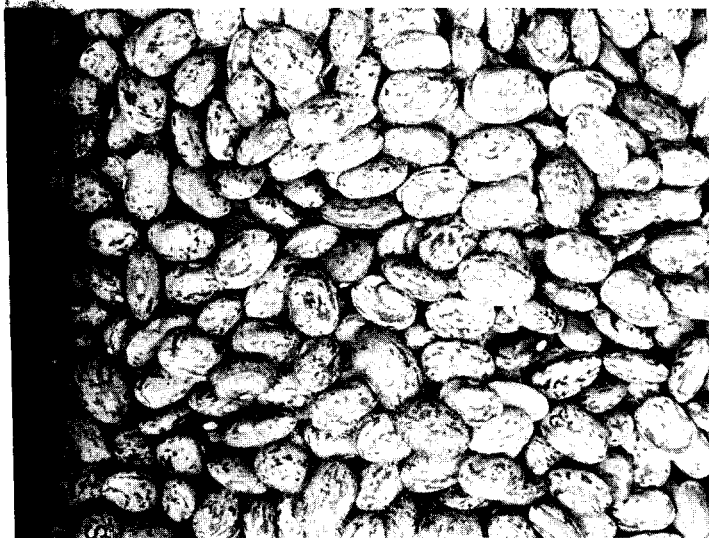




Field Bean Production

IN NORTH DAKOTA



L. A. Jensen
Extension Agronomist

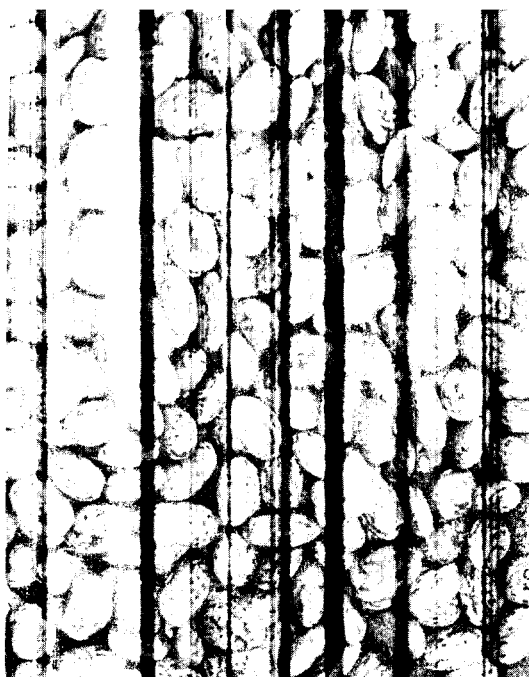
MAR 12 1974

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FARGO, NORTH DAKOTA 58102

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FIELD BEAN PRODUCTION IN NORTH DAKOTA

Dry, edible beans are grown commercially in several states but a large proportion of the crop is grown in five states. Ranked according to 1967 production, major producing states are Michigan, California, Colorado, Idaho and Nebraska. North Dakota ranked 8th among producing states but its production accounted for less than 1.5 per cent of the total U.S. production.

Field beans are a concentrated direct human food and are high in protein, phosphorus, iron and Vitamin B₁. They are readily stored after processing and can be transported easily.

Field bean production on a commercial scale was first introduced into the northern Red River Valley area in 1961, when an estimated 3,000 acres were planted. In 1962, when an estimated 5 to 6,000 acres were planted, late planting caused by wet spring weather resulted in many of the field beans being frozen before they matured. Since then, the acreage has expanded. Field beans are now being grown in Pembina, Walsh, Grand Forks, Traill, Cass and Richland counties in North Dakota and to a lesser extent, in the adjoining counties in Minnesota. There is also a small irrigated acreage in western North Dakota.

The Federal Crop Reporting Service reports harvested acreage and yield in North Dakota as follows:

Year	Harvested Acres	Yield Per Acre
1964	18,000	610 lbs.
1965	25,000	900 lbs.
1966	20,000	1,470 lbs.
1967	21,000	970 lbs.

Processing facilities have developed along with increased crop production. Currently there are six processing plants located in the Red River Valley.

Field beans are a specialty crop and require special cultural practices, know-how and attention on the part of a producer. It is not a crop that can be successfully grown by the farm operator who is not willing to give it some special attention.

A Contract Crop

Field beans are produced under contract, which assures the producer of good seed, production information, processing facilities and a market outlet for the crop.

Growing Requirements

Field beans are a warm season annual adapted to a rather wide variety of soils. They are sensitive to very alkaline and very acid soil conditions but are not sensitive to the character of the soil so long as it is reasonably fertile, well-drained and of such a nature that it does not interfere with germination and emergence of plants.

Alkali symptoms are yellow, stunted plants that later may actually show some corrosive action of the salts on the leaves. The leaf edges of the affected plant will be browned and dead and often accumulations of salt may be seen on the leaf surfaces.

The optimum growing temperature for field beans is 65 to 75 degrees F. They are a warm season crop and

544.3
1967
20

usually are not affected by high temperatures if adequate soil moisture is present. Cool, humid or rainy weather is unfavorable to field beans but even so, they are adapted to a fairly wide range of temperature. Bean production is more successful in areas where the rainfall is light during the latter part of the growing season. Good moisture throughout the growing season and dry harvest weather favor a high yield and high quality crop.

Field beans are not tolerant to frost in either spring or fall or to prolonged exposure to weather that is near freezing.

Place in Rotation

Field beans are a short season crop and will fit into a variety of rotation plans. They are commonly grown following alfalfa, clover, potatoes, sugar beets, peas and small grain crops. Field beans are not good weed fighters, even though they are a cultivated crop. If weeds are controlled, beans are a good replacement for summerfallow in the rotation. Sugar beet growers may find that field beans are one of the best crops to follow beets. Field beans should not be planted on the same field year after year because it can multiply disease and insect problems.

While field beans are a legume and produce most of their own nitrogen requirements, they do not leave a carry-over for next year's crop. They do mellow the soil, and plowing for next year's crop is usually not necessary.

Seedbed Preparation

Fall plowing is preferable for field beans on heavy soils unless they follow a row crop. A deep, firm seedbed free of clods and coarse debris is essential for field beans.

Fertilization

Grower experience indicates it is more economical to apply the fertilizer to preceding crops in the rotation than to the field bean crop itself. If the field is known to be low in phosphate, then an application of phosphate fertilizer would be advisable. Do not place fertilizer in contact with the seed.

Seed Selection

The use of certified blight-free seed is necessary because some blight (mosaic) diseases are seed-borne.

When field beans are planted under unfavorable soil and weather conditions, treating the seed may help to control rotting of the seed or damping-off of the seedlings. Seed treatment with insecticide-fung-

icide combinations may be advisable where an infestation of wireworm is present.

Disease-free field bean seed is supplied by the contracting company and is treated at the time it is processed.

Inoculation with nitrogen fixing bacteria generally is not necessary. Tests in most states do not indicate that inoculation of field bean seed is worthwhile.

Method and Rate of Planting

Field beans should be planted in warm soil after all danger of frost is past. The time of planting is a little later than for corn. Field beans should not be planted until the soil has reached a temperature of 50° F. at planting depth. Planting too early in cool, wet soil is likely to result in low germination. The most common planting time is from May 15 through June 7.

Field beans are grown in rows from 22 to 42 inches apart. The recommended row spacing for dryland production is 28 to 30 inches. The crop may be planted with an ordinary grain drill with some of the seed cups plugged to plant rows the desired distance apart or with a corn or field bean planter. Most field beans in the Red River Valley are planted with bean planters. Seeding rates vary from 50 to 70 lbs. per acre, depending largely on row spacing. The most common seeding rate is 60 lbs. per acre.

Normal planting depth is from 2 to 3 inches. Deep-er planting should not be made unless the topsoil is dry. Seeds should be planted in moist soil.

Weed Control

Cultivation is done principally to keep out weeds which compete for moisture, light and plant food and to prevent soil crusting. Cultivation must be shallow to prevent root cutting and should be started when the weeds are very small.

Field beans can be harrowed before they emerge and after emergence can be harrowed or rotary hoed on a warm afternoon to control weeds, especially in the row. Two or three cultivations generally are necessary for good weed control. As soon as the field bean plants are large enough, the cultivator should move dirt in around the plants to smother weeds and to facilitate harvesting.

It is generally advisable to stop cultivating when the field beans are large enough to shade out weeds or when cultivation would be likely to damage the roots. Field beans should not be cultivated when they are wet because blight and other diseases are easily spread by the cultivating equipment.

Pre-emergence or pre-plant chemicals offer the best opportunity for selective weed control in field beans but have been erratic and undependable in North Dakota. For PREPLANTING application, Treflan at $\frac{1}{2}$ to 1 pound active ingredient per acre when mixed 4 to 6 inches in the soil before planting controls both grass and broadleaf weeds except mustard. Eptam may also be used at 3 lbs. per acre applied preplanting and incorporated. The following PRE-EMERGENCE chemicals are suggested. For annual grasses (except wild oats), use Randex at 4 to 5 pounds active ingredient per acre. For annual grass and broadleaf weeds, apply Amiben at 2 pounds active ingredient per acre. Band application can be used to reduce the cost per acre.

Field beans are somewhat susceptible to injury from 2,4-D or MCPA, and drift onto bean fields should be avoided.

Harvesting

The vines are cut below the soil surface with special four-row or six-row field bean cutters that leave the plants in a single windrow. Two windrows are then put together with a side delivery rake or a special windrower designed to eliminate dirt and reduce shattering. Windrowing should be done immediately after cutting. A good small grain pickup or a special field bean pickup attachment on the ordinary grain combine is used for threshing field beans from the windrow.

Field beans should be harvested before killing fall frost. Frozen immature field beans are almost impossible to separate in processing but unfrosted immature field bean seed will shrink when drying so that it can be separated.

Field beans are ready for harvest when some of the pods are dry and when most of them have turned yellow. The nearly mature field beans in the yellow pods will continue to ripen after they are cut. Too many dry pods will result in heavy shattering when the field beans are harvested. Field bean cutting and windrowing can be done at night or early in the morning when the plants are damp with dew in order to reduce shattering loss. It is advisable to make field bean windrows as large as can conveniently be threshed. The larger windrows offer the seed more protection from injury, wind disturbance and shattering.

A chemical defoliant, Penco De-fol-ate, has label clearance and can be used. It can be applied when the field beans are nearly mature to prevent yield loss.

Field beans are ready for threshing when the moisture content is 15 per cent and there are no green beans present.

They must be threshed carefully to avoid damage to the seed. The cylinder speed should be reduced as much as possible and long seed drops in the separating, loading and handling operations should be prevented to avoid injury or splitting. The cylinder speed should be between 150 and 300 rpm for most threshing conditions. There must be sufficient clearance between the cylinder and the concave bar to allow the seed to pass through without injury. If there is evidence of injury or splitting of the seed, immediate adjustment should be made. For extended safe storage, the moisture content should not be over 13 per cent.

Disease and Insect Problems

Diseases and insects have not been a problem in this area but can become serious as production continues unless precautions are taken. The most effective disease control measure is to use disease free seed, practice crop rotation and avoid cultivating or entering the field when the field beans are wet.

There are three bacterial blights of field beans - halo blight, common blight and bacterial wilt. The bacteria causing these diseases are different but the plant symptoms are similar. These diseases usually appear as small water-soaked spots on the leaves. As these spots grow larger, they turn brown and finally kill the leaf. Similar water-soaked spots can be found on the pods and stems. Commonly, the bacteria enter the pod and affect the seeds. The use of disease free seed and crop rotation are the best preventive measures.

Mosaics are virus diseases spread by insects and some are seed borne. These are known as common mosaic, yellow field bean mosaic and curly top. These diseases usually affect the leaves, causing discoloration and curling of leaves and stunting the plant. Planting resistant varieties and use of disease free seed are the only satisfactory ways of controlling these diseases.

Root rots as a group are characterized by the formation of cankers on the stem below the soil level and on the fibrous roots. The cankers may be various sizes and shapes and may be gray, brown, black or brick red. Root rots are caused by several different fungi that live in the soil and on decomposed organic matter. No effective control other than crop rotation is known for root rot.

The major insect pests expected in North Dakota are aphids, leafhoppers, mites, lygus bugs, wireworms and grasshoppers. Minor insect pests include cutworms, thrips, blister beetles and crickets.

Marketing

Processing, storage and marketing is best handled by concerns experienced in the business. Field bean growers in the Red River Valley contract grow their crop and work closely with their contracting company in processing and marketing the crop.

There is a C.C.C. loan program on both thresher run field beans and processed field beans which pro-

vides a minimum market price. Details are available at county ASCS offices.

Field beans are handled and marketed based on official U.S. Grade standards.

IMPORTANT -- This is a food crop. Before using any herbicides, insecticides or fungicides be sure they have label clearance.

