

Crop Profile for Beans (Snap) in Pennsylvania

Prepared: March, 2004

General Production Information

The Commonwealth has been consistently the sixth largest (processing) snap bean producing state in the nation behind Wisconsin, Oregon, Michigan, New York and Illinois in recent history. Although Pennsylvania's 2001 snap bean production was down 17% from 2000, it must be taken into consideration that, according to the Pennsylvania Agricultural Statistics Service, the 2000 harvest set an all time record high for production since production levels were first recorded in 1918. The 2001 production levels were significantly higher than in 1998 and 1999 and not significantly lower than the 1997 production levels.

Since 1997 the number of acres of snap beans planted is down 1,000 acres and the number of acres harvested decreased by 1,200 acres. The yield per acre increased from 2.6 to 2.8 tons per acre. However, the overall production dropped from 23,000 tons to 22,690 tons. Farm values have also decreased over the past five years as the amount that growers received per ton of harvested beans dropped from \$220.00 in 1997 to \$213.00 per ton in 2001. Total farm value of snap beans in the entire Commonwealth dropped from just over five million dollars in 1997 to just over four million eight hundred thousand dollars in 2001.

Production Regions

The three main snap bean production regions in Pennsylvania include: 1) Centre and Clinton county area; 2) Columbia, Montour, and Northumberland county area, and 3) Lancaster and York county area. These three focused growing areas account for 60 percent of the snap bean production in the state.

Cultural Practices

Growers begin planting processing snap beans during the first week in May. In order for processing snap beans to reach timely maturity, they must be planted no later than the last week in July.

It is recommended that seeds are planted at a depth of 1.0-1.5 inches. Narrow rows have been shown to increase yields and decrease mid-season weed competition. They should be seeded at 100-140 pounds per acre (5-7 plants per running foot). Wide rows (30-36 inches) should be seeded at 75-90 pounds per acre (6-10 plants per running foot).

Of the 8,700 acres of snap beans grown in Pennsylvania: 84% are treated with herbicides, 81% are treated with insecticides, and 66% are treated with fungicides. The herbicide active ingredients used on

the most acres were two similar formulations of metolachlor (42% acres treated with metolachlor and 29% with S-metolachlor). The insecticide active ingredient used on the most acres was Acephate (61%). The fungicide used on the most acres was vinclozolin (62%).

Worker Activities

The greatest potential for exposure exists when workers empty the treated snap bean seeds into the planter hoppers, from 50 to 80 pound bags. Even though significant amounts of dust are released when the treated snap bean seeds are emptied from the bags, if gloves or respirators are worn exposure can easily be minimized to a level that is virtually non-existent. In addition, with fresh market snap beans, some acreage is still hand harvested and workers must adhere to the restricted entry interval (REI) to minimize potential exposure. This is more common after using Lannate or dimethoate for insect control in the field (48 hour REI).

Seed Treatment

Use treated seed or treat with thiram 65WP (2 ounces) plus chloroneb 65WP (4 ounces) or Apron XS LS (0.32-0.64 fluid ounce) per 100 pounds of seed. Add Lorsban, diazinon, or lindane seed protectant at manufacturer's recommendation. Where bacterial blight is a concern, request seed to be treated with streptomycin.

Rough handling of seed greatly reduces germination.

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

Weed Control

Major annual grasses common to Pennsylvania are: Foxtail, Barnyardgrass, and Fall Panicum. In wet years, annual grasses especially green foxtail and fall panicum become serious volunteer weeds and the snap beans need to be treated with a postemergent gramicide prior to harvest.

Major perennial grasses common to Pennsylvania are: Crabgrass, Johnsongrass (isolated areas only), Quackgrass, and Wirestem Muhley. In most years, perennial grasses are not a problem in snap bean fields.

Major broadleaves common to Pennsylvania are: Lambsquarters, Pigweed, Common Ragweed, Smartweed, Nightshade, Horsenettle and Velvetleaf. In most years, populations of these broadleaves are severe enough that at least one post emergent herbicide application is made prior to or after bloom.

Sedges: Yellow Nutsedge. Generally, sedges are not a problem in snap bean fields in most years.

No Till Pre-emergence

S-metolachlor (Dual Magnum) -- 0.63-1.91 lb/A.

S-metolachlor provides adequate control of most annual grasses. For moderate infestations, it can also control of pigweed and nightshade. However, a post emergence application of Bentazon may be required for adequate broadleaf weed control. Apply 0.66 to 2 pints per acre Dual Magnum 7.62E after seeding and before emergence. Tank-mix with Roundup Ultra 4SC or Gramoxone Extra 2.5SC to control emerged weeds.

Glyphosate (Roundup Ultra) -- 1.15 lb/A.

Roundup Ultra 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. Apply 1 to 1.5 quarts Roundup Ultra 4SC per acre after seeding and before emergence. Tank-mix with Dual Magnum 7.62E for residual weed control.

According to the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey, approximately 1,300 (15%) acres were treated with glyphosate during the 2000 PA growing season. The acres treated by this compound during the above growing season averaged 1.4 applications at a rate of 0.64 pounds ai.

Paraquat (Gramoxone Extra & Max) -- 0.5-1 lb/A.

Paraquat can be used for control of emerged annual weeds after seeding but before emergence of bean plants, or as a split application before and after seeding to control emerged annual weeds. Apply 1.5 to 3 pints per acre Gramoxone Extra 2.5SC. Be careful not exceed the maximum total labeled rate when using the split application. Tank-mix with Dual Magnum 7.62E for residual weed control. A new formulation, Gramoxone Max, was introduced in 2001. Check label rates for this compound.

No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used paraquat.

Conventional Tillage Pre-Plant Incorporated

EPTC (Eptam) - 2.5-4 lb/A.

Eptam is used to control of nutsedge, annual grasses, and moderate infestations of pigweed. Eptam can be tank-mixed with Treflan to improve control of common lambsquarters. Apply 3 to 4.5 pints of Eptam 7E or 25 to 30 pounds of Eptam 10G for control of nutsedge, annual grasses, and moderate infestations

of pigweed. Incorporate by disking twice into 3 to 4 inches of soil immediately after application. Combining Eptam with Dual Magnum may improve weed control but may increase the risk of crop injury when weather conditions are adverse.

S-metolachlor (Dual Magnum) -- 0.63-1.91 lb/A.

Primarily controls annual grasses and nutsedge. 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. Incorporating S-metolachlor significantly improves the product's performance on yellow nutsedge.

Trifluralin (Treflan) -- 0.5-0.75 lb/A.

Primarily controls annual grasses and a few broadleaf weeds. Apply 1.0 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. Do not use or reduce the rate used when cold, wet soil conditions are expected, or crop injury may result.

No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used trifluralin.

Pre-emergence

DCPA (Dacthal) -- 6-10.5 lb/A.

Primarily controls annual grasses and a few broadleaf weeds, including common purslane. Apply 8 to 14 pounds per acre of Dacthal 75WP. 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.

No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used trifluralin.

S-metolachlor (Dual Magnum) -- 0.63-1.91 lb/A.

S-metolachlor provides adequate control of most annual grasses. Apply 0.66 to 2 pints per acre Dual Magnum 7.62E. For moderate infestations, it can also control of pigweed and nightshade. However, a post emergence application of Bentazon may be required for adequate broadleaf weed control. Timely incorporating rains greatly enhance the pre-emergence performance of S-metolachlor.

Postemergence

Bentazon (Basagran) -- 0.5-1 lbA.

At the lower rate Basagran is used to control common cocklebur, mustards, and jimsonweed and at a higher rate it is used to control yellow nutsedge, common lambsquarter, common ragweed, and Canada thistle. Apply 1 to 2 pints per acre of Basagran 4SC when beans have fully expanded first trifoliolate leaves. 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).

Quizalofop-P-ethyl (Assure II) -- 0.04-0.08 lb/A.

Assure II can be used to control both annual and perennial grasses. However, yellow nutsedge, wild onion, and broadleaf weeds will not be controlled. Apply 6 to 12 fluid ounces per acre of Assure II 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.. 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.

No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used Quizalofop-P-ethyl.

Sethoxydim (Poast) -- 0.2-0.3 lb/A.

Poast can be used to control both annual and perennial grasses. However, yellow nutsedge, wild onion, or broadleaf weeds will not be controlled. 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. 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.

No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used Sethoxydim.

Snap Bean Herbicide Pennsylvania Use Information

Active Ingredient	Use Class¹	Hours to Reentry²	Days to Harvest	% of PA Acres Treated
Bentazon	G	48	30	12
EPTC	G	12	0	43
Fomesafen	G	24	0	23
Glyphosate	G	4	N/A	15
Metolachlor	G	24	0	42
S-Metolachlor	G	24	0	29

Key Snap Bean Herbicide Information from the National Agricultural Statistics Service in corporation with Pennsylvania Agricultural Statistics Service

Active Ingredient	Acres Treated (%)	Applications (#)	Rate per Application (lbs/acre)	Rate per Crop Year (lbs/acre)	Total Applied (1,000 lbs)
Bentazon	12	1	0.51	0.56	0.6
EPTC	43	1	3.17	3.17	12
Fomesafen	23	1	0.25	0.27	0.5
Glyphosate	15	1.4	0.64	0.94	1.2
Metolachlor	42	1.1	1.75	2.06	7.5
S-Metolachlor	29	1	1.1	1.1	2.7

Bearing acres in 2000 for Pennsylvania were 8700 acres.

Insect Control

The primary insects common to Pennsylvania are: potato leafhopper and European Corn Borer. Secondary insects common to Pennsylvania are: thrips and aphids.

Unlike many crops, Pennsylvania's processing snap bean crop usually uses more insecticides than its fresh market crop. The reason is that insect problems are easily culled out of the fresh market crop where hand labor is more common.

Soil borne insect damage can be decreased through delayed planting until soils are warmer so that seeds can germinate more quickly. Choose cultivars that are less susceptible to insect damage.

Potato Leafhoppers

The potato leafhopper infests snap bean fields at levels exceeding the economic thresholds in most fields every year in Pennsylvania. 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.

Recommended Chemical Control:

- acephate (See restrictions.)—0.67-1.33 lb 75S/A or OLF
- Asana XL (See restrictions.)—5.8-9.6 fl oz
- Capture (See restrictions.)—1.64-6.4 fl oz 2EC/A
- dimethoate (See restrictions.)—0.5-1 pt 4EC/A or OLF
- Lannate (See restrictions.)—1.5 pt LV/A or OLF
- Sevin—0.67 lb 80S/A or OLF

European Corn Borer (ECB)

Concerns regarding this pest are similar with both processed and fresh market snap beans. A significant problem with the European Corn Borer pest is that the larvae can cause contamination of the beans. The tolerance level for worms in snap beans is small, a zero tolerance level is preferred. The European Core Borer population is monitored through trap counts. Sprays are recommended when economic threshold levels are exceeded, which in most snap bean fields is every year in Pennsylvania.

The most critical times for corn borer treatment are at the bloom and pin stages. The young larvae do the most damage to green beans. They feed on the leaves, buds, or flowers for 4-6 days before boring into stem or the beans when the temperature reaches 70 degrees F. If the temperature is higher, the larvae will enter the plants more quickly. Begin treatment when moths are first detected in local black-light

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 threshold and spray intervals should be used:

Threshold and Spray Intervals

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

Recommended Chemical Control:

- Acephate (See restrictions.)—1.33 lb 75S/A or OLF
- Asana XL (Snap beans only; see restrictions.)—5.8-9.6 fl oz 0.66EC/A
- Capture (See restrictions.)—2.1-6.4 fl oz 2 EC/A
- Lannate (See restrictions.)—3-6 fl oz 2SC/A
- SpinTor (See restrictions.)—3-6 fl oz 2SC/A

Thrips

Generally thrips are not a problem in most years. 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. Sevin should not be used when mites are present.

Recommended Chemical Control:

- Acephate (See restrictions.)—0.67-1.33 lb 75S/A or OLF
- Capture (See restrictions.)—2.1-6.4 fl oz 2EC/A
- Di-Syston (See restrictions.)---12 oz 15G/1,000 ft of row (any row spacing). These rates are equivalent to 6.7 to 13.3 pounds per acre
- Lannate (See restrictions.)—1.5-3 pt LV/A or OLF
- Sevin—1.25 lb 80S/A or OLF

Aphids

The tolerance level for aphids that vector viruses in snap beans is very critical. The aphid population is monitored through scouting in the fields and spraying is recommended when economic threshold levels are exceeded, which occurs in most snap bean fields every year. 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.

Recommended Chemical Control:

- acephate (See restrictions.)—0.66-1.33 lb 75S/A or OLF
- diazinon (See restrictions.)—1.5 pt 4EC/A or OLF
- dimethoate (See restrictions.)—0.5-1 pt 4EC/A or OLF
- Lannate (See restrictions.)—1.5-3 pt LV/A or OLF

Key Snap Bean Pennsylvania Insecticide Information

Active Ingredient	Use Class¹	Hours to Reentry²	Days to Harvest	% Of PA Acres Treated
Acephate	G	24	14	61
Asana XL	R	12	3	0
Bacillus thuringiensis	G	4	0	0
Capture	R	9, 24	3	0
Dimethoate	G	48	0	33
Di-Syston	R	48	60	0
Kelthane MF	G	12	7	0
Lannate	R	48	3 ³	0
Methoxychlor	G	12	3	0
M-Pede	G	12	0	0

Mocap	R	48	-	0
Sevin	G	12	0	0
SpinTor	G	4	3	0
Thimet	R	48	60	0
Thiodan	R	48	3	0

¹ G=general, R restricted

² Chemicals with multiple designations are based on product and/or formulation differences. CONSULT LABEL. For Capture: 9 days = fresh, 24 hrs = processing.

³ See restrictions.

Key Snap Bean Insecticide Information from the National Agricultural Statistics Service in corporation with Pennsylvania Agricultural Statistics Service

Active Ingredient	Acres Treated (%)	Applications (#)	Rate per Application (lbs/acre)	Rate per Crop Year (lbs/acre)	Total Applied (1,000 lbs)
Acephate	61	1	0.73	0.78	4.2
Dimethoate	33	1.5	0.41	0.65	1.9

Bearing acres in 2000 for Pennsylvania were 8700 acres.

Key Snap Bean Insecticide Use Restrictions

- acephate -- DO NOT feed treated vines.
- Asana XL -- DO NOT exceed 39 total fluid ounces per acre per season. DO NOT feed treated vines to livestock.
- Capture -- DO NOT exceed 12.8 fluid ounces per acre per season.
- dimethoate -- DO NOT feed or ensile bean refuse to livestock from treated crops.

- Di-Syston -- DO NOT apply more than once per season or in direct contact with bean seed. Not labeled for seed corn maggot or tarnished plant bug control.
- Lannate -- At the 1 to 2 pint rate, Lannate may be applied up to 1 day of harvest. Wait 3 days following treatment if vines are to be fed, and 7 days if hay is to be cut.
- SpinTor -- DO NOT exceed 29 total fluid ounces per acre per season.

Insecticide Use

Eight different active ingredients are recommended to control the four insect pests common to Pennsylvania. Of these eight, Commonwealth growers (according to the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use Survey) use the only acephate and dimethoate. No growers participating in that survey used Capture, Asana, Spin-tor, Di-Syston, Lannate or Sevin.

According to the same survey, approximately 5,300 acres (61%) were treated with acephate. More than one application per season is uncommon but not unheard of. The average rate was 0.73 pounds of active ingredient per acre per application and on average 0.78 pounds active ingredient was used per season.

Dimethoate is used on 33% of the Commonwealth's processing snap bean crop. The acres treated by this compound during the 2000 growing season averaged 1.5 applications at a use rate of 0.41 pounds active ingredient.

Disease Control

Many of Pennsylvania's economically important disease problems in processing snap beans can be managed through proper rotation and the use of resistant varieties. However, 62% of the Commonwealth's processing snap bean crop required at least one chemical fungicide application during the 2000 growing season.

Anthracnose. Use western-grown seed and rotate to allow 2 years between bean plantings.

Bacterial Blight. Use western-grown seed. Fixed copper (1 lb ai/A) is of some value in reducing spread where incidence is low.

Snap Bean Rust. Rust is a problem only in late summer. Roma and Spurt are quite resistant to this disease. For the other varieties, spray when the disease first appears, and repeat every 7 days.

Recommended Chemical Control:

- chlorothalonil (Bravo, Equus, Terranil) -- 3 pt 6F/A or OLF.

Do not use treated area for grazing or feed plant parts to livestock, or Nova -- 4-5 oz 40W/A
No PA growers participating in the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey used chlorothalonil.

Root Rots. Root rot is caused by a complex of soilborne fungi. The primary fungus causing root rot in the mid-Atlantic region is Pythium. Pythium causes extensive damage in July and August during periods of warm, humid weather. Pythium can also cause extensive pod rot.

Cultural Controls:

Rotate beans with nonlegume crops. Avoid poorly drained soils. Plow under previous crop residue rather than disking it. 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. If have been shown to provide inadequate control, apply one of the following at planting if needed:

Ridomil Gold -- 0.5 - 1 pt 4E/A.

- Apply in a 7-inch band over the row at seeding.

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

Ridomil Gold PC -- 12 oz 11G/1,000 lin ft.

- Adjust application equipment so that granules are uniformly applied in the furrow at planting.
- Use data for Ridomil Gold or Ridomil Gold PC could not be published because too few PA growers used the products to produce valid data.

White Mold. Close spacing of snap beans may increase the potential for white mold in Pennsylvania. 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 when 70 to 80 percent of the plants have one or more open blossoms. A second spray should be made 5 to 6 days after the first spray, if the soil remains wet and blossoms are still present. Use one of the following and add a surfactant to enhance control:

- Benlate -- 1.5 - 2 lb 50WP/A, or
- Ronilan -- 1 lb 50DF/A (snap beans only) or OLF, or
- Rovral -- 1.5 - 2 lb 50WP/A, or
- Topsin -- 1.5 - 2 lb 85WDG/A or OLF

According to the 2000 National Agricultural Statistics Service (NASS) Vegetable Chemical Use survey, approximately 5400 acres (62%) were treated with Vinclozolin (Ronilan) in PA. More than one

application per season is uncommon but not unheard of. The average rate was 0.46 pounds of active ingredient per acre and the average user used 0.49 pounds active ingredient per season.

No growers participating in the survey used Benlate, Rovral or Topsin.

Key Snap Bean Fungicide Information

Pesticide	Use Class¹	Hours to Reentry²	Days to Harvest	% of PA Acres Treated
Benlate	G	24	14, 28 ⁴	0
chlorothalonil (snap bean only)	G	12,48	7	0
copper, fixed	G	24	0	0
Nova	G	24	0	0
Ronilan (snap bean only)	G	72	10	62
Rovral	G	12	0	0
Topsin M	G	12	14	0

Key Snap Bean Fungicide Information from the National Agricultural Statistics Service in corporation with Pennsylvania Agricultural Statistics Service

Active Ingredient	Acres Treated (%)	Applications (#)	Rate per Application (lbs/acre)	Rate per Crop Year (lbs/acre)	Total Applied (1,000 lbs)
Vinclozolin	62	1	0.46	0.49	2.6

Bearing acres in 2000 for Pennsylvania were 8700 acres.

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