SNAP BEANS

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Freezing, canning, and fresh use make snap beans an important sales item for the vegetable producer or roadside market operator. Snap beans can easily be adapted to "pick your own" operations and can be planted to provide successive harvests throughout the early summer or fall. Production declines, however, during the hottest part of the summer. Although other types of beans can be grown (lima, horticultural, edible soybeans, etc.), the greatest consumer demand is for either green or yellow, short, non-vining types — commonly called "green beans" or snap beans.

MARKETING

Beans are perishable; they must be refrigerated and moved quickly to market. Wholesale or retail grocers, farmers markets or roadside stands are possible market outlets, but be sure to check for potential sales, packaging requirements, quality standards, and delivery schedules well in advance of the growing season.

Beans make an excellent "pick your own" crop. Most newer varieties develop a concentrated "set" of pods, allowing the customer to provide a once-over harvest. You can then remove the plants and plant later crops of other vegetables.

SOIL AND LOCATION

Beans grow best in well-drained, relatively level soils. The plants are rather shallow-rooted even though the root system is quite extensive. They are not very aggressive and yields are severely reduced by competition from weeds. Beans for early harvest can be grown in sandy soils, which usually warm rapidly in the spring. However, sandy soils dry out quickly and do not hold the fertilizer needed by this shallow-rooted crop. Avoid low-lying, wet locations and heavy soils, as beans will not set pods under extremely wet conditions. Beans do best on a moderately acid soil (pH 5.5 to 6.5). They can tolerate pH levels slightly lower or higher with limited effects on yields, but extremely acid or alkaline soils should be avoided. Also, beans are very sensitive to salt, so locations with "salty" soil or poor quality irrigation water should be avoided.

FERTILIZATION

A soil test will indicate the need for limestone and certain fertilizer elements. Limestone may be needed in extreme southeast Kansas, but in most of the state, pH will not need to be corrected. Depending on soil test, apply 250 to 300 pounds of l2-l2-l2 (or similar analysis) or l50 to 200 pounds of l8-46-0 per acre prior to planting. The rate can be reduced by "banding" the fertilizer 4 inches deep and 3 to 4 inches from the row.

Beans require a regular supply of fertilizer for uniform growth, so one or two side dressings are necessary through the season, especially in wet seasons or in sandy soils. Apply 25 to 30 pounds of nitrogen per acre in a band 3 to 4 inches from the row, 2 to 3 weeks after planting. A second application 2 or 3 weeks later may be necessary in sandy soils or when heavy rainfall occurs. Although beans are members of the legume family, which can utilize nitrogen from the atmosphere through

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bacteria in the root system, snap beans are inefficient "fixers" of nitrogen and usually require fertilizer earlier in the season, plus additional fertilizer.

Over-fertilization will result in excessive foliage growth with little increase in yield and possible salt damage from fertilizer.

INOCULATION

Although inoculation can provide bacteria to aid in the nitrogen "fixing" capability of bean plants, little advantage can be observed in most areas where beans are grown. Care must be taken with inoculation, since wetting of the seeds (as often suggested in the instructions) can damage them.

SEEDING

Beans can be seeded when danger of frost is past and soils have begun to warm to a consistent 55°F. In most of Kansas, it is generally assumed that the early planting date should coincide with the average date of the last spring frost (usually mid-April in eastern and central Kansas). This allows a week after most danger of frost is past before seedlings emerge.

A bean crop planted at this time should be ready for harvest by mid- to late June. Additional plantings may continue at intervals until mid-May. Later plantings will mature in mid-July. Some problems with blossom development may occur with hot, dry, windy conditions that often prevail in mid to late July and early August. Fall plantings can begin in mid-July to early August and should be ready for harvest beginning in late September. Beans planted after September are not likely to mature before fall frosts.

Seed rate: Bean seed size varies, so seeding rate needs to be adjusted for the variety used. Seed rates may vary from 50 to 90 pounds per acre, although 60 to 80 pounds are most common. Be careful to drop 3 or 4 seeds per foot of row. Rows are usually 30 to 38 inches apart, with 36-inch rows being most common. Closer spacing of rows will increase per-acre yields, but adaptability of equipment may become a problem.

PLANTING

Seeds should be planted l to 1½ inches deep. Deeper planting depths should be used for fall plantings and in sandy soils. Firming wheels on the planter provide good soil-seed contact. Choose a planter plate that "fits" your seed size and operate the planter slowly (2 to 3 mph). Rapid planting can crack seed coats, which interferes with seed germination and results in no emergence or poorly developed, weak plants.

IRRIGATION

Beans require an even, continuous supply of water. Usually 1 to 1½ inches of water every 7 days, from rain or irrigation, is essential for good yields. On sandy soils, more frequent irrigation may be necessary.

The period form blossom development through early pod set is the most critical time for moisture to ensure adequate yields, but deficiencies of water at any time during the season should be avoided. Adequate irrigation will result in significantly higher yields, a major justification for installing an irrigation system for vegetable production.

Beans are subject to soil crusting after planting so some watering may be necessary early in the season to ensure rapid emergence and uniform stands. Usually light applications of water (¼ to ½ inch) should be sufficient to reduce soil crusting and encourage emergence.

WEED CONTROL

Weeds compete with bean plants for water, light, nutrients, and space. An effective weed control program is essential for profitable yields. Shallow, mechanical cultivation may be used to keep the rows weed-free. Discontinue cultivation when there is potential for plant damage by cultivation equipment.

Herbicides for beans can provide excellent weed control alone or in combination with cultivation. Following are chemicals for weed control, and their application rates.

trifluralin (Treflan); 1– 1½ pts / A. Preplant, incorporate soon after application; annual weeds.

EPTC (Eptam 7E); 3½ – 4½ pts / A. Preplant, incorporate soon after application, annual weeds and grasses. OR (Eptam 10G), 30–40 lbs / A.

DCPA (Dacthal 75W), 10–14 lbs / A. Preemergence, incorporate lightly. Irrigate (or rain).

meladachlor (Dual 8E) , 1 1 / 2– 3 pts / A. Use lower rate on sandy soils. Incorporate or water in.

pendemethylin (Prowl 4E), 1– 1 ½ pt / A. Use low rate on sandy soils. Apply before planting and incorporate.

bentazon (Basagran 4S), 1 – 1 ½ pts / A. Apply after first leaves have expanded. Use only as an emergence if other weed controls fail

VARIETIES

Snap beans commonly produced in Kansas fall into two major groups — green-podded and yellow-podded (or "wax"). Consider local market demands when selecting beans for fresh market purposes. Varieties differ in their time to pod maturity, color, shape, texture of the pods, and storability. Growers should initially plant several varieties and select those meeting their particular need. For expanded production, some variety suggestions are included below.

HARVEST

Most newer bean varieties have been developed for a concentrated set of pods. This requires "staggered" plantings to ensure harvest over a longer period of time. Beans should be harvested when the pods are full-sized but before the seeds begin to enlarge significantly. It usually takes l5 to l8 days following full blossom for beans to reach the harvest peak.

Recommended snap bean varieties and days to maturity

Green		
Strike	51	Smooth, high quality, good yields.
Provider	52	Consistent producer, versatile use.
Peak	52	Consistent, good yields.
Spartan Arrow	51	Straight pod, good, concentrated set.
Lake Largo	56	Light green, good yields, rust-resistant.
Pod Squad	52	Dark green pods, consistent yields.
Bush Blue Lake 274	54	Standard for canning.
Green, flat pod		
Roma	59	Broad, flat.
Greencrop	54	Long, flat.
Green Genes	52	Long, flat, improved.
Yellow or wax		
Res. Kinghorn	50	Standard, round pod.
Res. Cherokee	52	Oval pod, standard.
Goldrush	53	Round, large, excellent quality, yield.
Goldcrop	55	Long, straight pods.

Harvesting can be done by hand for fresh market or pick-your-own. Mechanical harvesters are available for larger scale, commercial, fresh market production. A washing/sorting line is usually required as harvesters bring stems, leaves, and some trash along with the beans.

Beans should be kept in cool (40 to 45˚F) storage conditions with high humidity until ready for sale. Beans can only be stored for 7 to 10 days and only if relative humidity is kept high to prevent shriveling or darkening.

Beans are usually sold by the pound or in plastic bags of several pounds in retail outlets. Some growers sell beans in bushel volumes (about 28 pounds), but it is more common method to sell them in a paper carton weighing 20 to 22 pounds.

DISEASES

In most cases, snap beans can be grown in Kansas without resorting to chemicals for disease control, provided good management practices are followed. Plant high-quality, disease-free seed in soils with adequate drainage. Seed should be treated with a fungicide before planting. (Normally, commercial seed is treated.) Crop rotations of 2 to 3 years are advisable. Do not cultivate beans when the foliage is wet. Keep fields free of weeds. Weeds may serve as alternate hosts for some pathogens and also can increase the relative humidity within the plant canopy. Prolonged periods of high humidity or leaf wetness favor disease development. After harvest, deep-plow bean refuse to reduce survival of bacterial pathogens.

Bacterial Blights

Incitants: Bacteria

Common blight: *Xanthomonas phaseoli,* Halo blight: *Pseudomonas phaseolicola,* Brown spot - *Pseudomonas syringae.*

Symptoms: Generally, bacterial blights are not a problem in Kansas, although they are potentially serious during wet summers. Symptoms of the bacterial blights are similar in the early stages of development. Water-soaked spots first develop on the undersides of the leaves. When viewed from the top of the leaf, these spots appear yellow. Eventually, the spots turn brown and a bacterial exudate can sometimes be seen leaking from the tissue. With common blight, leaf and pot lesions merge to kill large areas of tissue. Brown spot lesions typically remain small. Halo blight lesions are surrounded by a yellow ring.

Control: The best method of preventing bacterial blights is the use of high-quality, disease-free seed. Follow the cultural practices listed above. Fields should be carefully monitored during the growing season for bacterial diseases; early detection is important for control. Copper sprays (Kocide, Copper-Count-N, or Citcop-4E) applied at 3- to 7-day intervals beginning when symptoms first appear may help reduce the incidence of these diseases.

Damping-off, Root rot

Incitants: Fungi, *Rhizoctonia, Pythium, Fusarium*

Symptoms: Several fungi can cause seed decay or damping-off. These diseases tend to be a problem in cool, poorly drained soils. Seed may be decayed in the ground, or young seedlings may be killed prior to or immediately after emergence.

These same fungi also may cause root rots of young seedlings or mature plants. Above-ground symptoms of root rot include yellowing and dropping of leaves, wilting, stunting, reduced pod size, and discoloration of the stem near the soil line. Roots of diseased plants may show distinct sunken lesions or a general discoloration (red to brown) of the entire root system. Consult an extension specialist for determination of the fungus responsible for root rot in your area.

Control: All seed should be treated with a fungicide prior to planting. In most cases, seed companies will treat seed with thiram or captan prior to shipment. *If seeds have not been treated, it is advisable to do so before planting.*

Root rot is most severe in areas that have been continuously cropped to beans. Crop rotations will help reduce the severity of root rot.

White Mold or Sclerotinia Rot

Incitant: Fungus *Sclerotinia sclerotiorum*

Symptoms: White mold has not been reported on snap beans in the state; however, it was found on tomatoes in northeastern Kansas in l985 and has the potential to become a serious problem on snap beans. The fungus attacks a number of horticultural crops, including, beans, tomatoes, peppers and cucurbits.

Pods, stems, and occasionally leaves first develop small, water-soaked spots. These spots rapidly enlarge and girdle stems, killing all plant parts below the lesion. A white, cottony fungal growth soon covers the diseased tissue. Eventually, large (up to l/4 inch) black fungal structures, called sclerotia, form in the cottony growth. The disease is most severe when soil and plant surfaces remain wet for extended periods.

Control: The fungus is introduced into fields in contaminated soil, organic matter, or infested seed. Once in the field, the fungus can survive for many years on a number of plant hosts or as sclerotia in the soil. Therefore, every effort should be made to avoid introducing the pathogen into the field. Purchase seed from reputable firms. Avoid moving soil from infested areas into adjacent fields on farm machinery.

Susceptible vegetables (beans, tomatoes, cucurbits) should not be planted in infested fields. Long rotations (2 or 3 years) with non-host crops such as wheat or corn are recommended, although this practice will not completely eliminate the pathogen from the soil. Snap beans may be sprayed twice with Benlate or TopsinM at 7- to l4-day intervals beginning at bloom to protect against white mold.

Rust

Incitant: Fungus *Uromyces phaseoli* var. *typica*

Symptoms: Bean rust first appears as small spots on the underside of leaves. The spots enlarge, turn red, and develop a blister-like appearance. Eventually, the pustules rupture and release millions of brick-red spores. Some pustules also may form on the upper leaf surface and on pods. Leaves with numerous pustules turn yellow, begin to dry, and drop from the plant.

Control: The fungus can survive in crop debris, so fields should be deep-plowed at the end of the season. Crop rotations of 2 to 3 years are suggested. Several fungicides, including chlorothanonil (Bravo), zineb, maneb, and some fixed coppers, may be applied to beans to prevent rust infection. Applications should be made as soon as rust pustules are noticed and continued every 7 to 10 days. Fungicides may not be required if infection occurs 3 weeks before harvest.

Mosaic

Incitants: Viruses (Common bean mosaic, Bean yellow mosaic)

Symptoms: Symptoms are variable depending on the susceptibility of the host and the type of virus involved. In general, affected plants develop mottled, yellowed leaves. Diseased leaves may become distorted or puckered and typically are narrower than healthy leaves, with the leaf tips curled downward. Affected plants also are stunted.

Common bean mosaic virus may be transmitted in seed and pollen; both common bean and bean yellow mosaic viruses are transmitted from plant to plant by insect vectors (aphids) and by mechanical means.

Control: Most snap bean cultivars recommended for Kansas have resistance or tolerance to the common strain of common bean mosaic. These cultivars should be used whenever possible.

INSECTS

Insects are usually not major pests in beans when the crop is well managed. If bean leaf beetles, aphids, or spider mites do become a problem, the following are recommended chemical treatments (with waiting interval, in days, to harvest):

Bean leaf beetle

carbaryl (Sevin 80% WP, l–1 1/4 lbs/A (0 days)

methoxychlor 50% WP, 2 lbs/A (3 days) OR 2 EC, 2 qts/A (3 days)

endosulfan (Thiodan 50% WP, l lb/A) (3 days)

rotenone (see label for rates) (0 days)

Aphids

+diazinon 50% WP, l lb/A (7 days)

malathion 5 EC, l–1/2 pts/A (l day)

dimethoate (Cygon, De-Fend) 2.67 EC, 1 1/2 pts/A (0 days); OR 4 EC, 1/2– l pt/A (0 days)

endosulfan (Thiodan 2 EC), 1 1/2 qts/A, (3 days) (*Note:* Do not use sprayed foliage as forage. Do not make more than 3 applications per season.)

Spider mites

dicofol Kelthane MF, 3/4–1 pt/A

+ethion 4% D, 20 lbs/A, (2 days)

dimethoate (Cygon 400, 1/2 pt/A) (1 day)

Note: Trade names are used to identify chemicals. No endorsements are intended, nor is any criticism implied of similar products not mentioned.

COSTS AND RETURNS

Some general estimates of returns in terms of yield are:

• Poor yield (under poor weather conditions or low management): 2,500 lbs/A (100 bushels)

• Average yield (a realistic goal for producers to achieve): 3,500 lbs/A (150 bushels)

• Excellent yield (with good management and suitable varieties this is an attainable goal for production): 5,500 - 6,000 lbs/A (200-250 bushels)

Fresh market yields usually are for harvest at an immature stage, with beans sorted to remove cull and defective pods. Waiting until beans become larger increases pound per acre harvested.

Estimates of returns will vary depending on individual equipment investment and labor available. The following crop budget should be adjusted to meet your individual estimates of expenses in each category.

COST-RETURN PROJECTION FOR SNAP BEAN PRODUCTION IN KANSAS

VARIABLE COSTS PER ACRE

1. Fertilizer	56.00
2. Seed	60.00
3. Herbicides	12.00
4. Insecticides	00.00
5. Fungicides	00.00
6. Nematicides	00.00
7. Labor, hand harvest	580.00
8. Fuel and oil	30.79
9. Repairs	64.25
10. Water	8.00
11. Utilities	00.00
12. Custom hire	00.00
13. Supplies (cartons)	200.00
14. Marketing	00.00
15. Other	00.00
A. TOTAL VARIABLE COSTS:	$1,011.04

FIXED COSTS PER ACRE:

16. Interest, land and buildings	60.00
17. Taxes, land and buildings	10.00
18. Rent for rented land	00.00
19. Depreciation, machinery	75.00
20. Interest , machinery	45.00
21. Depreciation, buildings	12.50
22. Depreciation, irr. equipment	165.00
23. Interest, irr. equipment	99.00
24. Insurance	6.63
B. TOTAL FIXED COSTS	473.17
C. TOTAL COSTS	1,484.17
D. YIELD PER ACRE (BU)	200.00
E. PRICE PER UNIT ($9/BU)	9.00
F. RETURNS PER ACRE	1,800.00
G. RETURNS OVER VAR. COSTS	788.96
H. RETURNS OVER TOTAL COSTS	315.83
I. VARIABLE COSTS PER UNIT	5.06
J. TOTAL COSTS PER UNIT	7.42

Fuel consumption is estimated at 1.5 gallons per hour of tractor time.
Oil and lubrication are estimated at 15% of fuel cost.
Repairs are estimated at $2.25 per hour of tractor time and $l7 per acre for irrigation equipment.
Depreciation, interest on investment, and insurance for a truck are included as cost.

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