



Vegetables: Growing Dry Beans in Home Gardens

WASHINGTON STATE UNIVERSITY EXTENSION FACT SHEET • FS135E

Crop at a Glance

Growing season: Summer

Time of planting: May 15–June 1

Spacing: Plant seeds 2–3 inches apart in rows spaced 2–3 feet apart

Days to harvest: 90–120 days

Average yield: 1.2 pounds per 10-foot row

Common starting method: Direct seeding into the soil

Introduction

Dry beans are an easy crop to grow in the garden and have similar growing requirements to green beans. Bean seeds are large and easy to handle, and healthy seeds germinate quickly. Seed can easily be saved from plants each year, and can be stored for long periods of time.

Beans are a member of the legume family and are able to fix nitrogen from the air around the roots when the proper bacteria are present in the soil. Thus, it is not necessary to apply large amounts of nitrogen fertilizer to the crop. At the end of the season, gardeners can compost the plant residue or till it into the soil to provide nitrogen to the following crop. Dry beans are a good rotation crop because of their nitrogen-fixing ability; and they are able to break some common disease cycles, such as Verticillium wilt, for other popular garden crops.

Dry beans play an important role in a healthy diet. Not only are they a good source of protein (about 22%), they are also rich in fiber, minerals (such as zinc and iron), and B vitamins (such as folic acid). A healthy diet that includes weekly servings of dry beans can help lower cholesterol and prevent heart disease and diabetes—two major diseases common in the United States today.

This publication provides information on choosing dry bean varieties, and how to grow them. In addition, the

Further Reading section provides information on general gardening topics, such as soil fertility and natural pest management.

Selecting Types to Plant

There are hundreds of varieties of dry beans, which fall into two general categories—bush and pole types. Both types of beans are planted in rows or in raised beds, but pole beans require a trellis, and are well suited to gardens that have limited space (for additional information see *Beans and Peas*, Myers et al. 1996). There are many more varieties of bush beans, in a wide diversity of colors and patterns. The Washington State University Vegetable Horticulture website, <http://vegetables.wsu.edu/NicheMarket/BeanVarieties.html>, includes photos of many bush dry bean varieties that grow well in Washington State. On this website, gardeners will also find growing information such as the days to maturity, plant height, and pod and bean characteristics for the varieties listed.

Bush dry beans grow similarly to green beans, but there are differences between the two. Green beans have been bred and selected to have stringless pods; while the pods of most dry bean varieties are very fibrous (stringy), and are not palatable. Green bean seeds can be saved and eaten as a dry bean, but the high cost of the seed generally makes green beans undesirable for this use.

Select dry bean varieties that are resistant to diseases that are common in your area (see Disease section below). Most seed catalogs provide information regarding disease resistance for each cultivar sold. Commercially purchased seed has been grown in fields that are generally considered to be disease-free. However, garden-saved seed can be a potential source of disease (see Saving Seed below), and should be used with caution.

Choosing a Planting Site

Plant dry beans in fertile, well-drained soil, and in an area that receives at least six hours of direct sunlight each day. Select a location with enough of a slope for surface drain-

This fact sheet is part of the WSU Extension Home Garden Series.

age and sufficient subsoil permeability for proper drainage. While soil drainage is determined mostly by the site, it can be improved by using raised beds. Many dry bean varieties mature in late September in western Washington, so avoid planting in areas where rainfall will accumulate, preventing the crop from drying.

Planting Guidelines

Before planting beans, inoculate the seed with *Rhizobium leguminosarum*. *Rhizobium* is a bacterium that occurs naturally in the soil, but it is not present everywhere. The bacteria induce nodule formation on the plant roots and forms a symbiotic relationship with the plant to fix nitrogen from the air. Each species of legume requires a specific *Rhizobium*. If you are unsure if your soil has *Rhizobium*, add inoculum to the seed prior to planting or sprinkle inoculum over the seed in the furrow. Some garden seed suppliers sell an inoculum mix which contains types of *Rhizobium* suitable for the most common garden legume crops (beans and peas).

Late in the season, when pods have formed on the plants, gardeners should check for nodule formation. Loosen the roots with a garden fork or shovel and pull up the plant. An active, healthy root nodule will be pink to red in color on the inside, while an unhealthy nodule will be grey or white. By fixing nitrogen, the plant is able to meet much of its own nitrogen needs. Do not apply too much nitrogen fertilizer to the plants, as this will prevent the bacteria from forming root nodules (see Fertilizer section below).

There is no need to soak seeds prior to planting; however, if you choose to soak seeds, submerge them in room temperature water for no more than 12 hours. Bean seed will germinate quickly when the soil temperature is above 60°F.

Planting Guide for Bush and Pole Beans

Bean Type	Planting Depth (inches)	No. Seeds per Row Foot	In-row Spacing (inches)	Between Row Spacing (inches)	No. Days to Germinate	Optimum Soil Temp. Range (°F)	Base Air Temp. (°F)
Bush	1½–2	4–6	2–3	18–30	6–14	60–85	50
Pole	1½–2	2–3	4–6	36–48	6–14	60–85	50

Do not plant beans when the soil temperature is below 50°F. For best results, follow the planting guide below; and plant dry beans in rows or in a raised bed (Figure 1).

Prior to planting, test the soil to determine nutrient levels. Indicate on the soil sample that beans are the intended crop, and the soil test results will provide recommended nutrient application rates. Choose a fertilizer that best meets the phosphorus (P) and potassium (K) needs identified in the soil test. It is very difficult to accurately test soil for nitrogen (N), especially early in the season. When you select a fertilizer to meet phosphorus and potassium needs, do not over apply nitrogen, as this will prevent the natural formation of nitrogen-fixing nodules on the plant roots. For more information on calculating the amount of fertilizer to add to your garden, see *Soil Fertility in Organic Systems: A Guide for Gardeners and Small Acreage Farmer* (Collins et al. 2013).

Watering

In areas that do not receive precipitation during the growing season, water beans once a week from seeding until the bean pods have turned yellow (usually early- to mid-August). In areas that receive an inch or more of rainfall each month during the summer months and are accompanied by high humidity, it may be possible to grow dry beans without irrigation. If irrigating is required, apply approximately 1 gallon of water to 10 feet of row each week; then adjust the amount and frequency of irrigation based on crop symptoms.

Water is especially important during flowering to ensure good pod formation. Too much or too little water can cause blossom and pod drop, which leads to a decrease in yield. Apply water to the base of the plant and avoid



Figure 1. Placing bean seed in a row (left), rows of beans emerging (center), and a raised bed with dry bean plants (right). Photos: Carol Miles, Washington State University.

watering the foliage (leaves), as wet leaves provide an ideal environment for disease.

Drip irrigation is the preferred watering method to provide an even amount of water throughout the garden, and to avoid water loss from evaporation. This method also prevents watering weeds in the garden alleyways. Drip irrigation also helps prevent foliar diseases. If you are using overhead watering (sprinkler), water plants early in the morning in western Washington to allow them to dry before nighttime. Wet plants are more susceptible to foliar diseases when temperatures drop in the evening. Stop irrigating bean plants in early- to mid-August, or as soon as the pods turn yellow, to allow the pods to dry.

Weed Control

Beans are easy to keep weed-free if you start early in the season. Weed thoroughly between rows and within the rows once the plants are established, usually about 6 weeks after seeding. If you weed too soon, it is easy to pull the bean plants out with the weeds. Weed beans again in mid-July, and do one final weeding in early August.

Where the climate is dry, weeds that have not yet flowered can be discarded between rows of beans. These pulled weeds will dry out completely and die in 1 to 2 days, and will provide a layer of mulch around the beans. In wet areas, or if the weeds have flowered, discard weeds outside of the garden area, as the weed plants can re-root or seeds can sprout.

After the first weeding, apply 2 to 3 inches of mulch around the bean plants to reduce additional weed growth and to retain moisture in the soil. Fallen leaves, untreated lawn clippings, and weathered straw are all good mulch materials. Do not apply mulch within 2 inches of the plant, as it may provide a habitat for insect pests, which may feed on the bean plants.

If you are using lawn clippings or other yard debris where herbicides have been applied, or if you are using purchased compost made from yard debris or agricultural feedstock (manure, straw, hay), be aware of potential herbicide residues. Beans are especially sensitive to herbicide residues found in common lawn and grain crops (used for livestock feed and bedding), such as those containing aminopyralid. If herbicide residues are present, the plants will become deformed. The damage looks much like virus symptoms, and plants can die. For more information see the WSU Whatcom County Extension website: <http://whatcom.wsu.edu/>.

Saving Seed

Beans are self-pollinated, making it easy to save seed each year. Only select healthy pods from healthy plants for seed saving. There are several seed-borne diseases which can impact beans (see Disease below). Symptoms are usu-

ally not visible on the seed, so it is important to maintain disease-free plants.

Pest Management

Disease and Insect Pests. There are many disease and insect pests that affect dry beans. Below is a list of the most common problems, their symptoms, and how to manage them. For more information on pest management, including more in-depth information on biological control and current labeled pesticides, see the Washington State University HortSense website <http://pep.wsu.edu/hortsense/>. For more information on common problems in your area, as well as periods of vector activity, contact your county Extension office (see <http://extension.wsu.edu/locations/Pages/default.aspx> for a list of county Extension offices). Vectors are insects which do not cause direct damage to a crop, but they carry a disease that affects the crop. Common vectors include aphids and leafhoppers.

Common Disease and Insect Pests of Dry Beans

Anthracnose
Glomerella lindemuthiana
(perfect state) or
Colletotrichum lindemuthiana
(conidial state)

Photos: K. Mohan,
University of Idaho



Symptoms: Leaves: Lesions on leaf petiole and lower leaf surfaces are brick red to purple and turn dark brown to black over time. **Pods:** Tan to rust colored lesions (1–10 mm in diameter), sunken in and bordered by a slightly raised black ring and reddish brown border.



Corrective Action: Plant disease-free seed. Use a 2 to 3 year crop rotation with non-host crops such as small grains, corn, and other vegetables.

Bean Common Mosaic Virus (BCMV)

Photo: K. Mohan,
University of Idaho



Symptoms: Leaves: Leaf roll, green-on-green vein banding, blistering and yellow dots (atypical). **Whole plant:** Stunted growth, mosaic mottle, and malformation.

Corrective Action: Use virus-free seed and resistant varieties. Remove affected plants from the garden (do not compost), and control aphids, which are common disease vector.

Beet Curly Top Virus,
Curtovirus

Photos: L. duToit, WSU

Symptoms: Leaves: Young plants exhibit epinastic leaf curl (downward bending of leaves caused by excessive growth of the upper side) and yellowing. Plants infected at later stages of growth show less severe symptoms, with epinastic leaf curl and yellowing on new growth. Darkening and thickening of leaves and shortening of internode. **Pods:** The number of pods will be reduced, as only pods that began formation before infection will reach maturity.

Corrective Action: Grow resistant or tolerant cultivars. Delay planting of susceptible cultivars until after the leafhopper (a vector) migration is finished.



Common Blight

Xanthomonas axonopis pv.
phaseoli

Photo: H. Schwartz, CSU

Symptoms: Leaves: Water-soaked spots that gradually coalesce into irregular shapes. Lesions become dry, brown and surrounded by a yellow margin. Generally occur on margin of leaf. **Pods:** Dark red-brown, circular and slightly sunken lesions. **Seeds:** May be shriveled and exhibit poor germination.

Corrective Action: 2 to 3 year crop rotation. Use disease-free seeds.



Fusarium Root Rot
Fusarium solani

Photo: G.Q. Pelter, WSU

Symptoms: Red discoloration on main root, later turning brown and decaying. Poor root development. In severe cases plants are stunted and leaves turn yellowish and may drop early.

Corrective Action: Plant in well-drained soil or raised beds. Use 5 to 6 year crop rotation with non-host small grains or resistant vegetable crops.



Halo Blight

Pseudomonas syringae pv.
phaseolicola

Photos: D. Inglis, WSU (top)
C. Miles, WSU (bottom)

Symptoms: Leaves: Small water-soaked spots on underside of leaf, followed by brown spots with a yellow halo. **Pods:** Dark, greasy, water-soaked spots. **Seeds:** May be shriveled or discolored.

Corrective Action: Use a 2 to 3 year crop rotation. Plant disease-free seed. Delay planting until after heavy spring rains. Remove weeds and volunteer beans to avoid disease reservoirs. Plant tolerant or disease resistant cultivars.



Sclerotinia White Mold
Sclerotinia sclerotiorum

Photos: L. duToit, WSU

Symptoms: Flowers: White moldy, cotton appearance as mycelium grows on flowers. **Whole plant:** Lesions start as small, circular, dark-green, and appear water-soaked, but rapidly become larger, slimy, and may envelope the entire plant. Under moist conditions, the lesions may grow external mycelium, which have a white mold appearance.

Corrective Action: Rotate with non-host crops, such as small grains, corn, or resistant vegetable crops. Avoid excessive nitrogen fertilization. Use the widest plant spacing to reduce disease. Choose cultivars that grow upright and open to avoid disease pressure.



Bean Seed Maggot
Delia platura

Photos: T. Waters, WSU

Symptoms: Seed maggots cause the most damage in spring when they feed on the embryo of newly emerging seedlings. Damaged seedlings die or develop into deformed plants, which give low yields. Maggots that attack young seedlings bore into the stem, usually causing the plant to die.

Corrective Action: Avoid planting in spring following a wet cycle when the seed maggot is most abundant. Also delay planting for several weeks after a cover crop, manure, or compost has been incorporated.



Cucumber Beetle, Spotted
Diabrotica undecimpunctata,
Cucumber Beetle, Striped
Acalymma trivittatum

Photos: K. Gray, *Insect Image Collection* (top), and A. Formiga, *Oregon State University* (bottom)

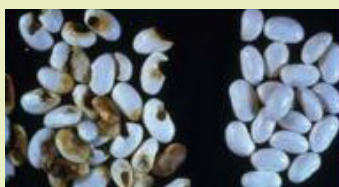


Symptoms: Eggs are laid in soil in the spring and larvae feed on roots. Adults emerge in the summer and feed on stems, leaves, flowers, and pods. Adults can overwinter in mild areas, and can be found within clumps of grass.

Corrective Action: Rotate with a non-susceptible crop. Use a perimeter trap crop of a Cucurbita variety to attract cucumber beetle. For more information see *Cucumber Beetles: Organic and Biorational Integrated Pest Management*, <https://attra.ncat.org/attra-pub/summaries/summary.php?pub=133>.

Western Bean Cutworm
Striacosta albicost

Photos: *Montana State University* (top) *Ontario Vegetables*, <http://onvegetables.com/> (bottom)



Symptoms: Moths lay their eggs on the undersides of dry bean leaves. Larvae chew through pod walls and feed on developing seeds.

Corrective Action: Till crop residues in the fall to destroy overwintering pupae. Control weeds such as lambs-quarters and wild mustard, which attract egg-laying females and provide a source of food for larvae.



Figure 2. Drying harvested bean plants on a tarp in a sunny driveway (top), and in a garage with a box fan (bottom). Photo: Carol Miles, Washington State University.

Harvest and Storage

Dry beans are ready to harvest when the pods are dry and easily open in your hand. However, you should not wait too long to harvest, because the pods will shatter (open on their own), throwing dry beans to the ground. To harvest, pick individual pods, pull the entire plant, or cut the plant at the soil line. Place pods or plants in a sunny area or in a dry sheltered area so they dry completely (Figure 2). Beans are ready to be shelled when the pods are very dry. Individual pods can be shelled by hand or the whole plant can be threshed by stomping. Place the plants on a tarp, or in a bag or box, and walk firmly over the plants until pods have split open (Figure 3). After threshing, clean the beans by sifting through a compost screen—the beans will fall through the screen and the large plant debris will remain on top (Figure 3). Place the plant debris back in the garden or in the compost pile. Use a seed cleaning screen, which can be purchased or handmade, to remove small debris (Figure 4). Finally, hold the screen in front of a fan and the remaining debris will blow away; this can be messy, so it is best to do this outside.

Store beans in a tightly closed container in a dark dry place. Glass jars, tin cans, and plastic buckets all make good storage containers, as long as the lid is tight-fitting. Stored dry beans can be used for food or seed. Dry beans can be stored for several years, however, after three or more years, they may develop “hard seed,” and will not absorb water well for cooking or germination.

Further Reading

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Figure 3. Threshing dry beans: stomping on plants that are in a burlap bag (left); sifting beans from plant debris using a compost screen. Photos: Carol Miles, Washington State University.



Figure 4. Cleaning dry beans: sifting out the smaller debris (left), and using a fan to blow out the remaining debris (right). Photos: Carol Miles, Washington State University.

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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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