

SUSTAINABLE GARDENING

FOR SCHOOL AND HOME GARDENS

Snap Beans, Bush and Pole

Phaseolus vulgaris



QUICK FACTS

- Plant family: *Fabaceae* (Pea)
- Harvest Season: Warm
- Life Cycle: Annual
- Seed to first harvest: 45-60 days (bush), 50-70 days (pole)



Create a Sustainable Garden by improving soil health, relying on locally available materials and resources, and practicing environmentally sound horticultural practices

History

Snap beans are legumes and members of the *Fabaceae* family, also known as the Pea family, which includes other warm-season beans, peas, lentils and peanuts, along with many other plants, shrubs and trees (Figure 1).

This crop is thought to have originated in the Latin American countries of southern Mexico, Guatemala, Honduras and Costa Rica. Snap beans thrive in these sandy clay soils and have been grown in Mexico for over 7,000 years. However, there is evidence that snap beans may have been cultivated much earlier in Peru, as seeds were found with a mummified woman buried with pre-Incan artifacts. Native Americans introduced snap beans to North America prior to European colonization and transported this crop through Mexico and into the Southwestern U.S. By 1492 snap beans were found in Florida and spread up the east coast to Virginia. In the 16th century, Spanish explorers introduced this crop to Europe and trading continued its migration. See Figure 2.



Figure 1. Snap beans belong to the *Fabaceae* plant family, along with peas, lentils, peanuts and many more.



Figure 2. Map showing the origin and migration of snap beans to the U.S.

The original varieties of snap beans were called “string beans” due to the fibrous string lining the pods, which was visible when snapped. By 1890 breeding programs in the U.S. began to produce the modern stringless varieties. By the 1950s, the majority of snap beans produced were stringless and resistant to the common bean mosaic virus. The French are credited with the culinary presentation of snap beans in restaurants and are famous for their thin and flavorful green bean variety: Haricot Verts (pronounced arr-ee-co-vair).

Snap beans were originally grown for their seeds, but today the entire pod is edible. This is contrary to shell beans, like the lima bean (a different species, *Phaseolus lunatus*), which are grown for the seed rather than the edible pod. Pole snap beans require support, as their plants grow over 8 feet tall. Historically, Native Americans planted this crop beside corn, using the corn stalks as natural support for bean plants, while squash covered the ground to prevent weeds. Hence, the native companion growing method is called “Three Sisters” (see Figure 3).

Today, snap beans are distributed all over the world and are especially popular in the southern U.S. during Thanksgiving when baked into a green bean casserole. There are over 100 varieties of snap beans, varying in shape, size and color. They are one of the most commonly grown vegetables in American gardens.



Figure 3. The traditional Native American companion growing method for squash, pole beans and corn.

Growing

Varieties

There are two main categories of snap beans, both annuals, differing chiefly in their growing habit and plant size: (1) bush beans or (2) pole beans. Bush beans are short and, as the name suggests, they have a bush growth habit. Bush beans are determinate, meaning they generally set fruit at the same time during a shorter harvest period, as stem growth stops at a “determined” height with a terminal bud. In contrast, pole beans are indeterminate, meaning they have a stem that continues to grow “indeterminately,” producing fruit progressively over a longer harvest period. Bush beans do not require support, unlike pole beans, which grow to over 8 feet tall and need to be supported by stakes or trellises. Both categories are fairly cold and heat sensitive, although pole beans are more heat tolerant and will produce further into the summer. See Figure 4.

Bush snap bean varieties may differ in color, size, flavor and disease/pest resistance. These include traditional green beans with round and straight pods



Figure 4. Main types of snap beans are bush or determinate (left) and pole or indeterminate (right).

(e.g., Blue Lake, Contender and Provider), giant, green Italian Romano varieties (e.g., Jumbo and Roma II), slender and buttery French Haricot Vert varieties (e.g., Maxibel), and yellow wax beans (e.g., Gold Rush and Golden Wax).

Varieties of pole beans also differ in appearance and disease/pest resistance, with traditional green and round varieties (e.g., Blue Lake, Kentucky Blue, and McCaslan), colorful and striped varieties (e.g., Louisiana Purple and Rattlesnake), and the flat Romano variety called Northeaster. The Yardlong Asparagus Bean is a vigorous and more heat-tolerant pole bean variety producing pods over 2 feet long and is closely related to the southern pea.

Almost all snap beans varieties are open-pollinated (including heirloom). Some snap beans are heirloom varieties, like Cherokee Wax and Tendergreen bush beans and the rattlesnake pole bean, meaning these seeds have been saved for at least 50 years and can be saved each season and replanted. Bean flowers are perfect (containing both male and female parts) in both types of snap beans. All snap beans are self-pollinating, so if saving seed, different varieties only need to be separated by a distance of 10-20 feet to prevent cross-pollination.

It is recommended to select disease-resistant varieties when possible. See the recommended snap bean varieties for Louisiana in Table 1.

Table 1. Recommended Snap Bean Varieties for Louisiana

Variety Name	Description	Days to Harvest*	Pod/Plant size	Resistance
Bush				
Bronco	Dark green; round, straight, slender pods; productive; open-pollinated	58 days	5.5" pod	
Blue Lake	Medium green, round, straight pods; flavorful; productive; mostly stringless; heirloom variety	55 days	6-8" pod, 15-18" plant	Bean mosaic virus
Carson	Slim, yellow pods; productive; flavorful; open-pollinated	52 days	5.5" pod	Bean mosaic virus, anthracnose, bacterial brown spot
Cherokee Wax	Yellow wax pods; productive and stringless; heirloom variety	58 days	6" pod	
Contender (Buff Valentine)	Early and hardy green variety; flavorful; heirloom	49 days	5.5" pod	Bean mosaic virus, powdery mildew
Derby	Round, long and straight medium green pods; stringless; open-pollinated	53 days	6" pod, 12-24" plant	Bean mosaic virus
Gold Rush	Yellow wax bean with white seeds; round and straight; flavorful; concentrated harvest; stringless; open-pollinated	55 days	4-6" pod	Bean mosaic virus
Golden Wax	Bright yellow, stringless wax pod; crisp with buttery flavor; very productive; open-pollinated	50 days	4-5" pod, 16-18" plant	Bean rust
Greencrop	Green pods; flavorful; tender; slightly flattened; productive; open-pollinated	50 days	8" pod	Bean mosaic virus
Jade	Deep green, slender pods; flavorful and tender; productive; heat tolerant; open-pollinated	53-55 days	6-7" pod, 18-22" plant	Bean mosaic virus, bacterial brown spot, bean rust, curly top virus

Variety Name	Description	Days to Harvest*	Pod/Plant size	Resistance
Jumbo	Giant, Italian, dark green variety; flavorful; stringless; open-pollinated	55 days	6-7" pod	Bean mosaic virus
Maxibel	French Haricot Vert variety; long, slender green pods; flavorful and tender; stringless; open-pollinated	65 days	6-8" pod	Bean mosaic virus, anthracnose
Provider	Productive and early; round green pods with purple seeds; open-pollinated	50 days	5-8" pod, 16-18" plant	Bean mosaic virus, powdery mildew, downy mildew, pod mottle virus
Roma II	Italian Romano-type green variety; long and flat; stringless; open-pollinated	59 days	5-6" pod	Bean mosaic virus
Royal Burgundy	Deep purple pods that turn green when cooked; beige seeds; productive; cold tolerant; stringless; open-pollinated	55 days	5" pod	Bean mosaic virus
Strike	Medium green, smooth pods with white seeds; concentrated pod set; open-pollinated	55 days	5-6" pod	Bean mosaic virus
Tendergreen	Productive green pods; long and straight; heirloom variety	52 days	6" pod	
Topcrop	Straight, green, round pods; flavorful; productive; stringless; open-pollinated	50 days	5-6" pod, 12-24" plant	Bean mosaic virus
Valentino	Dark green, slender and straight pods with white seeds; concentrated pod set; productive; heat tolerant; open-pollinated	53 days	5.5" pod	
Pole Blue Lake	Bright green pods with white seeds; productive; open-pollinated	66 days	5-6" pod, 8' plant	
Kentucky Blue	Sweet, stringless, straight dark green pods; productive; open-pollinated	63 days	5-7" pod, 6-8' plant	
Kentucky Wonder	Bright green, stringless pods; productive; flavorful; heirloom variety	65 days	7-9" pod	Bean mosaic virus, bean rust
Louisiana Purple	Bright purple pods turn green when cooked; flavorful; purple-green vines; stringless; early; heirloom variety	60 days	6-8" pod, 5-6' plant	Drought
McCaslan	Dark green, stringless pods; flavorful and productive; heirloom variety	70 days	7" pod	Drought
Northeaster	Early Romano variety; flat green pods; stringless; buttery flavor; open-pollinated	56 days	7-8" pod	

Variety Name	Description	Days to Harvest*	Pod/Plant size	Resistance
Rattlesnake	Purple-streaked, dark green, round pod; stringless; beige seeds; productive in hot, humid areas; flavorful heirloom variety	56-65 days	7-8" pod, 10' plant	
Yardlong Asparagus Bean	Green, red/purple, or white/green pod; reliable and easy variety; heirloom variety	58 days	24-26" pod (harvest at 18")	

Notes: *From seed to harvest

Table varieties selected from recommendations by LSU AgCenter, UF Extension, Texas A&M Extension and Southeastern U.S. Vegetable Crop Handbook.

Variety descriptions compiled from High Mowing Organic Seeds, Johnny's Selected Seeds, Reimer Seeds, Southern Exposure Seed Exchange, Sow True Seed, Jordan Seeds and Hoss Tools.

Other recommended snap bean varieties for Louisiana include:

Bush: Ambra, Dorabell, Dwarf French Tendergreen, Festina, Goldcrop Wax, Hialeah, Lynx, Magnum, Tender Crop.

Pole: Dade, Garden of Eden, Romano Gold.

When and How to Plant

While snap beans are warm-season crops, they can also be successfully planted in the fall (refer to Snap Bean Planting Guide, Table 2, for recommended dates).

Snap beans should be direct-seeded outside, ideally when soil temperatures are between 60-85 degrees Fahrenheit. In the spring, seeds can be planted when the soil temperature warms to 60-65 F and, in the fall, when the soil temperature cools to 85 F. Seed germination is very poor below 50 F and above 95 F. The use of a soil temperature map can help guide planting decisions.

Bush snap beans can be planted intensively, as plants are smaller, allowing for two rows of seeds planted 18

inches apart in each raised row (see Table 2). Plant seeds 1 inch deep and spaced 2-4 inches apart, cover with soil and water in. Seeds should germinate in 7-14 days.

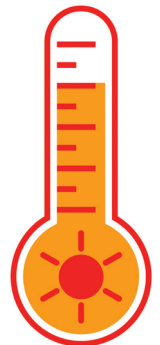
Pole snap beans need support for vines, such as stakes, a fence, or a trellis at least 6-8 feet tall. Another option is building a "teepee" out of poles (use this [video](#) as a guide). If using a fence or trellis for support, sow 2-4 seeds every 6 inches in single rows (see Table 2). If using the "teepee" method or stakes for support, place stakes or set poles every 12 inches and then sow 5-7 seeds around the teepee (see Table 2). Plant seeds 1 inch deep, cover with soil and water in. Seeds should germinate in 7-14 days.

Table 2. Snap Bean Planting Guide

Snap Bean Type	Direct-seed Outside Dates	Seeds Per 1 ft	Plant Spacing (inches)	Row Spacing (inches)	Rows Per Bed	Days to Harvest*
Bush	<u>North LA</u> : April-May 15, Aug.-Sept. <u>South LA</u> : Feb.-May 15, Aug.-Sept.	4-6	2-4	18-36	1-2 rows, 18" apart	45-60 days
Pole	<u>North LA</u> : April-May 15, Aug.-Sept. <u>South LA</u> : Feb.-May 15, Aug.-Sept.	5-7	6-12	36-48	1 row	50-70 days

*Seed to first harvest

Note: Table adapted from LSU AgCenter and UF Extension Planting Guides, and Southeastern U.S. Vegetable Production Handbook.



After germination, snap beans prefer warm days (80-85 F) and cool nights (55-60 F). Avoid growing past the end of May or in temperatures over 90 F as this will cause bloom drop, along with poor pollination and fruit set. For a continuous supply of snap beans, sow seeds outside every two weeks during the recommended planting dates.

Where to Plant

Snap beans should be sown into well-drained soil with a soil pH between 5.5-6.8 that receives full sun (at least 6 hours/day). Avoid soils that crust easily as this prohibits germination; snap beans grow best in sandy, clay soils. It is recommended to plant snap beans in box beds or in traditional raised garden rows that are 8-10 inches tall to ensure good drainage. It is recommended to add a layer of compost, peat moss, rotted hay or other organic matter and mix into the soil to optimize plant health.

Each season rotate plant families — avoid planting crops from the same plant family in the same area of the garden — to reduce disease and pests. A crop rotation of at least two years is recommended for legumes like snap beans to reduce risk of root rot disease.

Plant Care

It is recommended to follow [sustainable gardening](#) principles.

Watering: Snap beans should be watered weekly (1-1.5 inches), being sure to maintain soil moisture during blossom and pod set stages. Drip irrigation is preferred to reduce diseases. If watering overhead, irrigate in the morning when the sun can dry plant leaves quickly.

Fertilization: Beans, as a member of the legume family, can interact with soil microorganisms to gather nitrogen from the air into specialized nodules on the plant root system. This makes them a “light feeder” of nitrogen. Do not overfertilize, as excessive nitrogen will induce plants to remain in a juvenile, vining stage that delays flowering and fruiting.

Organic fertilizers such as compost, fish emulsion, composted poultry litter or manure, worm castings, and blood or bone meal originate from living organisms. They

are far more environmentally sustainable and safe than traditional synthetic fertilizers. They naturally release nutrients more slowly and over a longer period of time. When applying organic fertilizer, it is important to use in unison with compost, cover crops and crop rotation, which all work together to build soil health. Learn how to convert inorganic fertilizer recommendations to organic fertilizers [here](#).

Alternatively, a synthetic fertilizer may be used at a rate of about 0.5 pounds (1 cup) of 13-13-13 for every 25 feet of row or 75 square feet. Broadcast, or sprinkle evenly, over the soil before planting and then mix in about 3-6 inches using a rake. For long-growing pole beans, supplemental side-dressing, or reapplication of synthetic or organic fertilizer, may be applied after the first beans appear. Side-dressing is the addition of fertilizer to the soil around already established plants when the plant begins to fruit or vine, primarily to provide nitrogen. If using synthetic fertilizer, sprinkle lightly down the sides of the row; water into the soil. Additional side-dressing may be applied every 3-4 weeks, especially for pole beans. Because of their slow, steady release of nitrogen, crops fertilized with organic fertilizer do not need to be sidedressed.

Weeds: Early weed control is important for this fast-growing crop to avoid decreased yield and quality. Snap bean roots are shallow, so weeding by hand is recommended. Organic mulch is useful for weed control, but plastic mulch is not recommended for bush beans due to the close spacing of bean plants.

Insect pests and diseases: Common insect pests for snap beans are aphids, whiteflies, spider mites and thrips. Snap beans are susceptible to diseases such as anthracnose, blight, bean mosaic virus, bean rust, downy and powdery mildew, and root rot. Many varieties of snap beans are resistant to specific diseases and these should be selected and planted. Other recommended tools for prevention are crop rotation, weed control and good sanitation practices. See Table 3 to aid in diagnosis and management of some common snap bean insect pests and diseases.

Table 3. Organic and Natural Management for Common Snap Bean Insect Pests and Diseases

Symptoms	Diagnosis	Organic and Natural Management
<ul style="list-style-type: none"> Elongated brown-red cankers on stems and leaf veins Small, brown-red spot on pods forms rusty brown border around lesions Wet, humid conditions 	Anthrachnose	<ul style="list-style-type: none"> Crop rotation (3 years) Plant resistant varieties Avoid working in field when plants are wet Mulch; avoid overhead irrigation Regular harvest; remove diseased plants/pods Organic/natural fungicides
<ul style="list-style-type: none"> Curled and yellowed leaves Stunted crops Sticky honeydew on leaves 	Aphids	<ul style="list-style-type: none"> Timely planting and harvest Reduce water stress Weed control Use water jet to dislodge Reflective mulches; insect barrier fabric Beneficial insects: lady bugs, lacewings, predatory stink bugs, syrphid flies Insecticidal soap, neem oil, pyrethrin, Azera
<ul style="list-style-type: none"> Water-soaked spots on lower leaf surface Leaves appear burned and drop Circular, red-brown lesions on pods 	Bacterial blight	<ul style="list-style-type: none"> Plant resistant varieties Crop rotation (2+ years) Control weeds Copper-type fungicide/ bactericide
<ul style="list-style-type: none"> Stunted plants, reduced yield Mosaic and lesions on leaves Blackened roots 	Bean mosaic virus	<ul style="list-style-type: none"> Plant resistant varieties Remove weeds and manage aphids Remove and discard diseased plants
<ul style="list-style-type: none"> Small, white spots with a yellow halo on lower leaves of mature plants Rust-colored lesions on leaves Yellow leaves; leaf drop 	Bean rust	<ul style="list-style-type: none"> Crop rotation (2+ years) Sanitation, weed control; plant resistant varieties Remove crop debris after harvest Organic/natural fungicide when rust lesions appear
<ul style="list-style-type: none"> Damp, cool conditions Small, yellowing angular patches on leaves White, cottony fungal growth on pods that shrivel and die Damping off 	Downy mildew	<ul style="list-style-type: none"> Crop rotation (2+ years) Plant resistant varieties Reduce leaf moisture by improving air circulation; morning irrigation Remove crop debris and weeds Organic/natural fungicides

Symptoms	Diagnosis	Organic and Natural Management
<ul style="list-style-type: none"> • Small, round, white spots with fungal growth on older leaves with dark mottled underside • Leaves covered with talc-like powder; leaf yellows and dies • Hot, dry conditions 	Powdery mildew	<ul style="list-style-type: none"> • Plant resistant varieties • Good soil health and air circulation • Increase plant spacing • Eliminate weeds • Organic/natural fungicides containing sulfur
<ul style="list-style-type: none"> • Uneven distribution of stunted plants • Pale green/yellow leaves; wilt • Root galls, knots, swellings 	Root-knot nematodes	<ul style="list-style-type: none"> • Plant resistant varieties • Crop rotation with nonhost crops (e.g., corn) • Soil solarization, nematicides
<ul style="list-style-type: none"> • Infected seeds are soft and discolored • Small, elongated, red-brown lesions on roots of young plants • Stunted plants; infected tissue is soft and watery • Shriveled taproot, girdled stems 	Root rot (<i>Rhizoctonia</i> , <i>Pythium</i> , <i>Fusarium</i>)	<ul style="list-style-type: none"> • Plant in recommended soil conditions • Crop rotation (2+ years) • Seed treatment • Soil solarization
<ul style="list-style-type: none"> • Spiderlike pests; very small • Feeding on underside of leaves causes yellow spots and tiny webs • Begin around garden perimeter, grassy areas • Prevalent in hot, dry weather 	Spider mites	<ul style="list-style-type: none"> • Timely plant and harvest • Adequate irrigation • Beneficial insects: predatory mites • Restrict mowing grass close to crops • Paraffinic and neem oil, sulfur dust, Chenopodium terpene extract, soluble silica, Aramite, Biomite
<ul style="list-style-type: none"> • Damage to pods that begins in the flowers • Deformed, twisted pods with red-brown marks • Stunted plants; wilt 	Thrips	<ul style="list-style-type: none"> • Trap cropping and resistant varieties • Fine insect netting (50+ mesh) • Beneficial insects: flower bugs, lacewings, predatory mites • Spinosad, insecticidal soap, paraffinic oil, Chenopodium extract
<ul style="list-style-type: none"> • Leaf discoloration and wilt • Tiny white flies flutter when plants are disturbed • Sticky honeydew on leaves • Black sooty mold fungus 	Whiteflies	<ul style="list-style-type: none"> • Regular monitoring of plants • Crop rotation • Insect netting (50+ mesh) • Beneficial insects: lacewings, parasitic wasp, predatory mite • Insecticidal soap, neem oil, <i>Beauveria bassiana</i>

Note: Adapted from UMass Extension Vegetable Program and Alabama A&M and Auburn Universities Extension. The Louisiana Pesticide Law regulates the use of pesticides in schools to protect children and staff from harmful exposure to chemicals and is enforced by LDAF. The recommended alternative to routine pesticide use is integrated pest management (IPM), which combines pest control, disease management techniques and organic/natural alternatives, many of which are found in this table.

Harvest and Storage

It is recommended to harvest snap beans in early maturity before the beans become tough. By hand, harvest bush snap beans 2-3 times every few days and pole snap beans 7-10 times on a 5-7-day schedule. When harvesting, be sure to pick all mature (and overmature) beans to promote a healthy and productive plant. Take care not to break branches and stems.

Harvested snap beans should be stored in a plastic bag, unwashed, in the refrigerator. In ideal storage conditions of 40-45 F (with 95% humidity), snap beans will last 7-10 days.

Snap beans may be preserved by canning, freezing or drying.

Nutrition

Snap Beans Are Nutritious and Good For You

Good source of dietary fiber

Important for bowel health, lowering cholesterol, controlling blood sugar and maintaining a healthy weight.

High in potassium

Essential for body function, especially the heart, kidney, nerves, bones and muscles.

Rich in vitamins C and A

Important for bones, skin, blood vessels, eye health, a strong immune system and cell growth.

Recipes

Basics of cooking with snap beans: extension.purdue.edu/foodlink/food.php?food=snap%20bean
General information on selecting, pairing, preparing, and storing. Also includes a list of recipes.

Video on how to prepare snap beans: youtu.be/H-ZKO_4ScVs

Ever wondered about the basics of how to prepare snap beans? Chef Allison Kingery shows a couple of options for preparing this vegetable.

Taste Test Ideas



Green Bean Casserole



Green Bean Slad with Tuna



Stir Fry with Snap Beans

Other websites with many snap bean recipes:

Arizona Health Zone

Visit www.azhealthzone.org/recipes and search for snap bean recipes.

USDA MyPlate Kitchen

Visit www.myplate.gov/myplate-kitchen/recipes and search for snap bean recipes.

Produce for Better Health Foundation

fruitsandveggies.org/fruits-and-veggies/green-beans/?view=recipes
Recipes include vegetable chowder, 4-bean salad, and more.

Oregon State University's Food Hero

foodhero.org/recipes/category/1289
Recipes include mix and match skillet meal and superhero shepherd's pie.

Sources

- Southeastern Vegetable Extension Workers, 2020 Southeastern U.S. Vegetable Crop Handbook content.ces.ncsu.edu/southeastern-us-vegetable-crop-handbook
- LSU AgCenter, Louisiana Vegetable Planting Guide www.lsuagcenter.com/~media/system/d/e/3/e/de3e7516e68dfee4a21a84b38caa4df8/pub1980%20vegetable%20planting%20guide%20rev%2001%2017pdf.pdf
- LSU AgCenter, Louisiana Commercial Vegetable Production Recommendations www.lsuagcenter.com/~media/system/3/4/3/1/3431c847fdf6d4cd4dce689cb358b397/pub2433commvegetablebwlwres.pdf
- LSU AgCenter, Vegetable Gardening Tips: Beans www.lsuagcenter.com/~media/system/2/2/8/c/228cc6f59333c2f88151653d10b855df/2309%20beans%20rev%200417pdf.pdf
- UF Extension, Planting Guide edis.ifas.ufl.edu/pdffiles/VH/VH02100.pdf
- UF Extension, Vegetable Production Handbook of Florida edis.ifas.ufl.edu/pdffiles/cv/cv29200.pdf
- Texas A&M AgriLife Extension, Vegetable Varieties for Central Texas aggie-horticulture.tamu.edu/travis/wp-content/uploads/2015/09/VegetableVarieties2015.pdf
- Texas A&M AgriLife Extension, Easy Gardening: Green Beans cdn-ext.agnet.tamu.edu/wp-content/uploads/2014/09/how-to-grow-green-beans.pdf
- Texas A&M AgriLife Extension, Commercial Crop Guides: Beans: Green/Snap aggie-horticulture.tamu.edu/vegetable/files/2011/10/bean.pdf
- Alabama A&M and Auburn Universities Extension: Common Diseases of Snap and Lima Beans www.aces.edu/blog/topics/lawn-garden/common-diseases-of-snap-and-lima-beans/
- UMass Extension, Vegetable Program: Beans, Snap, Dry, and Lima Fact Sheet ag.umass.edu/vegetable/fact-sheets/beans-snap-dry-lima
- UMass Extension Vegetable Program: Disease, Insect, and Mites Fact Sheets ag.umass.edu/vegetable/fact-sheets
- PennState Extension: Snap Bean Production extension.psu.edu/snap-bean-production
- University of Arizona CALS: Green Beans cals.arizona.edu/fps/sites/cals.arizona.edu.fps/files/cotw/Green_Beans.pdf
- Purdue Extension FoodLink: Snap Bean extension.purdue.edu/foodlink/food.php?food=snap%20bean
- Maynard, Donald N & Hochmuth, George J (2007). Knott's Handbook for Vegetable Growers (5th edition). John Wiley & Sons Inc.
- Decoteau, Dennis R (2000). Vegetable Crops. Prentice-Hall Inc.
- Swiader, John M & Ware, George W (2002). Producing Vegetable Crops (5th edition). Interstate Publishers Inc.
- Sukprakarn, S, Juntakool, S, Huang, R, and Kalb, T (2005). Saving your own vegetable seeds—a guide for farmers. AVRDC publication number 05-647. AVRDC—The World Vegetable Center, Shanhua, Taiwan. 25 pp.
- Seed Savers Exchange, A Guide to Isolation Distances: www.seedsavers.org/isolation-distances
- University of Georgia Extension, How to Convert an Inorganic Fertilizer Recommendation to an Organic One, Circular 853. extension.uga.edu/publications/detail.cfm?number=C853

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