



Extension Extra

ExEx 6024
May 1993
Horticulture

SOUTH DAKOTA STATE UNIVERSITY / U.S. DEPARTMENT OF AGRICULTURE

Growing Beans in the Home Garden

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Beans have been grown and used as a food crop since ancient times (5,000 to 6,000 B.C.). Beans can be eaten at various stages of development. **Green beans** are a source of vitamins A, C, thiamin (B1), and riboflavin (B2) and in the minerals calcium, phosphorus, and iron. **Dry beans** are high in protein and are an important part of the diet where meat is only available in limited quantities. **Snap beans** commonly are grown in home gardens all over the country and are a popular vegetable for fresh, canned, or frozen use.

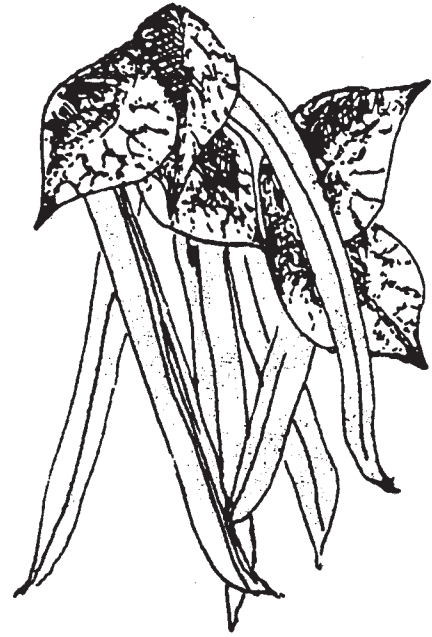
Snap and lima beans have similar cultural requirements and grow and develop in similar ways. Both are warm season crops that have climbing or bush growing habits. Lima beans, however, require a considerably longer growing season (65 to 85 days) compared to snap beans (45 to 60 days). The difference is because lima beans are grown primarily for their large (but not fully mature) seed compared to snap beans, which are grown for their fleshy, immature pod.

Snap beans belong to the species *Phaseolus vulgaris*, which includes a number of different types of beans used in either the green or the mature state. Lima beans generally are grouped into large and small seeded types. The large seeded limas (*Phaseolus limensis*) are perennials but are grown as annuals. The bush lima is classified as *Phaseolus limensis* var. *limenaus*.

Other types of beans also are grown. The fava bean (*Vicia faba*), also known as English broad bean, is not a true bean but is related to vetch. A cool-season vegetable, plant in much the same way as snap beans. Harvest fava beans when the pods are large and full of flat beans. A few varieties of soybean (*Glycine soja*) also can be grown in South Dakota. These are warm-season beans, grown either for fresh consumption, like snap beans, or grown for the mature beans, which are dried. There are many other

types of shell beans, besides soybeans.

Some that may be grown in South Dakota include kidney, adzuki, pinto, garbanzo, black, brown, navy, red, and many others. Consult the garden catalog and seed packet for cultural information.



Growth Habit . . .

Beans have three general growth habits:

- Bush (determinate)
- Runner (indeterminate or pole)
- Half runner (semi-determinate)

Runner beans are the original form. Bush beans are a fairly recent development, resulting from a mutation of the runner type. A determinate plant is one which first grows vegetative shoots but later stops growing, then produces flowers and fruits. Bush or determinate beans grow from one to two feet high and have a short center stem with six to seven nodes and several strong branches. Each stem flowers at the top.

An indeterminate plant grows vegetative shoots, starts to flower and produce fruit, but continues to grow. The runner beans are indeterminate and have a main stem that can grow to 10 feet or more in length producing flowers and fruit in the leaf axils. The tip of the stem continues to grow and does not flower.

Beans are self pollinating, so you do not need to plant more than one variety to produce fruit. Beans also are day neutral which means that they can produce fruit at any time of the year, weather permitting.

Snap bean pods are generally 3-8 inches long and 1/4 to 3/4 inches wide. Some bean pods may be fleshy and round while others may be flat. Pods vary in color, with green or yellow being most common; beans with yellow pods are often referred to as wax beans.

Pod fiber development increases as the seed develops and depends upon the cultivar. Lima bean pods generally are curved and round, contain two to six seeds, and range in size from 1/4 to 1 inch.

Climate . . .

Beans are warm-season vegetables that will not tolerate frost. Adequate moisture and warm, but not hot, temperatures are important for rapid growth, good pod set, and early maturity. Lima beans, especially the large-seeded types, are more sensitive to weather extremes than are snap beans. For uniform rapid germination, beans require warm soil and germinate best when the soil temperature is between 60 and 85F. The germination rate of snap and lima beans is extremely poor below 50F and above 95F. Beans grow best at an air temperature of 70 to 80F.

Soil and Fertilizer . . .

Beans will grow on all types of soils except soils that form crusts after watering or rain. A heavily crusted soil will prevent the seedlings from emerging. Sandy to clay loam and muck soils often are used to grow beans.

Beans are a dicot because they push their two large seed leaves up through the soil in germination and, therefore, need a well-prepared seedbed. They prefer mildly acid soil (pH 5.5 to 6.5) but will tolerate a slightly higher pH. However, they grow poorly under highly alkaline conditions.

Beans are legumes, which enables them to utilize nitrogen from the air, through nitrogen fixation, to supply some of

their need for nitrogen. Consequently, they are not very responsive to fertilizer. Their nitrogen needs vary depending on soil type and management practices. Apply fertilizer containing a 1:2:1 (nitrogen:phosphorus:potassium) ratio at the rate of 3/4 to 1 lb of nitrogen per 1,000 sq ft (1 lb of 8-16-16 for 25 ft of row) for bush beans and 1 1/4 lb of nitrogen per 1,000 sq ft (1 1/4 lb of 8-16-16 for 25 ft of row) for pole beans. Apply the fertilizer in a band, 3-4 inches away on each side of the row. A band application is more effective than broadcasting at planting time, since the bean plant does not produce a large root system.

After the first harvest, beans may be fertilized again. Apply ammonium nitrate (35-0-0) or another high nitrogen fertilizer a couple of times (two weeks apart) at the rate of 1/2 cup per 25 ft row as a side dressing. Be sure to stay 4-6 inches away from the row. Irrigate after sidedressing. This will encourage continuous production over a longer period.

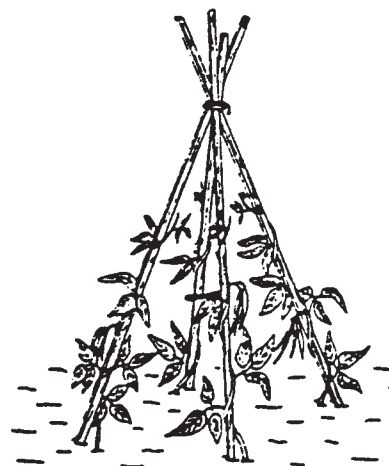
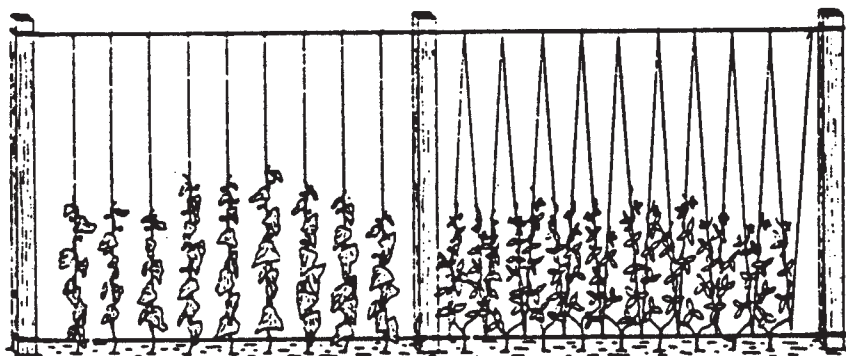
Plant Spacing . . .

The traditional spacing for bush snap beans consists of rows 2 to 2 1/2 ft apart with seven to nine plants per foot of row for irrigated gardens and six to eight plants per foot of row if the garden will not be watered. In the case of the bush lima bean, the distance between rows is the same but there are three to four plants per foot of row. Intensive or square foot gardens can have plants spaced on about 1 ft x 1 ft spacing to eliminate wasted aisle space.

For continuous production of bush beans during the summer, make two or three plantings two weeks apart.

Pole bean cultivars of both snap and lima beans may be planted in rows or hills. If rows are used, plant the seeds 6-12 inches apart within rows and space the rows 3-4 ft apart. Space the hills 3-4 ft apart each way and plant five to six seeds per hill. Once the plants begin to grow, take out the weakest plants, leaving three to four plants per hill.

Pole beans are most productive if they are provided a trellis to grow on. A simple framework of chicken wire or string on a fence works well.



Cultivating and Watering . . .

Cultivating should be shallow since root injury, especially during pod development, reduces crop yields significantly.

A constant supply of moisture is critical to maximize yield and quality, and to maintain uniformity. Deformed pods result from water stress due to low soil moisture or hot dry weather. Beans require 1 to 1.25 inches of water per week in South Dakota. Low soil moisture, high temperatures, and low relative humidity may cause up to 85% of the flowers to drop off and not form a pod.

Other tips:

- Do not cultivate or work in the garden when bean leaves are wet to avoid spreading foliage diseases.
- Water in the forenoon so the leaves are dry by the time the sun goes down to discourage foliage diseases.
- Water from below using trickle or ooze hoses to keep the foliage dry.
- Water thoroughly by applying enough water to saturate the soil to a depth of six to eight inches, then do not water again until the soil dries.
- Conserve soil moisture and deter weed growth by applying an organic mulch around the plants 2-3 inches thick after plants are six to eight inches tall.

Harvesting . . .

Pick beans when the foliage is dry. Pick the pods when small and tender; the longer the snap beans stay on the plant, the tougher they become. When you can see the outline of seed inside the pod, the beans are over mature and will have reduced quality, be tougher, and have a poorer flavor. Frequent picking increases the quality and quantity of the beans. Snap beans usually are ready for harvest 12 to 14 days after the first blooms have opened, but the time required varies with weather conditions.

Harvest lima beans as soon as the pods begin to show evidence of the beans inside. Once the pods begin to turn yellow, quality will be reduced. Maturity of the crop is delayed by:

- Heavier soils
- High soil moisture content
- High nitrogen content of soil
- Cool temperatures

Storage . . .

After harvest, clean the beans in very cold water and store in the refrigerator. Beans can be kept for seven to ten days.

Pests . . .

Always plant good quality seed and select disease resistant varieties. Frequent scouting of the garden for early signs of insect and disease problems can be an effective means of identifying and controlling pest problems. Avoid disturbing foliage when wet, rogue out diseased plants, and control weeds to reduce pest problems.

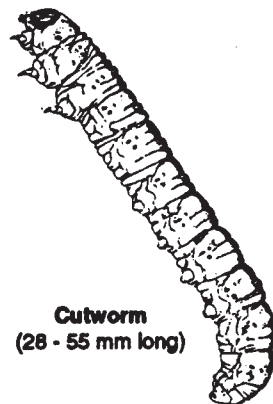
Thoroughly clean up the garden in the fall, removing all debris to reduce future pest problems.

Insects

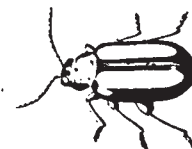
Beans are most susceptible to insect damage when they are young plants. As the plants mature they are less affected by insect pests. The major pests of beans include asparagus beetle, cutworms, wireworms, flea beetles, aphids, cabbage loopers, corn earworms, cucumber beetles, Mexican bean beetles, leafhoppers, mites, slugs, and plant bugs. Grasshoppers also may be a problem late in the harvest season. (See illustrations.)



Asparagus beetle
Common (l.) Spotted (r.)
(6 - 9.5 mm long)



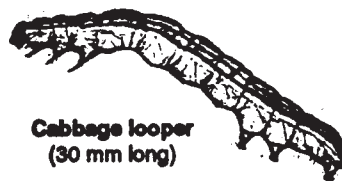
Cutworm
(28 - 55 mm long)



Flea beetle
(2.5 mm long)



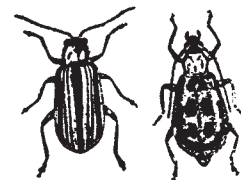
Aphid
(1.6 - 2.4 mm long)



Cabbage looper
(30 mm long)



Corn earworm
(44 mm long)



Cucumber beetle
Spotted (l.) Striped (r.)
(6 mm long) (5 mm long)

Disease

Most disease pathogens are more severe late in the season, especially during warm, moist weather. The more common diseases include anthracnose, bacterial blight, bacterial wilt, bean rust, common mosaic, and seedling rots.

Rodents

Small animals, especially rabbits and gophers, like to eat young bean plants. A fence, at least 2 ft high and buried 6 inches in the ground is the best defense against these pests.

For additional assistance in identifying pest problems and treatment alternatives, contact your local County Extension Office.



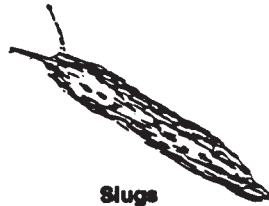
Mexican bean beetle
(6 - 8.5 mm long)



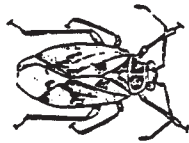
Leafhopper
(3 mm long)



White grub



Slugs



Plant bugs



Grasshoppers



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150 copies printed by CES at a cost of 12.5 cents each. May 1993.