

**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

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**BEETS**

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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**

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**Varieties<sup>1</sup>**

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**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)

## Varieties (continued)

Varieties <sup>1</sup>	
<b>Market</b>	
Ruby Queen	These varieties are recommended for DE, MD, NJ, PA, VA, WV
Centurion*	
Chioggia	
Pacemaker III	
Touchstone Gold (yellow)	
Kestrel (red)	

<sup>1</sup> Varieties listed by maturity, earliest first.

\* Indicates hybrid variety

### 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.

Beets	Pounds N per Acre	Soil Phosphorus Level			Soil Potassium Level		
		Low	Med	Opt.	Low	Med	Opt.
		Pounds P <sub>2</sub> O <sub>5</sub> per Acre			Pounds K <sub>2</sub> O per Acre		
	75-100 <sup>1</sup>	150 <sup>1</sup>	100 <sup>1</sup>	50 <sup>1</sup>	150 <sup>1</sup>	100 <sup>1</sup>	50 <sup>1</sup>
	50 <sup>2</sup>	150 <sup>2</sup>	100 <sup>2</sup>	50 <sup>2</sup>	150 <sup>2</sup>	100 <sup>2</sup>	50 <sup>2</sup>
	25-50 <sup>3</sup>	0	0	0	0	0	0

<sup>1</sup>Total 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%.

<sup>2</sup>Broadcast and disk-in

<sup>3</sup>Sidedress 4-6 weeks after planting

Apply 1 ½-3 pounds of boron (B) per acre in mixed fertilizer. See Table B-10 for more specific boron recommendations. #

### Seed Treatment

Use treated seed to prevent disease, see the Disease Section for more information

### Seeding and Spacing

The crop is seeded from early April to late July. Optimum germination temperatures range between 50° to 85°F (10° to 29.4°C). Sow seed 1/2 inch deep at the rate of 15 to 18 seeds per foot of row. Space rows 15 to 20 inches apart; thin plants to 3 inches apart. For Fall seeding, rows should be spaced 4-6" apart.

### Weed Control

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.

### Preplant Incorporated

Cycloate--2.5-3 lb/A. Apply 1.67 to 2 quarts Ro-Neet 6E.

Incorporate into 3 to 4 inches of soil immediately after application. Plant anytime after treatment.

### Postemergence

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 30 days.

Clopyralid--0.047-0.188 lb/A. Apply 2 to 8 fluid ounces of Stinger 3A per acre in a single application to control certain annual and perennial broadleaf weeds. Stinger controls weeds in the Composite and Legume plant families. Common annuals controlled include galinsoga, ragweed species, common cocklebur, groundsel, pineappleweed, clover, and vetch. Perennials controlled include Canada thistle, goldenrod species, aster species, and mugwort (wild chrysanthemum). Stinger is very effective on small seedling annual and emerging perennial weeds less than 2 to 4 inches tall, but is less effective and takes longer to work when weeds are larger. Use 2 to 4 fluid ounces to control annual weeds less than 2 inches tall. Increase the rate to 4 to 8 fluid ounces to control larger annual weeds. Apply the maximum rate of 8 fluid ounces to suppress or control perennial weeds. Spray additives are not needed or required by the label, and are not recommended. Observe a minimum preharvest interval (PHI) of 30 days. Stinger is a postemergence herbicide with residual soil activity. Observe follow-crop restrictions, or injury may occur from herbicide carryover.

Phenmedipham--0.5-0.67 lb/A. Apply 3 to 4 pints per acre.

Spin-Aid--1.3EC. For use in Maryland only. See label for application restrictions, mixing instructions, and weather restriction to prevent crop injury or herbicide failure.

Sethoxydim--0.2-0.5 lb/A. Apply 1 to 2.5 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, and 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 60 days and apply no more than 5 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.

**Flea Beetles**

- beta-cyfluthrin (Baythroid XL)
- bifenthrin (garden beet) (Brigade, Sniper or OLF)
- carbaryl (Sevin 80S or OLF)
- cyfluthrin (Renounce 20WP, Tombstone, or OLF)
- imidacloprid (soil, drip--Admire PRO; foliar--Nuprid 1.6F, Provado 1.6F or OLF)
- imidacloprid + cyfluthrin (Leverage 2.7)
- thiamethoxam (soil, drip--Platinum 2SG or OLF; foliar--Actara 25WDG)
- zeta-cypermethrin (garden beet) (Mustang MAX, Respect or OLF)
- zeta-cypermethrin+bifenthrin (garden beet) (Hero EC)

**Aphids, Leafminers (LM)**

- bifenthrin (**aphids only**) (Brigade, Sniper or OLF)
- imidacloprid (**aphids only**) (soil--Admire PRO; foliar--Nuprid 1.6F, Provado 1.6F or OLF)
- imidacloprid + cyfluthrin (**aphids only**) (Leverage 2.7)
- spinetoram (**LM only**) (Radiant 2SC)
- spinosad (**LM only**) (Entrust 80W, SpinTor 2SC or OLF)
- thiamethoxam (**aphids only**) (soil, drip--Platinum 2SG or OLF; foliar--Actara 25WDG)

**Beet Armyworm**

- methoxyfenozide (Intrepid 2F)
- spinetoram (Radiant 2SC)
- spinosad (Entrust 80W, SpinTor 2SC or OLF)

**Garden Webworms**

- Bacillus thuringiensis* (Biobit, Dipel, Dipel 2E, Javelin, XenTari or OLF)
- methoxyfenozide (Intrepid 2F)

**Disease Control**

**Seed Treatment**

Use seed treated with thiram 75WP (3 oz/100 pounds; 1 level teaspoon/lb) or Apron XL LS (0.32 to 0.64 fl.oz/100 pounds) plus Maxim 4FS (0.08-0.16 fl oz/100 pounds).

**Damping-Off** (caused by Pythium or Phytophthora).

Apply the following preplant incorporated or as a soil-surface spray after planting

- mefenoxam--(Ridomil Gold 1.0-2.0 pt 4SL/A or 2.0-4.0 pt Ultra Flourish 2E/A), or

metalaxyl (MetaStar)--4.0 to 8.0 pts/treated A (see label for specific details)

**Cercospora Leaf Spot**

Allow 2 or 3 years between beet plantings. Thoroughly disc under beet refuse at end of season since leaf spot pathogens can overwinter on plant residues. Warm, wet weather and rainfall favor leaf spot development. Scout plantings on a regular basis, especially if wet weather persists.

Apply one of the following on a preventative basis and/or when weather conditions are favorable for disease development. Repeat every 7 to 10 days.

**Rotate one of the following FRAC code 11 fungicides:**

- Quadris--9.0-15.5 fl oz 2.08SC/A, or
- Cabrio--8.0-12.0 oz 20EG/A, or
- Headline--9.0-12.0 fl oz 2.09EC/A

**With:**

fixed copper at labeled rates

Do not make more than two sequential applications of Cabrio, Quadris or Headline before alternating with a copper fungicide. Tank mix FRAC codes 11 fungicides with copper to help reduce the chances for resistance development.

**Pocket Rot (Rhizoctonia)**

Pocket rot is most prevalent in cool, wet soils and especially in plantings showing poor plant vigor and those fields planted yearly in beets. Rotate between fields each year and scout on a regular basis.

Apply the following in a preventative manner.

- Quadris--0.40-0.80 fl oz 2.08SC/1000 row ft

**Black Spot**

Boron deficiency can cause black spots inside beet roots and large black dry rots on root surfaces. Boron deficiency is most likely to occur in alkaline soils high in calcium and is exacerbated by dry conditions. Apply boron at planting according to soil test results.

**Harvesting**

Market beets are hand-harvested when 1-3/4 to 2 inches in diameter.

Pesticide	Use Category <sup>1</sup>	Hours to Reentry <sup>2</sup>	Days to Harvest
<b>INSECTICIDE</b>			
<i>Bacillus thuringiensis</i>	G	4	0
beta-cyfluthrin	R	12	0
bifenthrin	R	12	1
carbaryl	G	12	7
cyfluthrin	R	12	0
imidacloprid (soil/foliar)	G	12	21/7
imidacloprid + cyfluthrin	R	12	7
methoxyfenozide	G	4	14
spinetoram	G	4	7
spinosad	G	4	3
thiamethoxam (soil/foliar)	G	12	AP/7
zeta-cypermethrin	R	12	1
zeta-cypermethrin+bifenthrin	R	12	21

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Pesticide	Use Category <sup>1</sup>	Hours to Reentry <sup>2</sup>	Days to Harvest
<b>FUNGICIDE (FRAC code)</b>			
Cabrio (Group 11)	G	12	0
copper, fixed (Group M1)	G	12,24,48	0
MetaStar (Group 4)	G	48	14
Quadris (Group 11)	G	4	0
Ridomil Gold (Group 4)	G	48	0
Ultra Flourish (Group 4)	G	48	0

See Table 3.

<sup>1</sup> G = general, R = restricted

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

## BROCCOLI, BRUSSELS SPROUTS, CABBAGE, CAULIFLOWER, COLLARDS, KALE, AND KOHLRABI

### Varieties

Varieties <sup>1</sup>	DE	MD	NJ	PA	VA	WV
<b>Broccoli</b>						
Castle Dome	D		N	P		
Captain*	D		N		V	WV
Major*	D		N		V	WV
Everest*	D		N	P	V	WV
Imperial	D		N	P		
Emerald Pride	D		N	P		
Barbados*	D		N	P		
Durango*	D		N			
Belstar*	D		N		V	
Arcadia*	D		N	P	V	WV
Lucky*	D		N		V	
Laguna*	D	M	N	P	V	
Gypsy*	D		N	P	V	WV
Pinnacle*	D		N	P		WV
Eureka* (fall production)	D		N	P		WV
Packman				P		WV
Liberty*	D		N	P	V	WV
CMS Liberty (trial)					V	
Sultan*	D		N	P		WV
Diplomat*	D		N	P		WV
Windsor*	D		N	P		WV
<b>Brussels Sprouts</b>						
Oliver*			N	P		
Jade Cross E*	D	M	N	P	V	WV
Prince Marvel*	D	M	N	P	V	WV
Franklin			N	P		
Vancouver			N	P		
<b>Cabbage: Early-Midseason</b>						
Early Thunder					V	
Charmant* (YR)		M	N		V	WV
Morris* (YR)			N	P		
Blue Gem* (YR,BRT)			N	P		
Dynamo* (small head) (SpR)			N		V	
Blue Vantage* (YR)			N	P		
Green Cup* (YR)	D		N	P		
Quisto*			N			
Emblem* (SpR)			N			
Platinum Dynasty* (SpR)					V	
Charm Dynasty*					V	
Bronco*	D		N	P	V	WV
Thunderhead					V	
Bravo* (YR, BRR)	D		N	P	V	WV

(table continued next column)

### Varieties (continued)

Varieties <sup>1</sup>	DE	MD	NJ	PA	VA	WV
<b>Cabbage: Early-Midseason</b>						
Blue Thunder* (SpR)	D			P	V	
Constana*			N		V	
Ulima Vantage*			N			
Blue Dynasty (SpR)*	D		N	P		
Green Laker (SpR)*				P		
Cheers (SpR)*				P		
Blue Thunder (SpR)*			N	P		
Superstar (SpR)*			N	P		
Bobcat (SpR)*			N	P		
<b>Cabbage: Pointed head, thin leaf</b>						
Caraflex (F1) –early 2 lb head					P	
Caramba – early, 4 lb head					P	
Murdoc – late. 12 to 15 lb head					P	
<b>Cabbage: Red</b>						
Ruby Ball*		M		P	V	WV
Red Head*	D	M	N	P	V	WV
Red Dynasty (SpR)*	D		N	P	V	
Super Red 80 (SpR)*	D		N	P	V	WV
Super Red 90 (SpR)*	D		N			
Cario (SpR)*	D		N	P		
<b>Cabbage: Savoy</b>						
Savoy Express (early trial)				P	V	WV
Savoy Ace*	D		N	P	V	WV
Chieftain	D		N		V	
<b>Cabbage: Chinese</b>						
Blues* (Napa type)	D		N	P		
Jade Pagoda*	D	M	N	P	V	WV
Michihli	D	M	N		V	WV
Mount (SpR)			N	P		
Yuki						WV
<b>Pak Choi</b>						
Joi Choi* (white, flat petiole)	D	M		P		WV
Mei Quing Choi* (green, flat petiole)	D	M		P		WV
Prize Choi* (white, round petiole)	D			P		
<b>Cauliflower</b>						
Snow Crown* (spring or fall)	D	M	N	P	V	WV
Icon*			N			
Cheddar* (bright orange)			N	P	V	WV
Amazing*			N	P	V	
Majestic*			N			
Violet Queen* (purple)				P		WV
Apex*			N	P		
Cassius*	D		N			
Fremont*	D			P		WV
Whistler			N			
Candid Charm*	D		N	P	V	
Cashmere*				P		
Panther* (green)				P		
Wentworth*			N	P	V	WV
Concert*			N			
Graffiti* (lavender-purple)				P		WV
<b>Collards</b>						
Top Bunch*			N	P	V	WV
Top Pick*					V	
Flash*			N	P		
Blue Max*				P	V	
Champion	D	M	N	P	V	WV
<b>Kale</b>						
Dwarf Blue Curled (Vates strain)	D	M	N	P	V	WV
Dwarf Siberian (overwinter)	D	M	N			WV
Red Russian				P		WV
Winterbor						WV

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