

## Market Green Bean Production in West Virginia

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**Figure 1.** Green beans have excellent market demand and are easy to grow. (Source: L. Jett)

Snap or green beans (*Phaseolus vulgaris*) are a popular summer, garden vegetable grown throughout West Virginia and Central Appalachia. Snap beans are highly nutritious containing abundant dietary fiber and Vitamin C. As a group, snap beans include bush beans, half-runner beans and pole beans. Snap beans can have several types of growth habits including bush, semi-vining, and vining. Bush varieties tend to have a concentrated set of beans and do not require trellising. Semi-vining or indeterminate types include half-runner and pole beans which are popular in many regions of West Virginia primarily for their flavor, canning quality and high marketable yields. Half-runner and pole beans require trellising. A trellis supports vine growth, increases yield, improves bean quality and make it easier to harvest the beans

There are several types and phenotypes of snap beans including round-pod, flat-pod, brown/white seed, yellow-wax and filet beans. Traditional bush, half-runner and pole beans are round pod types, but there are excellent flat pod (e.g., Romano) and filet beans. Filet beans are very tender, young beans (1/8 inch diameter) without any strings. There are several varieties of filet beans which perform well in West Virginia (Table 1).

Most hybrid bush beans do not have a fibrous string while most of the heirloom half-runner and pole bean types have a string which must be removed before cooking, freezing or canning. The string and pod can toughen in hot, dry weather. Removing the string during processing is simple and coincides with washing, snapping and tipping the beans.

Snap beans are tender vegetables and should be planted after the last frost date. Beans require a soil temperature at the 1inch depth of at least 60°F for optimal germination. Beans are planted approximately 1 inch deep and approximately 4-6 inches between seeds with rows spaced 30-36 inches apart. Beans can be planted on bare soil or into plastic mulch which accelerates germination and suppresses weed germination/emergence and soil moisture evaporation (Figure 2). For planting on plastic mulch, black or white, embossed mulch is used, and 2 rows are planted on a 36-42 inch-wide bed. Rows are approximately 12-18 inches apart on the plastic mulch. A single line of drip tube is placed on each bed with a medium flow rate to provide water throughout the growing season. Plasticulture beans are typically hand-harvested. If planting for mechanical harvest, bush beans are planted on bare ground rather than plastic mulch.

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**Table 1.** Some recommended varieties of snap beans for West Virginia.

Cultivar	Type	Days to harvest	Comments
Boone	Bush	58	Very dark green pods; Can be mechanically harvested
Caprice	Bush	55	Produces a concentrated set of dark green beans.
Coal Camp	Pole	72	WV Heirloom pole bean which can be harvested green or dried.
Crockett	Bush	58	Excellent quality with dark green pods. Can be mechanically harvested
Fat Man	Pole	70	WV heirloom bean with 5-6" pods
Ferrari	Bush	58	Dark green filet bean; erect plant
Fortex	Pole	60	Stringless pole bean with excellent flavor and yield.
Jade	Bush	55	Medium-green pods; excellent for hand-picking.
Hunter	Pole Romano	70	Pole Romano-type with 10 in. pods excellent flavor
Josephine Jackson	Half-Runner	60	Heirloom half-runner with medium green pods and excellent yields
Kentucky Wonder	Pole	70	Straight 8 inch pod typically harvested when young and tender/
Nickel	Bush	55	Compact filet bean with excellent yields
Mountaineer	Half-Runner	62	Heirloom half-runner with excellent yield
Non-Tough	Half-Runner	65	Heirloom half-runner with large pods that stay tender.
Roma II	Bush Romano	60	Produces 5 inch, flat pods
Royal Burgundy	Bush	60	Purple pods with green interior.
Strike	Bush	53	High marketable yields and quality
Volunteer	Half-Runner	62	Medium-green half runner with excellent disease tolerance and yield.

For early-season harvest, beans can be successfully transplanted. Two seeds per cell (50-cell tray) would suffice. The transplants are planted three weeks after seeding approximately part on plastic mulch and can produce an early harvest.



**Figure 2.** Commercial snap beans can be established on plastic mulch with drip irrigation.  
(Source: L. Jett)

Succession or staggered planting of green beans every 2-4 weeks will provide a continuous supply of beans over the summer and early fall. To harvest fall snap beans, plant in early August for harvest before frost. A row cover can be placed over bush beans to protect from late frost. Snap beans are sensitive to high temperatures and drought stress. When beans are exposed to high temperatures and dry weather during flowering, the flowers will abort or fall off the plant.

Snap beans can be successfully grown within a high tunnel as an early or late-season crop (Figure 3). Typically, half-runner or pole beans are best suited to high tunnels since they can be trellised and produce a crop over an extended period of time. However, bush beans can be succession-planted within a high tunnel for continuous harvest. High tunnel bean yields have averaged 2-3 lbs. per linear foot within a high tunnel in West Virginia. Beans are sensitive to soil salts, so it is important to have the high tunnel soil regularly tested for soluble salts.



**Figure 3.** High tunnels can be used for early and late-season bean production. (Source: L. Jett)

Prior to planting snap beans, a soil test should be performed. Beans do best with a soil pH of 5.8-6.5 on well-drained soil. Nutrients such as phosphorus and potassium can be applied at or before planting. Beans are in the legume family which includes crops such as peas and peanuts. Legume plants can produce some of their own nitrogen, so it is important not to overapply nitrogen either as an organic (e.g., compost) or synthetic (e.g., 10-10-10) fertilizer). In West Virginia, no more than 80 lbs. of actual nitrogen per acre is applied. The nitrogen can be split between a preplant and sidedress application. Consult the *Commercial Vegetable Production Recommendations* for specific fertilizer rates for snap beans.

Pole and half-runner bean are trellised for maximum yield and quality. Runners or vines from these types of beans can be 15-20 feet long. Several types or styles of trellis structures can be used. At WVU, we have evaluated a slanted trellis design which significantly increases harvest efficiency and quality for pole and half-runner beans (Figure 4). In addition, other trellis designs include using cattle panels, netting, T-pee trellises and even companion plants such as sweet corn.



**Figure 4.** The slanted trellis design significantly improves harvest efficiency of runner beans. (Source: L. Jett)

Growing snap beans on plastic mulch can significantly reduce weed competition, although several herbicides are labelled for commercial bean production. Snap beans are amenable to no-till production. Common insect pests of beans in West Virginia include the Mexican bean beetle (Figure 5) corn earworm, Japanese beetles, stink bugs and mites while diseases such as bean mosaic virus, anthracnose, white mold and bacterial blight are potential diseases. Beans must be rotated each year to avoid many pest problems. The bean planting should be scouted regularly for detecting pests. The WVU Extension Plant Diagnostic Clinic can help diagnose any pest issues encountered and provide control recommendations for organic or conventional production.



**Figure 5.** Mexican bean beetles can significantly defoliate bean plants and reduce marketable yields.

Snap beans are harvested approximately 14 days from flowering or 60-70 days from seeding. Bush beans often have a concentrated flowering cycle, while half-runner and pole beans continually flower through the season. Most pole and half-runner beans will produce beans for 2 or more months. Some varieties of half-runner beans will cease flowering after a time then start a new flowering cycle in late summer in West Virginia. Beans are mostly self-pollinated, but pollinators may improve marketable yield. If seeds are being saved from heirloom or other open pollinated varieties, the varieties should be separated by at least 20 feet to maintain variety purity.

An even supply of water during flowering through pod set is critical for good yields. Supplemental irrigation will be needed if rainfall is less than 1 inch per week. Beans should be picked before the seeds (developing bean) get too large and the pods too tough or discolored. Half-runner and pole beans are picked when small and tender but can be picked just as the beans begin to swell within the pod. Some pole beans can be harvested as fresh shelled or dry beans. Filet beans are harvested when the pods are 1/8-1/4 inches in diameter. Most snap beans are harvested every 3-5 days throughout the growing season. Hybrid bush bean varieties will have a concentrated set of beans which can either be mechanically harvested or hand-harvested. Avoid picking beans after a rain or heavy dew when the foliage and beans are wet. Use clean, reusable harvest containers for bean picking (Figure 6). Harvest aprons are available which can be used to increase harvest efficiency. Slanted trellises can be used to improve harvest efficiency since all of the beans are on one side of the row for the picker to access. Picking in late evening or morning when field heat is lower will improve postharvest shelf life of green beans. To remove field heat when picking in high temperatures, beans can be hydrocooled in cool water and stored at 38-42°F for optimal quality. If a cooler is not readily available, place the beans in a shaded area and market as rapidly as possible. Snap beans are very well-suited for U-Pick markets since

there is a large demand for beans. A good yield of green beans is approximately 150 bushels/acre or 2.5-5 tons/acre. The fresh weight of a bushel is typically 30-35 pounds. Some half-runner beans can yield as much as 8-10 tons/acre. In general, each plant of half-runner beans produces about 0.5 pounds of marketable beans.

When marketing beans, the crop can be sold either by weight or volume. Many producers prefer to sell fresh beans by the pound. The beans can be prepackaged in 1-3 lb. perforated bags for consumers. Beans are well-suited to value added processing such as pickling, freezing or canning. Processed beans can be sold throughout the year when the fresh crop is not available.



**Figure 6.** Snap beans should be harvested in clean containers, cooled and packaged in boxes or perforated bags for market. (Source: L. Jett and L. Sickler)

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