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Chapter 11.
Legume Production in Florida: Snapbean, Lima Bean, Southernpea, Snowpea

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BOTANY

Nomenclature

Family - Fabaceae (Leguminosae)
Snapbean - *Phaseolus vulgaris*
Lima bean - *Phaseolus* lunatus
Southernpea - *Vigna unguiculata*
Snowpea - *Pisum sativum*

Origin

Snapbean and lima bean are New World vegetables with Central America being the center of origin. Southernpea and snowpea originated in southeastern Africa and central Asia, respectively.

Related Species

All of the vegetable crops generally recognizable as peas and beans are included in the Fabaceae family. One root crop, jicama, is also a legume. Many species are of economic importance and the family is, after the Poaceae, the most important source of human food. It also provides field and forage plants, timber, fiber, dyes, gums, insecticides, flavorings and many other products. A number of ornamentals also are included in this family. The unique ability of legumes to fix atmospheric nitrogen is of great importance; however, it is not of much practical significance in the vegetable legumes because of the short crop cycle. Southernpea is more efficient in N fixation than snapbean.

VARIETIES

Selection of the variety to plant is one of the most important decisions the commercial vegetable grower must make each season. Each year seed companies and experiment stations release dozens of new varieties to compete with those already available. Growers should evaluate some new varieties each year on a trial basis to observe performance on their own farms. Plant only those that show real promise based on University of Florida, industry, or grower trials. A limited number of new varieties should be evaluated so that observations on plant performance, characteristics, and yields can be noted and recorded. It is relatively easy to establish a trial but very time-consuming to make all the observations necessary to make a decision on adoption of the new variety for large scale production. Some factors to consider before adopting a variety are:

Yield - The variety should have the potential to produce crops at least equivalent to those already grown. In recent years, the average yield of beans in Florida was about 180 30-lb bushels per acre. Harvested yield may be much less than potential yield because of market constraints.

Disease Resistance - The most economical and effective means of pest management is through the use of varieties that are resistant or tolerant to disease. Many bean varieties are tolerant of some strains of common bean mosaic. When all other factors are about equal, it would be prudent to select a variety with needed disease resistance or tolerance.

Horticultural Quality - Characteristics of the plant habit as related to climate and production practices and of the marketed plant product must be acceptable. Beans to be harvested mechanically must have sufficient pod wall fiber to protect the integrity of the product. Beans to be hand harvested are of lower fiber content and have higher eating quality.

Adaptability - Successful varieties must perform well under the range of environmental conditions usually encountered on the individual farm.

Market Acceptability - The harvested plant product must have characteristics desired by the packer, shipper, wholesaler, retailer, and consumer. Included among these qualities are pack out, size, shape, color, flavor, and nutritional quality. Consumers have identified dark-green pod color and small sieve size with high culinary quality.

Variety selection is a very dynamic process. Some varieties retain favor for many years, whereas others might be used only a few seasons if some special situation, such as plant disease or marketing change, develops. Variety selection in Florida often requires special regional consideration due to the wide range of climatic variations of the peninsula. Some currently used legume varieties for Florida, are presented in Table 1.

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SEEDING AND PLANTING

Planting dates and seeding information for legumes are given in Table 2.

FERTILIZER AND LIME

Broadcast all P_2O_5 and micronutrients. Band 25 to 50% of N and K_2O at planting. Sidedress remaining N and K_2O at pre-bloom stage. Sidedress N and K_2O can be applied through center pivot irrigation system. Soil test results for mineral soils for legumes are given in Table 3.

PLANT TISSUE ANALYSIS

Plant tissue analysis information for legumes is given in Table 4. The analysis was done at early bloom, using the most recently matured trifoliate leaf.

IRRIGATION

Irrigation is critical when rainfall is low during the fruit set and pod development period. Crop water requirements (see Chapter 3, *Principles and Practices of Irrigation Management for Vegetables*, Tables 4-6) may approach 95% of ETo (see Chapter 3, , Table 3) during rapid growth and development. Thus, if ETo were around 0.15 inches per day, crop water use might average 0.14 inches per day (this equals about 3800 gallons per acre per day). If an overhead irrigation system were used and operated to apply water with a 70% efficiency, then the daily irrigation requirement would average 0.20 inches (5400 gallons per acre) [0.14/0.70]. Crop water requirements are expected to decrease to around 85% of ETo during the last period of crop growth.

Table 1. Legume varieties that are in commercial use in Florida arranged by type.

Type	Variety	Type	Variety	Type	Variety
Green Bush (Fig. 11-1)	Ambra	**Green Bush**	Benchmark	**Lima**	Jackson Wonder
	Benchmark		Prosperity		Nemagreen
	Bronco		Seville	**Southernpea**	Early Acre
	Caprice		Sonata		Knuckle Purplehull
	Capricorn		Storm		Magnolia
	Charon	**Yellow Bush**	Gold Mine		Pinkeye Purplehull
	Dusky		Golden Rod		Texas Cream 40
	Fandango		Gold Rush		Toppick Brown Crowder
	Hialeah	**Green Pole**	Dade		Topppick Cream
	Leon	**(Fig. 11-2)**	Macaslan		White Acre
	Mercury	**Lima**	Fordhook 242		Zipper Cream
	Mirada		Early Thorogreen	**Snowpea**	Oregon Sugarpod II
	Opus				

Table 2. Seeding and planting information for legumes in Florida.

Planting dates	Snapbean bush	Snapbean pole	Lima bean bush	Lima bean pole	Southernpea	Snowpea
North Florida	Mar - Apr; Aug - Sept 5	Mar - Apr; Aug - Sept 5	Mar - Apr; Aug	Mar - Apr; Aug	Mar - July	Jan - Mar
Central Florida	Feb - Apr; Aug - Sept	Feb - Apr; Aug - Sept	Feb - Mar; Aug - Sept	Feb - Mar; Aug - Sept	Feb - Aug	Nov - Feb
South Florida	Sept - Apr	Sept - Apr	Sept - Apr	Sept - Apr	Sept - Apr	Nov - Feb
Seeding information						
Distance between rows (in)	18 - 36	36 - 48[1]	18 - 36	36 - 48[1]	20 - 42	36[1] 2 row bed
Distance between plants (in)	2 - 4	3 - 5	3 - 6	8 - 12	3 - 6	2 - 6
Seeding depth (in)	1 - 1.5	1 - 1.5	1 - 1.5	1 - 1.5	1 - 1.5	1 - 1.5
Seed per acre (lb)	45 - 80	30 - 45	40 - 60	20 - 40	15 - 30	25 - 50
Days to maturity from seed	45 - 60	50 - 70	60 - 80	80 - 100	75 - 90	60 - 80
Plant populations [2]	172,240	58,000	116,160	21,780	104,544	87,120

[1] Should be trellised.
[2] Populations based on closest between and within row spacing.

WEED MANAGEMENT

Herbicides labeled for beans and peas are listed in Table 5.

INSECT MANAGEMENT

Table 8 outlines the insecticides approved for use on insects attacking beans and peas.

DISEASE MANAGEMENT

Chemicals approved for disease management in legumes are outlines in tables as follows:

Table 6 - Bean
Table 7 - Southernpea

PRODUCTION COSTS

An example of breakeven production costs for snap bean is given in Table 9.

Table 3. Soil test results and fertilizer recommendations for mineral soils for legumes.[1]

Target pH	N lb/A[2]	VL	L	M	H	VH	VL	L	M	H	VH
		P_2O_5[2] (lb/A/crop season)					K_2O (lb/A/crop season)				
Snapbean											
6.5	100	120	100	80	0	0	120	100	80	0	0
Southernpea, Snowpea, English pea											
6.5	60	80	80	60	0	0	80	80	60	0	0
Lima bean, Pole bean											
6.5	100	120	100	80	0	0	120	100	80	0	0

[1] See Chapter 2 section on supplemental fertilizer application and best management practices, pg 11.

[2] Seeds and transplants may benefit from applications of a starter solution at a rate no greater than 10 to 15 lbs/acre for N and P_2O_5, and applied through the plant hole or near the seeds.

Table 4. Plant tissue analysis at early bloom for snapbean.

Status	N	P	K	Ca	Mg	S	Fe	Mn	Zn	B	Cu	Mo
	Percent						Parts per million					
Deficient	<3.0	0.25	2.0	0.8	0.25	0.20	25	20	20	15	5	0.4
Adequate range	3.0-4.0	0.25-0.45	2.0-3.0	0.8-1.5	0.25-0.45	0.20-0.40	25-200	20-100	20-40	15-40	5-10	0.4-0.8
High	>4.0	0.45	3.0	1.5	0.45	0.40	200	100	40	40	10	0.8
Toxic								>100		>150		

Table 5. Chemical weed controls: Beans and Peas

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre) Mineral	Muck
Bentazon (Basagran)	Beans, Peas	Early postemergence	0.5 - 1.0	---
Remarks: Apply early postemergence when weeds are small and actively growing. Beans are to Basagran after the first trifoliate leaf has fully expanded. A crop oil concentrate or a UAN solution (28, 30, 32% nitrogen solution) may be added for improved control. Yellowing, bronzing, speckling or leaf burning may occur under certain conditions. This injury is generally outgrown without delaying podset or maturity. Basagran is a contact herbicide and controls many young broadleaf weeds. It does not control grass. Read and follow the label directions for hard to control weeds such as yellow nutsedge.				
Carfentrazone (Aim)	Legume Group (All)	Preplant Directed-hooded Row-middles	0.031	0.031
Remarks: Aim may be applied as a preplant burndown treatment and/or as a post-directed hooded application to row middles for the burndown of emerged broadleaf weeds. May be tank mixed with other registered herbicides. May be applied at up to 2 oz (0.031 lb ai). Use a quality spray adjuvant such as crop oil concentrate (coc) or non-ionic surfactant at recommended rates.				
EPTC (Eptam 10G) (Eptam 7E)	Beans (Green or Dry)	Preplant incorporate or at layby	3.0 - 4.0	---
Remarks: Controls germinating annuals and suppresses nutsedge and other perennial weeds. Incorporate in same operation to reduce evaporation loss. Direct layby applications between rows and incorporate.				
Glyphosate (Roundup, Durango) Touchdown, Glyphomax)	Beans & Peas	Chemical fallow Preplant, pre emergence, Pre transplant	0.3 - 1.0	
Remarks: Roundup, Glyphomax and Touchdown have several formulations. Check the label of each for specific labeling directions.				
Halosulfuron (Sandea)	Snap Beans	Preemergence Postemergence0.024-0.032	0.024-0.032 0.024-0.032	0.024-0.032
Remarks: Apply preemergence application after planting but before cracking at 1/2 to 2/3 oz product/A. Use the lower reate on light sandy soils. Do not incorporate. For postemergence applications apply 1/2 to 2/3 oz product 3 weekds after emergence or at the 3 trifoliate stage, but before flowering. Do not exceed 1 oz per acre per crop cycle. Apply with a non-ionic surfactant or crop oil concentrate.				
Imazethapyr (Pursuit)	Dry Beans, Lima Beans, Southern Peas, English Peas	Preplant incorporated; Preemergence; Early Postemergence	0.031 - 0.062	---
Remarks: May be applied to Navy, Great Northern, Red Kidney, Black turtle, Cranberry and small white type dry beans, Lima Beans, Southern and English Peas. May be applied preplant incorporated or Preemergence to all the above crops at 2 ozs/acre or 3 to 4 ozs/acre for English and Southern Peas. An early postmergence application at 3 ozs. (English Peas) and 4 ozs./acre (Southern Peas) may be made with a non-ionic surfactant. Controls a large number of broadleaf weeds preemergence and several postemergence. Read the label for weed species and timing for control.				
Imazethapyr (Pursuit)	Snap beans	Preplant incorporated Preemergence	0.023	0.023
Remarks: May be applied as a preplant incorporated or preemergence treatment to snapbeans at 1.5 oz. product/acre. May be tank-mixed with a registered preemergent grass herbicide. There is a 30 day PHI. Check plant back restrictions on the label.				
S-Metolachlor (Dual Magnum)	Pod Crops: Bush, Pole, Lima, Mung Beans; Southern, English Peas	Preplant incorporate or preemergence	0.95-1.26	1.26
Remarks: Dual Magnum is an isomer of Dual and has a lower application rate. Use 1 to 1.33 pints/A. Controls most annual grasses and some broadleaf weeds as well as yellow nutsedge. May be applied preplant incorporated or preemergence and watered into the soil. See label for specific tank-mix combinations and recommendations for Eptam and Treflan.				
Paraquat (Gramoxane Inteon) (Firestorm)	Lima, Snap Beans; Peas	Preplant Preemergence	0.47 - 0.94 0.31-0.47	0.47 - 0.94 0.5 - 1.0
Remarks: Apply as a band treatment over the crop row or as a broadcast treatment before, during or after planting, but before the emergence of the crop. Weeds emerging after the application will not be controlled. Crop plants emerged at the time of application will be killed. Use a non-ionic surfactant in the spray mixture.				

Table 5. Continued.

Herbicide	Labeled crops	Time of application to crop	Rate (lbs. AI./Acre) Mineral	Muck
Paraquat (Gramoxone Inteon) (Firestorm)	Dry beans	Harvest aid	0.31 - 0.47	0.31-0.47
Remarks: Use a non-ionic spreader at 1 qt. per 100 gals. of spray mix. May be used in up to 2 applications. A split application may improve vine coverage. Do not harvest within 7 days of last application. May be used on the dry forms of the following: Chick peas, Garbanzo beans; Sweet, White sweet, White and Grain lupines; Kidney, Lima, Mung, Navy, Pinto, Snap and Wax beans; Asparagus beans; Blackeye and Cowpeas. Do not use on Faba beans.				
Pedimethalin (Prowl)	Beans: Dry, Lima, Snap; Chickpeas, Southern Peas	Preplant incorporated	0.5 - 0.75	1.0
Remarks: Incorporate within 7 days of application to the top 1 to 2 inches of soil. Label state control of many weeds including crabgrass, fall and Texas panicum, goosegrass, signalgrass, carpetweed, Florida pusley, kochia, lambsquarter, pigweed, purslane and annual spurges. May be applied alone or tank-mixed with Dual or Eptam.				
Pelargonic Acid (Scythe)	Legume vegetables (Beans (all) Peas (all))	Vegetative Burndown (site preparation)	3-10% v/v	3-10% v/v
Remarks: General contact, non-selective, foliar applied herbicide. No residual control. Product is non-translocated. May be tank mixed with soil residual compounds. Consult label for rates and other information.				
Quizalofop (Assure II) Targa	Snap beans, dry beans, succulent and dry peas	Postemergence	0.04-0.08	0.04-0.08
Remarks: For control of emerged annual and perennial grasses. Application is 6-12 oz Assure II to actively growing grasses depending on species to be controlled. Subsequent flushes of grasses require additional treatments. For ground application always include a non-phytotoxic petrolium based oil concentrate at 1% v/v (4 qts/100 gals) or a non ionic surfactant at 0.25% v/v (1 qt/100 gal). Reductions in grass control is possible when applied immediately prior to, or sequentially after application of post broadleaf herbicides. Follow label directions. It may be tank mixed with Basagran. Do not apply within 15 days of harvest. Do not apply more than 14 oz of product per acre per season.				
Sethoxydim (Poast)	Beans and Peas, dry and succulent	Postemergence	0.188 - 0.28	---
Remarks: For postemergence control of annual and perennial grass weeds, use 1 pt. (0.188 lb. ai.) to 1.5 pts. (0.28 lb. ai.) per acre depending on weed species to be controlled. Will not control sedges or broadleaf weeds. Use 2 pts. crop oil concentrate per acre in the spray mix. Do not apply more then 4 pts. per acre in one season. Do not apply within 15 days of harvest for succulent beans and peas or 30 days for dry beans and peas. Bean and pea types and species on which application may be made include beans of the *Phaseolus* genus (includes Adzuki bean, Field bean, Kidney bean, Lima bean, Navy bean, Mung bean); Lupines (includes Sweet lupine, White lupine, Grain lupine); Cowpeas - *Vigna* species (includes blackeye pea, Southern pea, Broad bean); *Vicia faba* or faba bean; Chick pea - *Cicer arietinum* or garbanzo bean; guar - *Cyamopsis tetragoneloba*; and peas - *Pisum* species (includes garden peas, field peas, sugar peas).				
Sodium Chlorate (Defol 6)	Dry beans; Southern peas; Guar beans	Defoliant/Desiccant	6.0	6.0
Remarks: Apply at a rate of 1 gal. per acre in 5 to 10 gals. of water by air or 10 to 20 gal. by ground equipment. Thorough coverage is essential. Make application 7 to 10 days before anticipated harvest, longer if temperatures are cool. Do not graze treated fields or feed treated fodder or forage to livestock.				
Trifluralin (Treflan EC) (Treflan TR-10) (Treflan MTF)	Green, Lima, Mung, Guar Beans; Southern, English Peas	Preplant incorporated	0.5 - 0.75	---
Remarks: Controls germinating annuals, especially grasses. Incorporate 4 inches or less within 8 hours. Results in Florida are erratic on soils with low organic matter and clay contents. Note label precautions of planting non-registered crops. See labels for specific application rates.				

Table 6. Disease management for beans.

Chemical	Fungicide Group	Max. Rate Per Acre Per Application	Season	Min. Days To Harvest	Pertinent Diseases	Remarks
Ridomil Gold EC Ridomil Gold SL (mefenoxam)	4	1 pt/treated acre		0	Pythium, seedling blight	Apply at seeding in a 7-12" band on soil over seed furrow
Ridomil Gold PC GR (mefenoxam, PCNB)	4, 14	0.75 lb/100 ft of row		0	Seedling blight	
Apron XL LS (mefenoxam)	4	0.64 fl oz/100 lb of seed		0	Pythium, Phytophthora damping off	Seed treatment only
Applause 720, Bravo ZN, Bravo Ultrex, Bravo Weatherstik, Chloronil 720, Equus DF, Equus 720 SST Echo 720, Echo 90 DF, Echo ZN (chlorothalonil)	M5	See label	See label	7 or 14 See label	Rust , gray mold, Botrytis blight	Do not use on crops for livestock
Endura (boscalid)	7	11 oz	22 oz	7 (succulent)	Ascophyta blight, Botrytis gray mold, White mold	Limit 2 appl/crop & alternate chemistry
Topsin M 70 WP, Topsin 4.5FL, Topsin M 70 WDG, Topsin M WSB (thiophanate methyl)	1	See label	See label	14 (snap) 28 (lima)	Gray mold, white mold, anthracnose	Apply once at 50-70% bloom or twice (max.=1 ½ lbs/appl.) with first at 10-30% bloom and second at peak bloom
Rovral 4 F (iprodione)	2	2 pt	4 pt	0	Gray mold, white mold	Limit 2 appl/ crop. Not for use as livestock feed
Nova 40 W Rally 40 WSP (myclobutanil)	3	5 oz/treated acre	1.25 lb/ acre	0	Rust, Rhizoctonia pod rot	30 day plant back restriction
Amistar, Dynasty, Heritage, Quadris (azoxystrobin)	11	See label	See label	0	Rust, web blight, southern blight, anthracnose, Rhizoctonia diseases	Limit 4 appl/crop & alternate chemistry
Botran 75-W (dichloran)	14	4 lb (pole) 3 lb (bush)		2	Sclerotinia diseases	Do not use on crops for livestock
Defiant (thiram)	M5	1.3 fl oz /100 lb of seed		0	Damping off, Seed decay, seed blight	seed protection
Headline (pyraclostrobin)	11	9 fl oz	18 fl oz	7	Rust, powdery mildew, Cercospora leaf spot	Limit 2 appl/crop & alternate chemistry
Amicarb 100 Milstop (potassium bicarbonate)		5 lb 3 lb/treated acre		0	Anthracnose, Alteraria leaf spot, gray mold,	Avoid tank mixing with highly acidic pesticides as this may reduce efficacy ;
Blocker 4F (PCNB)	14	2 pt		0	Rhizoctonia root rot, white mold	Apply to seed furrow and covering soil; Do not spray seed directly. See label

Table 6. Continued.

Chemical	Fungicide Group	Max. Rate Per Acre Per Application	Max. Rate Per Acre Per Season	Min. Days To Harvest	Pertinent Diseases	Remarks
Copper formulations including, but not limited to: Badge SC, Basic Copper 53, Champ DP, Champ Formula 2 F, Champion WP, COC DF, COC WP, Nordox, Copper-Count-N, Copper-Z 4/4, Kentan DF, Nu Cop, Kocide, Cuprofix Ultra 40 Disperss, Stretch, Tenn-Cop 5E (Copper hydroxide; Copper oxychloride; Cuprous oxide)	M1	See label	See label	See label	Bacterial blights	Use with caution when used in a program containing phosphonic fungicides
Phosphonic fungicides including, but not limited to: Fosphite, Fungi-phite, Prophyt, Topaz (Potassium phosphite or potassium derivative)		See label	See label	0	Pythium and Rhizoctonia diseases	Use with caution when used in a program containing copper fungicides
Iprodione 4L AG (iprodione)	2	2 pt	4 pt	0	White mold, g ray mold	
Kaligreen (Potassium bicarbonate)		3 lb		1	Powdery mildew	Avoid tank mixing with highly acidic pesticides as this may reduce efficacy
Maxim 4FS (fludioxonil)	12	0.16 fl oz/100 lb seed		0	Seedling and damping off diseases	Seed treatment
Oxidate (hydrogen dioxide)		1 gal		0	See label	
Turfcide (PCNB)	14	15 oz/1000 ft of row		0	Rhizoctonia stem and root rot	
Serenade (Bacillus subtilis strain QST713)		4 pt		0	Rust, white mold, powdery mildew	
Sonata (Bacillus pumilis strain QST2808)		8pt		0	Rust, powdery mildew	
Sonata 40 WSP (Bacillus pumilis strain QST2808)		5 oz/treated acre	5 lb/ treated acre	0	Rust, pod tip rot, powdery mildew	

Table 6. Continued.

Chemical	Fungicide Group	Max. Rate Per Acre Per Application	Season	Min. Days To Harvest	Pertinent Diseases	Remarks
Sulfur formulations including, but not limited to: Kumulus DF, Micro Sulf, Micronized Gold, Microthiol Disperss, Sulfur 90W, Super-Six, Wettable Sulfur, Yellow Jacket Wettable Sulfur (sulfur)	M2	See label	See label	See label	See label	Do not apply during periods of warm weather or phytotoxicity may occur
Switch 62.5 WG (cyprodinil; fludioxonil)	9, 12	14 oz	56 oz	7	White mold, gray mold	
Terrachlor 2E (PCNB)	14	6.6 fl oz/1000 ft of row		0	Rhizoctonia root rot	Soil application only
Thiophanate-methyl 85 WDG (thiophanate methyl)	1	1.6 lb/treated acre	3.2 lb/ treated acre	14 (snap)	Gray mold, white mold, anthracnose	First application at 10-30% bloom
T-methyl 70 W WSB (thiophanate methyl)	1	2 lb/treated acre	4 lb/ treated acre	14		
Cabrio 20 EG (pyraclostrobin)	11	16 oz	48 oz	0	Cercospora leaf spot, Rhizoctonia diseases	Limit 3 appl/crop & alternate chemistry
Copper compounds including Badge, Basic Copper 53, Basicop, Champ, COC, Copper Count-N, Cuprofix Disperss, Kocide, Nordox, Nu Cop, Stretch, Tenn Cop	M1	See label		0	Cercospora leaf spot, Brown spot, Bacterial blight	
Top Cop with Sulfur	M1, M2	4 pt/treated acre		0	Rust, Powdery mildew, Bacterial blight	Do not use in aluminum tanks
Sporan EC (rosemary oil, clove oil, thyme oil)		3 pt/treated acre		0	See label	Use of adjuvants is highly recommended
Trilogy (neem oil)		2 gal/treated acre or 2 gal/100 gal water		0	See label	
Phosphonics (derivatives of phosphoric and phosphorous acids including, but not limited to: Fosphite, Fungi-Phite, Helena Prophyt, Phostrol, Topaz)		See label				

Table 7. Disease management for southernpea.

Chemical	Maximum Rate/Acre/ Application	Maximum Rate/Acre/ Crop	Minimum Days to Harvest	Pertinent Diseases	Select Remarks
Fungicides labelled on beans can be used on Southernpeas unless the label restricts use for specific crops (e.g. snap beans, lima beans, etc).					
Ridomil Gold 4 EC	1 pt/trtd acre			Pythium seedling blights	Apply at seeding in a 7-12" band on soil over seed furrow.
Amistar 80 DF	5 ozs	20 ozs	0	Rust, Cercospora leaf spot	Limit is 1 sequential appl. and 4 appl. per crop
Bravo Ultrex 82.5 DF	1.8 lbs	7.3 lbs	14	Rust, Cercospora leaf spot	Do not use crop for livestock.
Bravo Weather Stik 6 F	2 pts	8 pts	14	Rust, Cercospora leaf spot	Limit is 4 appl./crop. Not for use as animal feed.

Table 8. Selected insecticides approved for use on insects attacking beans and peas.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
Acramite 4SC (bifenazate)	12-16 fl oz	12	3	twospotted spider mite	un	Succulent edible podded legumes and succulent shelled beans only.
Admire Pro (imidacloprid)	7-10.5 fl oz	12	21	aphids, leafhoppers, thrips, whiteflies	4A	Do not apply more than 10.5 fl oz per acre per season.
Agree WG (*Bacillus thuringiensis* subspecies *aizawai*)	0.5-2.0 lb	4	0	lepidopteran larvae (caterpillar pests)	11	Apply when larvae are small for best control. OMRI-listed[2].
***Asana XL** (esfenvalerate)	2.9-9.6 fl oz	12	3 - snap 21 - dry	beet armyworm (aids in control), cabbage looper, corn earworm, corn rootworm (adults), cowpea curculio, cucumber beetles, cutworms, European corn borer, flea beetles, grasshoppers, green cloverworm, leafhoppers, Mexican bean beetle, painted lady butterfly (larvae), pea aphid, saltmarsh caterpillar, velvetbean caterpillar	3	Do not feed or graze livestock on treated vines. Do not apply more than 0.2 lb ai/acre per season (4 applications at highest rate).
Assail 30SC 70WP (acetamiprid)	2.5-5.3 oz 1.0-2.3 oz	12	7	aphids, bean leaf beetle, cucumber beetles, leafhoppers, Mexican bean beetles, thrips, whitefly	4A	Edible podded legumes and succulent shelled peas and beans.
Avaunt (indoxacarb)	3.5 oz	12	7	corn earworm	22	Southern pea (dry) varieties only.
Aza-Direct (azadirachtin)	1-2 pts (max 3.5 pts)	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	un	Anti-feedant, repellent, insect growth regulator. OMRI-listed[2].
Azatin XL (azadirachtin)	5-21 fl oz	4	0	aphids, beetles, caterpillars, leafhoppers, leafminers, mites, stink bugs, thrips, weevils, whiteflies	un	Anti-feedant, repellent, insect growth regulator.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
***Baythroid XL** (beta-cyfluthrin)	0.8-3.2 fl oz - dry beans & peas	12	7 - dry beans & peas	beet armyworm (1st & 2nd instar), corn earworm, cowpea curculio, cutworms, fall armyworm (1st & 2nd instar), grasshoppers, plant bugs, potato leafhopper, southern armyworm (1st & 2nd instar), stinkbugs, yellowstriped armyworm	3	Maximum amount for dry beans & peas = 6.4 fl oz. Maximum for southern peas = 10.5 fl oz. Not for use on succulent beans or peas or dry beans. Do not feed treated vines or hay to livestock.
	0.8-2.1 fl oz - southern pea		3 - southern pea			
Biobit HP (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2.0 lb	4	0	caterpillars (will not control large armyworms)	11	Treat when larvae are young. Good coverage is essential. Can be used in the greenhouse. OMRI-listed[2].
BotaniGard 22 WP, ES (*Beauveria bassiana*)	**WP:** 0.5-2 lb/100 gal **ES:** 0.5-2 qts/100 gal	4	0	aphids, thrips, whiteflies	--	May be used in greenhouses. Contact dealer for recommendations if an adjuvant must be used. Not compatible in tank mix with fungicides.
***Brigade 2 EC** (bifenthrin)	1.6-6.4 fl oz	12	3 - succulent 14 - dry	aphids, armyworms, bean leaf beetle, cloverworm, corn earworm, corn rootworm adults, cucumber beetles, cutworms, grasshoppers, leafhoppers, loopers, *Lygus* spp., mites, pea leaf weevil, pea weevil, plant bugs, sap beetles, stink bugs, thrips, webworms, whiteflies	3	Do not apply more than 12.8 ounces of product per acre per season to succulent beans, peas and dry peas. Maximum of 19.2 oz for dry beans per acre per season.
Courier 40SC (buprofezin)	**40SC:** 9-13.6 fl oz.	12	14	whitefly nymphs	16	For snap beans only. Allow 14 days between applications. Do not exceed 0.76 lb ai/acre per crop (2 applications at high rate).
Crymax WDG (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2 lb	4	0	caterpillars	11	Use high rate for armyworms. Treat when larvae are young.
Deliver (*Bacillus thuringiensis* subspecies *kurstaki*)	0.25-1.5 lb	4	0	caterpillars	11	Use higher rates for armyworms. OMRI-listed[2].
***Diazinon 50W**	4-8 lb	72	at planting	cutworms, wireworms	1B	Succulent beans only. One application.
***Diazinon AG500**	2-4 qt					
***Dibrom 8E** (naled)	1-1.5 pt	48	1	aphids, leafhoppers, loopers, *Lygus* bugs, spider mites	1B	Ground application only, not for cowpeas and fieldpeas for livestock feeding.
Dimethoate 4EC (dimethoate)	0.5-1 pt	48	0	aphids, bean leaf beetle, grasshoppers, leafhoppers, leafminers, *Lygus* bug, Mexican bean beetle, mites	1B	Do not feed treated vines. Highly toxic to bees.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
DiPel DF (*Bacillus thuringiensis* subspecies *kurstaki*)	0.5-2 lb	4	0	caterpillars	11	Treat when larvae are young. Good coverage is essential. OMRI-listed[2].
Entrust (spinosad)	1-2 oz	4	3 28 - dry	armyworms, corn earworm, leafminers, loopers, thrips	5	**Succulent -** Do not apply more than 9 oz/acre per crop. **Dry -** Do not apply more than 3.75 oz/acre per crop. OMRI-listed[2].
Esteem Ant Bait ((pyriproxyfen)	1.5-2.0 lb	12	1	red imported fire ant	7C	
Extinguish ((S)-methoprene)	1-1.5 lb	4	0	fire ants	7A	Slow-acting IGR (insect growth regulator). Best applied early spring and fall where crop will be grown. Colonies will be reduced after three weeks and eliminated after 8 to 10 weeks. May be applied by ground equipment or aerially.
Intrepid 2F (methoxyfenozide)	4-16 fl oz	4	7	armyworms, corn earworm (suppression), loopers	18	Do not apply more than 64 fl oz per acre per season or make more than 4 applications per season. Succulent beans & peas, blackeyed & southern peas.
Javelin WG (*Bacillus thuringiensis* subspecies *kurstaki*)	0.12-1.50 lbs	4	0	most caterpillars, but not *Spodoptera* species (armyworms).	11	Treat when larvae are young. Thorough coverage is essential. OMRI-listed[2].
Knack IGR (pyriproxyfen)	8-10 fl oz	12	7	silverleaf whitefly, sweet potato whitefly	7C	Supplemental label. Do not make more than 2 applications per season. Not for soybeans.
***Lannate LV, *SP** (methomyl)	**LV:** 0.75-3 pts **SP:** 0.25-1.0 lb	48	See label: varies with rate and crop use	aphids, beet armyworm, corn earworm, cucumber beetles, European corn borer, fall armyworms, leafhoppers, loopers, *Lygus* bugs, Mexican bean beetle, saltmarsh caterpillar, thrips, variegated cutworm, yellow-striped armyworm	1A	
Lepinox WDG (*Bacillus thuringiensis* subspecies *kurstaki*)	1.0-2.0 lb	12	0	for most caterpillars, including beet armyworm (see label)	11	Treat when larvae are small. Thorough coverage is essential.
Malathion 8F (malathion)	1.5 pt	12	1	aphids, cucumber beetles, mites, Mexican bean beetle, potato leafhopper	1B	Field & greenhouse. Do not graze or feed forage to livestock.
Mocap *15G, EC (ethoprop)	See label for rates	48	at planting	symphylans	1B	Snap and lima beans. Do not allow granules to contact seed.
M-Pede 49% EC Soap, insecticidal	1-2% V/V	12	0	aphids, leafhoppers, mites, plant bugs, thrips, whiteflies	--	OMRI-listed[2].

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
***Mustang Max EC, EW** (zeta-cypermethrin)	1.28-4.0 oz	12	1 - succulent 21 - dried shelled peas or beans	bean leaf beetle, corn earworm, cowpea curculio, cutworms, fall armyworm, flea beetles, grasshoppers, leafhoppers, lesser cornstalk borer (aids in control), Mexican bean beetle, plant bugs, potato leafhopper, saltmarsh caterpillar, southern armyworm, stink bugs, thrips (aids in control), true armyworm, velvetbean caterpillar, whiteflies (aids in control), yellowstriped armyworm	3	Do not make applications less than 5 days apart. Not for soybeans
Neemix 4.5 (azadirachtin)	4-16 fl oz	12	0	aphids, armyworms, bean leaf beetle, cabbage looper, corn earworm, cutworms, garden webworm, leafminers, loopers, soybean looper, webworms, whiteflies	un	Acts as IGR and feeding repellent. Does not kill adult insects. OMRI-listed[2].
Orthene 75 S, 97 (acephate)	**75S:** 0.33-1.33 lb **97:** 0.25-1.0 lb	24	14 - snap beans or dry beans 0 - lima beans, succulent form	aphids (excluding black bean aphid), armyworms (excluding beet armyworm), bean leaf beetle, bean leafroller, cabbage looper, corn earworm, cutworms, European corn borer, fleahoppers, grasshoppers, green cloverworm, leafhoppers, Mexican bean beetle, plant bugs (*Lygus*), soybean looper, thrips, whiteflies (except silverleaf or sweetpotato whiteflies)	1B	Do not apply more than 2 lb active ingredient per acre per season.
***Penncap-M** (methyl parathion)	2-4 pts	4 days (see label)	15	aphids, cowpea curculio, cucumber beetles, European corn borer, leafhoppers, *Lygus* bugs, Mexican bean beetle, stink bugs	1B	For dry beans (southern peas) Begin applications when blooms are first observed.
***Proaxis Insecticide** (gamma-cyhalothrin)	1.92-3.84 fl oz	24	7 for edible podded and succulent shelled. 21 for dry beans and peas.	Aphids(1) , armyworms(2) , bean leaf beetle, blister beetles, corn earworm, cucumber beetles, cowpea curculio(3), cutworms, flea beetles, grasshoppers, green cloverworm, leafhoppers, leaftiers, lesser cornstalk borer(1), loopers, meadow spittlebug, Mexican bean beetle, painted lady butterfly (larvae), plant bugs, saltmarsh caterpillar, spider mites(1) , stink bugs, thrips(1) , tobacco budworm, velvetleaf caterpillar, webworms, whiteflies(1)	3	(1) Suppression only (2) First and second instars only. (3) For control before larvae bore into the plant stalk or pods. Do not apply more than 1.92 pints per acre per season. Do not graze livestock in treated areas or harvest vines for forage or hay.
Provado 1.6 F (imidacloprid)	3.5 oz	12	7	aphids, leafhoppers, whiteflies	4A	Not recommended following a soil application of Admire. Not for dry soybeans.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
Pyganic 5.0 (pyrethrins)	4.5-18 oz	12	0	insects	3	Treat when insects first appear.
Pyrellin EC (pyrethrins + rotenone)	1-2 pt	12	12 hours	aphids, bean leaf beetle, cucumber beetles, European corn borer, flea beetles, flea-hoppers, leafhoppers, leaf-miners, loopers, *Lygus* bugs, mites, plant bugs, stink bugs, thrips, whiteflies	3, 21	
Radiant SC (spinetoram)	3-8 fl oz	4	3 - succulent 28 - dry	armyworms, corn earworm, loopers, *Liriomyza* leafminers, thrips	5	Do not apply more than 28 fl oz per acre per crop for succulent or 12 fl oz for dry.
Sevin 80S, 4 F (carbaryl)	**80S:** 0.63-1.88 lb **4F:** 0.5-1.5 qt	12	14 days for grazing or harvest for forage, or within 3 days of harvest of fresh beans or peas, or within 21 days of harvest of dried beans or peas, seed or hay.	armyworms, bean leaf beetle, blister beetles, corn earworm, cowpea curculio (suppression), cucumber beetles, cutworms, fall armyworm, flea beetles, garden webworm, green cloverworm, leafhoppers, Mexican bean beetle, plant bugs, saltmarsh caterpillar, stink bugs, tarnished plant bug, three-cornered alfalfa hopper, thrips, velvetbean caterpillar, webworms, yellowstriped armyworm	1A	Repeat, as needed, up to 4 times. Applications should be at least 7 days apart.
SpinTor 2 SC (spinosad)	3-6 fl oz	4	3 - succulent 28 - dry	armyworms, corn earworm, European corn borer (eggs and larvae), leafminers, loopers, thrips	5	
Sun Spray 98.8%, JMS Stylet-Oil, Saf-T-Side, others (oil, insecticidal)	3-6 qts/100 gal (JMS) 1-2 gal/100 gal (others)	4	0	aphids, leafhoppers, leafminers, mites, thrips, whiteflies	--	Organic Stylet -Oil and Saf-T-Side are OMRI-listed[2].
***Temik 15G** (aldicarb)	5.0-14 lb	48	at planting, 90	aphids, leafhoppers, leafminers, Mexican bean beetle, mites	1A	Dry beans only. One application. Do not feed green forage hay, or straw to livestock. Do not use green pods as food for humans.
***Thimet 20 G** (phorate)	No more than 7.6 lb	48	60	aphids, leafhoppers, *Lygus* bugs, Mexican bean beetles, mites, seedcorn maggots, thrips	1B	At planting only. Avoid direct contact with seed.
***Thionex 3 EC, 50W** (endosulfan)	1-2 lb	24	3	bean leaf skeletonizer, black bean aphid, cucumber beetles, flea beetles, leafhoppers, Mexican bean beetle, stink bugs, whiteflies	2	Do not use on lima beans. Do not make more than 3 applications per year.

Table 8. Continued.

Trade Name (Common Name)	Rate (product/acre)	REI (hours)	Days to Harvest	Insects	MOA Code[1]	Notes
Trigard (cyromazine)	2.66 oz	12	7	leafminers	17	Dry beans (including southern pea), except cowpea and soybeans, also succulent lima beans. Limited to 6 applications.
Trilogy (extract of neem oil)	0.5-2% V/V	4	0	aphids, mites, suppression of thrips and whiteflies	un	Apply morning or evening to reduce potential for leaf burn. Toxic to bees exposed to direct treatment. OMRI-listed[2].
***Warrior II** (lambda-cyhalothrin)	0.96-1.92	24	7 - edible podded and succulent shelled 21 - dried, shelled	aphids, bean leaf beetle, beet armyworm(2), corn earworm, cutworms, cucumber beetle adults, green clover worm, fall armyworm (1st & 2nd instar), flea beetles, grasshoppers, leafhoppers, leafminers, lesser cornstalk borer(2), loopers, Mexican bean beetle, plant bugs, spider mites(2), stink bugs, thrips(1), whiteflies(2), yellowstriped armyworm (1st & 2nd instar)	3	(1) Does not include western flower thrips. (2) Suppression only.
Xentari DF (*Bacillus thuringiensis* subspecies *aizawai*)	0.5-2.0 lb	4	0	caterpillars	11	Treat when larvae are young. Thorough coverage is essential. May be used in the greenhouse. Can be used in organic production.

The pesticide information presented in this table was current with federal and state regulations at the time of revision. The user is responsible for determining the intended use is consistent with the label of the product being used. Use pesticides safely. Read and follow label instructions.

[1] Mode of Action codes for vegetable pest insecticides from the Insecticide Resistance Action Committee (IRAC) Mode of Action Classification v. 6.1 August 2008.

1A. Acetylcholinesterase inhibitors, Carbamates (nerve action)
1B. Acetylcholinesterase inhibitors, Organophosphates (nerve action)
2A. GABA-gated chloride channel antagonists (nerve action)
3. Sodium channel modulators (nerve action)
4A. Nicotinic acetylcholine receptor agonists (nerve action)
5. Nicotinic acetylcholine receptor allosteric activators (nerve action)
6. Chloride channel activators (nerve and muscle action)
7A. Juvenile hormone mimics (growth regulation)
7C. Juvenile hormone mimics (growth regulation)
9B and 9C. Selective homopteran feeding blockers
10. Mite growth inhibitors (growth regulation)
11. Microbial disruptors of insect midgut membranes
12B. Inhibitors of mitochondrial ATP synthase (energy metabolism)
15. Inhibitors of chitin biosynthesis, type 0, lepidopteran (growth regulation)
16. Inhibitors of chitin biosynthesis, type 1, homopteran (growth regulation)
17. Molting disruptor, dipteran (growth regulation)
18. Ecdysone receptor agonists (growth regulation)
22. Voltage-dependent sodium channel blockers (nerve action)
23. Inhibitors of acetyl Co-A carboxylase (lipid synthesis, growth regulation)
28. Ryanodine receptor modulators (nerve and muscle action)
un. Compounds of unknown or uncertain mode of action

[2] OMRI-listed: Listed by the Organic Materials Review Institute for use in organic production.

*** Restricted Use Pesticide**

Table 9 . Breakeven production costs for snap bean at various yield levels in the Miami-Dade County area, 2005-2006.

		Yield (bushels/acre)				
	Cost per acre	**185**	**210**	**235**	**260**	**285**
Variable Costs	$1,673.70	$9.05	$7.97	$7.12	$6.44	$5.87
Fixed Costs	$1,141.65	$6.17	$5.44	$4.86	$4.39	$4.01
Harvest Cost/unit		$6.65	$6.65	$6.65	$6.65	$6.65
Total Cost/unit		$21.87	$20.06	$18.63	$17.48	$16.53