contans--2.0-4.0 lb 5.3WG/A

Post seeding: Close spacing of snap beans may increase the potential for white mold. Fungicide sprays are needed *only* when the soil has been wet for 6 to 10 days before bloom. For snap beans, a fungicide should be applied at 10-20% bloom. A second spray should be made 7-10 days after the first spray, if the soil remains wet and blossoms are still present. Check labels for details on fungicide timing. For lima beans, later fungicide applications have been beneficial if favorable environmental conditions persist. Use one of the following:

Endura--8.0-11.0 oz 70W/A, or

Endura--5.0 oz 70W/A plus thiophanate-methyl (0.7-1.05 lb/A 70WP/A active ingredient) (snap beans only), or

iprodione--1.5-2.0 pts 4F/A or OLF, or

Omega--8.0 fl oz 500F/A (also has good activity against downy mildew), or

thiophanate-methyl--1.5-2.0 lb 70WP/A or OLF, or

Switch--11.0-14.0 oz/A 62.5WG, or

Switch--6.0-11.0 oz/A 62.5WG plus thiophanate-methyl (0.7-1.05 lb a.i. /A active ingredient)

Southern Blight (*Sclerotium rolfsii*)

Southern blight can be a serious disease of snap and lima beans in the southernmost areas of the region. The disease is favored by high temperatures as well as wet weather and/or irrigation. Rotations do not eliminate the pathogen, but rotations with corn, sorghum, small grains or grasses reduce disease severity. Moldboard plowing to bury sclerotia can be used to limit contact of the fungus with bean stems and hypocotyls. Fungicides can also provide some protection. Quadris--15.4 fl oz 2.08SC/A

BEETS

Beets are frost tolerant and produce the best commercial quality when grown during cool temperatures (50° to 65°F [10° to 18.3°C]). Lighter color and wider zoning occur during rapid growth in warm temperatures. Beets will form seedstalks if exposed to 2 or 3 weeks of temperatures below 50°F (10°C) after several true leaves have formed. Beets have a high boron requirement. See Plant Nutrient Recommendations below and Table B-10.

Varieties

Varieties¹

Market

Crosby (greens and roots)

Early Wonder*

Scarlet Supreme*

Red Cloud*

Chariot*

Red Ace*

Excalibur*

These varieties are recommended for DE, MD, NJ, PA, VA, WV

(table continued next page)