



Home Garden Beans

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Beans generally grow well in Hawaii's warm climate. The most common beans found in home gardens are types of green bean (also called snap or string bean) grown for eating as a vegetable. These include numerous green bean cultivars of *Phaseolus vulgaris*, yard-long bean or asparagus bean (*Vigna unguiculata sesquipedalis*), lima bean (*Phaseolus limensis*), and, occasionally, yellow or wax bean (also *P. vulgaris* varieties). Both bush and pole types of green beans can be found, with either flat or rounded pods. Most are grown for harvest and preparation of the entire young pod, although the limas are often shelled before cooking.

Some lesser known beans that occasionally are found in home gardens in Hawaii and can be consumed as snap beans include the rice bean (*Vigna calcaratus*), winged bean (*Psophocarpus tetragonolobus*), lablab bean (*Lablab* species), and sword bean (*Canavalia* species). The bean types used for dried beans, such as navy, kidney, pinto, garbanzo, mung, adzuki, and others, are not commonly grown in Hawaii.

Varieties

Pole bean varieties are usually preferred in home gardens because they yield more for a given space and over a longer period of time. Most gardeners in Hawaii prefer the long, flat-podded types. Three pole bean varieties have been developed by UH-CTAHR for disease resistance. 'Hawaiian Wonder' is resistant to fungal rust disease in some areas and should be planted if rust is a problem. 'Poamoho', which is stringless, and 'Manoa Wonder' are resistant to infection by the root-knot nematode. Other pole bean favorites include the Mainland types 'Kentucky Wonder', with long, somewhat rough pods, and 'Blue Lake', with shorter, round pods. 'Blue Lake' also has bush variants.

'Greencrop' is a flat-pod bush bean that has been grown successfully in Hawaii. 'Magnum' is a bush type that has done well in trials and produces large, flat pods. 'Greencrop' and most other bush beans are resistant to rust disease. Most bush bean varieties found in seed catalogs produce short pods that are round in cross-section.

Lima beans also come in pole ('King of the Garden') and bush ('Fordhook 242', 'Henderson Bush') varieties. Both large- and small-seeded varieties can be found. Pole lima beans are essentially perennial in Hawaii if kept free of pests and diseases.

"Yard-long beans" are long-podded pole beans similar to the shorter-podded bush versions called black-eye pea or cowpea.

Preparing the soil: amendments and fertilizer

Bean plants grow best in well drained, moderately acidic to neutral soil (pH 6.0 to 6.8 is optimum) with a good level of soil organic matter. Have the soil analyzed to determine the soil pH and whether any soil amendments (including lime, dolomite, and phosphate) are needed. A soil analysis is particularly recommended for new garden sites. A "standard" soil analysis, which measures soil pH and available soil phosphorus, potassium, calcium, and magnesium, is relatively inexpensive and can be done by the CTAHR Agricultural Diagnostic Service Center** or a commercial laboratory (preferably one having experience with Hawaii's soils).

*This document replaces Hawaii Cooperative Extension Service Home Garden Vegetable Series no. 8, "Beans," 1978.

**For information on sampling soil and arranging for its analysis by CTAHR-ADSC, see the CTAHR publication *Testing your soil—why and how to take a soil-test sample*, available at www.ctahr.hawaii.edu/freepubs under "Soil and Crop Management," or from UH-CTAHR Cooperative Extension Service offices statewide.

Soil with pH below 5.5 requires application of agricultural lime to increase the pH to a level more favorable for plant growth. Soil in high-rainfall areas often requires lime to increase the calcium supply.

Low levels of available soil phosphorus limit plant growth in many of Hawaii's soils. Both lime and phosphate fertilizer must be mixed thoroughly into the surface 6–8 inches of the soil before planting.

Home garden productivity can usually be increased by amending the soil with organic matter, such as compost or well rotted animal manure (see the CTAHR publications *Backyard composting—recycling a natural product* and *Composted animal manures—precautions and processing*). If a suitable material is available, make an annual application to the garden of 1–3 inches spread over the soil and mixed into the surface 6–8 inches. If the material is in short supply, its application can be limited to the area within 6–10 inches from the planting row or spot.

To ensure adequate levels of the major plant nutrients, include a general fertilizer when preparing the garden before planting. Commonly available rapid-release fertilizer formulations suggested for vegetables are 16-16-16 (“triple-16”) and 10-20-20 (these numbers refer to the percentages of nitrogen, phosphate, and potash in the fertilizer). Commercial growers often figure on applying a total of 150 pounds of N per acre to a bean crop. On a 100 square-foot (sq ft) basis, this is equivalent to two applications (one preplanting, the second to the bearing crop) of $1\frac{3}{4}$ pounds of 10-20-20 or 1 pound of 16-16-16 per application. Gardeners who prefer to use slow-release formulations will apply all of the nutrients before planting. Preplanting fertilizers should be mixed well with the garden soil.

Soil phosphorus can increase to an undesirably high level after long-term application of high-phosphate fertilizers, such as 10-30-10. If this is part of the garden's history, a soil analysis should be done to check the phosphorus level. If it is in excess, a zero-P formulation can be created by mixing equal amounts of urea and muriate of potash to produce a formulation that is about 23-0-30. For the 100 sq ft basis fertilizer schedule mentioned above, about $\frac{3}{4}$ pound of this fertilizer would be applied in each of two applications.

Fertilizer application to the bearing crop

When the plants begin to flower, apply the second dose of general fertilizer. Divide the amount of fertilizer being applied into small doses according to the number of plants in a 100 sq ft garden area. Apply each dose 6–8 inches from the base of each plant. Some gardeners spread the fertilizer on the soil surface, but others believe it is best to use a trowel to incorporate it 2–4 inches into the soil in one or two spots, using care to minimize damage to the plant root system. Irrigate after the application.

Instead of a single postplanting application, some gardeners divide the amount into two applications, the second made two to three weeks after the first. Others will apply smaller amounts of fertilizer every two weeks after bearing begins. Water-soluble fertilizers with micro-nutrients may also be used for postplanting applications.

Planting

Plant seeds directly in the soil about 1–1½ inches deep. For pole beans, seeds can be planted 6–12 inches apart on both sides of a trellis or fence. Allow 36–40 inches between rows of pole beans. Most pole bean varieties form vines 2–3 weeks after emerging. Train the vines to climb the support instead of crawling on the ground. Bush beans can be planted 4–6 inches apart in rows 30 inches apart. Pole lima beans can produce huge vines and need wider spacing and a sturdy fence for support.

Irrigation

Irrigate as necessary to maintain available soil moisture, but avoid soil waterlogging. Any setback early in their growth may result in smaller, weaker plants with reduced yields. To minimize leaf disease, avoid wetting the plant when applying water. If possible, irrigate only the soil using furrows, drip lines, or soaker hoses. If using overhead (sprinkler) irrigation, do it in the morning so the plants dry quickly as the day warms.

Insect pest management

Gardeners may find several pests on beans. The bean fly lays eggs on the first leaves shortly after germination, and the maggot tunnels down the stem to the first node. The damage thus caused to the plant's vascular system results in wilting and dying of the top of the plant.

In areas severely infested with bean flies, weekly insecticide applications may be necessary from seedling emergence until flowering. Mature plants usually tolerate bean fly infestation without further applications of insecticide.

Cutworms and slugs hide during the day and feed on the stems near the soil at night. Collars several inches high stuck into the soil around the stem can deter cutworms, and regular disposal of slugs removed from their hiding places will reduce their damage. Chinese and Fuller rose beetles chew the leaves, and leafminers tunnel into the leaves, leaving white trails. Aphids, whiteflies, and mites suck the plant sap and may be controlled with insecticidal soaps. Occasionally, pod borers infest the inside of the pods, and stink bugs puncture the pods. When using pesticides, read the label to ensure that the intended use is included on it, and follow all label directions.

Disease management

The most common diseases of beans in Hawaii are root-knot nematodes, which invade the roots, and the diseases rust, anthracnose, and halo and bacterial blights, which affect the leaves. These foliar diseases are more prevalent during prolonged periods of wet weather, and they rarely are a problem in dry areas. Irrigating only the soil and keeping the leaves dry will help reduce incidence of foliar diseases. When possible, use nematode-resistant varieties such as ‘Poamoho’ and ‘Manoa Wonder’ and rust-resistant varieties such as ‘Hawaiian Wonder’ and most bush beans. Soil solarization and incorporation of manure or compost may help to reduce populations of nematodes in the soil

Harvest

Green beans are usually harvested just before the seeds start to swell and become visible as bumps on the outside of the pod. For most varieties, this usually occurs about 10 days after flowering or about 6 weeks after planting. Most of the pods of bush bean varieties mature around the same time, during which two to four harvests can be taken.

Pole beans continue to produce as long as the plant remains healthy. Regular harvesting of the beans promotes further flowering. Lima beans are harvested when the beans reach full size but before the pods start to turn yellow.

Seed availability

Seeds of ‘Hawaiian Wonder’, ‘Manoa Wonder’, and ‘Poamoho’ are available from the CTAHR Agricultural Diagnostic Service Center Seed Lab on the UH Manoa campus and from some garden stores. Other varieties can be found in garden stores and seed company catalogs. CTAHR Seed Lab order forms can be obtained online at <www.ctahr.hawaii.edu/seed> or from Cooperative Extension Service offices statewide.

Other resources

Useful CTAHR publications for the gardener include *Testing your soil—why and how to take a soil-test sample* and *Plant-parasitic nematodes and their management*. Find these and other titles at <www.ctahr.hawaii.edu/freepubs>.