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FIELD BEAN PRODUCTION IN NEBRASKA

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FIELD BEAN PRODUCTION IN NEBRASKA

Prepared by Departments of Agronomy,
Entomology, and Plant Pathology

The federal government's appeal for increased plantings of war crops has caused many farmers to consider planting dry, edible beans, who have had no previous experience with this crop. Interest in beans for 1943 has also been increased because of the proposed incentive payments on acreage planted, the government supported market price, the Commodity Credit Corporation's offer to make loans on uncleaned beans, and the inclusion of dry beans among the rationed food items. This circular has been prepared to help answer the many requests for information on field bean culture from prospective bean growers in 1943.

Production

Production of dry, edible beans in Nebraska has been increasing steadily over the past 15 years. During the period 1929-1938 an average of 150,000 bags (100 lbs. per bag) were produced annually. The marked rise in Nebraska bean production is illustrated in table 1 which shows the

Table 1. - Acreage and production of dry, edible beans in Nebraska for the past three years, according to federal and state estimates.

Year	Acreage planted	Acreage harvested	Production (bags)
1940	24,000	21,000	319,000
1941	29,000	27,000	432,000
1942	38,000	35,000	560,000

approximate acreage planted, the acreage harvested, and the total state production for the past three years

The market value of the 1942 crop of 560,000 bags was estimated to be \$2,371,000. In 1942 more than 98 percent of the state's bean acreage was located in the eight western-most counties. Approximately 76 percent of Nebraska's acreage was in Scotts Bluff and Morrill Counties alone, where most of the beans are grown under irrigation. Yields of beans in western Nebraska vary from an average yield of 2 to 6 bags on dry land to from 15 to 20 bags per acre under irrigation. Yields under irrigation may go up to 30 or more bags per acre in exceptional cases. Production of field beans in areas other than the western portion of the state has been attempted at times in various localities. The results have varied from complete failure to yields of 8 to 10 bags per acre, in some instances.

Adaptation

Dry-bean production in the United States is confined largely to those regions where summer temperatures are moderate and where rainfall or irrigation water is ample. As indicated above, few beans are produced in Nebraska outside of the Western area. There are several reasons why bean production in the central part of the state is usually uncertain and in the eastern part is usually unsuccessful. These are (1) the generally higher temperatures in the east during and after the flowering period which cause low yields, (2) conditions for spread of bacterial blight which are generally more favorable in the central and eastern sections, and (3) the likelihood of rainy weather at harvest and during drying causes discoloration of beans. If rains persist at harvest molds may cause loss of the entire crop.

Varieties

The Great Northern, a variety producing a large, white bean and sometimes called the "large navy", constitutes about 90 percent of the dry-bean production in Nebraska. The Great Northern is hardier, earlier, and more productive in the High Plains region than the small Navy. Most of the Great Northern seed used at present is certified seed of either U. I. 59 or U. I. 123, two University of Idaho selections. Both give good yields in western Nebraska.

The Pinto variety, a brownish speckled bean, is grown to some extent in western Nebraska. Most production is in

the dry-land areas. It is a long-season variety, producing more vine than the Great Northern.

Diseases

Field beans are frequently subject to severe damage from bacterial blight, sometimes erroneously referred to as "rust". Losses from blight vary from none or very slight to extremely high. Blight is often the limiting factor in successful bean production. The disease is seed-borne and plants growing from infected seed develop bacterial lesions on the young cotyledons and primary leaves. Bacteria from such lesions wash down the stem where cankers are formed. Splashing rain spreads the bacteria to healthy plants. The disease attacks leaves, stems, and pods. Plants infected when young usually die early in the season. If infection takes place later, it causes defoliation and blighted pods which yield discolored beans.

The only practical method of control of blight is the use of disease-free seed. Only certified seed should be used since the amount of seed infection cannot be estimated by looking at the seed. Idaho certified seed, produced under blight-free conditions, is widely used in the bean-producing area of the North Platte valley. In this connection it is of interest to quote from a report made to the PLANT DISEASE REPORTER in August 1938 on the field-bean diseases in the North Platte Valley that season:

"About 60 percent of the acreage was planted with certified seed from Idaho and shows a slight general infection that is causing only a trace of loss. About 36 percent of the acreage was planted with seed only one year removed from certified. This shows an average of 30 to 35 percent loss. About 4 percent of the acreage was planted with seed of unknown origin and shows an average of 50 percent loss, chiefly due to common blight."

Bean rust, a true plant rust, appears occasionally late in the fall, just before harvest. This disease does not cause much reduction in yields and causes little or no reduction in quality.

Mosaic, a virus disease, causes a reduction in yield. Fields planted with certified seed should contain few or no mosaic plants. Although the disease is seed-transmitted,

infected seed cannot be detected by looking at it. The disease is carried from diseased to healthy plants by aphids. Fields in central and eastern Nebraska are more subject to spread of mosaic because of heavier populations of aphids.

Insect Pests

Infestations of the Mexican bean beetle are confined to a few counties in the western part of Nebraska. Usually damage is more or less local in nature, but in 1942, and to a less extent in 1941, numerous infestations developed in the Scottsbluff territory. Mexican bean beetles are yellow to copper-brown with 16 small, black spots on the wings. They resemble the beneficial lady beetles, to which they are closely related. Both the beetles and larvae feed on the foliage of beans, eating away the lower part of the leaf and causing the upper surface to dry out. The Mexican bean beetle can be effectively controlled with derris or cube dust, containing 1/2 to 1 percent rotenone, or a derris or cube spray. Before the pods are formed a cryolite or calcium arsenate dust may be used.

In central and eastern Nebraska beans frequently are damaged by the potato leaf hopper. These are small, slender, yellow-green insects 1/4 to 1/3 inch long. They are very active and difficult to see on green foliage. The leaves on infested plants become distorted, curl upward around the margins, and eventually turn brown and die. Heavily infested plants become stunted and fail to produce a normal crop. Leaf hoppers can be controlled with a standard Bordeaux spray or copper-lime dust. A sulfur dust or a wettable sulfur spray is effective for low or medium infestations; for heavy populations, pyrethrum should be added.

Occasionally small, dark brown to black plant lice or aphids develop in large numbers on the terminal growth of bean plants. Control can be obtained with standard nicotine sprays or dusts. There are a number of other insects, such as grasshoppers, cut worms, wire worms, corn ear worms, and onion thrips, which occasionally become injurious to beans locally.

Beans in the Rotation

Although beans make fair yields on relatively poor soil in western Nebraska, they respond well to high fertility when soil moisture is plentiful. Under these conditions the best yields in any part of the state can be expected where soils are heavily manured or in rotations with legumes or where both manure and legumes are used. On non-irrigated land the yield of beans is dependent upon the balance between rainfall and nitrogen. High fertility with abundant soil moisture gives the best yields. On the other hand, high fertility and a shortage of soil moisture may result in a lower yield than that obtained from low fertility with fair to good soil moisture conditions. Beans should not be planted on highly alkaline soils as the plants become yellow and unproductive.

Beans have been planted following all types of crops in western Nebraska. On irrigated land, some growers use beans just ahead of alfalfa in a rotation while others go so far as to plow under sweet clover for their bean fields. Most western growers, however, use beans following a rotation which consists of a legume (alfalfa or sweet clover), potatoes and sugar beets. On the dry-land beans may follow either cultivated crops or fallow. Beans seeded in fallow land have the best chance for a satisfactory yield.

In order to reduce wind erosion of light soil, it is desirable to seed rye in the fall after the beans have been cut.

Seedbed

Plowing, followed by thorough packing, provides the best seedbed. The use of a pulverizer may be necessary on heavy soils. On weedy ground, except where the land is quite sandy and subject to blowing, these operations should be done early in the spring and followed by other tillage operations to destroy one or more crops of weeds before planting. A plentiful supply of soil moisture is essential if good stands of beans are to be obtained.

Planting

Beans may be planted from about May 1 in eastern Nebraska to June 10 in western Nebraska. Under irrigation the rows are commonly from 20 to 24 inches apart and

the beans dropped 2 to 3 inches apart in the row. For Great Northerns this would be about 50 pounds per acre. On non-irrigated land the rate of planting would need to be adjusted downward in keeping with prospective soil moisture conditions. Since growers frequently use corn cultivators on non-irrigated plantings, they plant in rows about 40 inches apart and space the beans 4 to 6 inches apart. This would be 15 to 20 pounds per acre.

Beans are most commonly surface planted. Regular bean planters are preferred but a grain drill may be used satisfactorily to plant beans by stopping part of the feeds according to the desired distance between rows. Care should be exercised to prevent cracking of the beans by the planter. Beans should be planted from 2 to 3 inches deep. The 3-inch depth is advisable only on the lighter, more sandy soils.

Tillage

Where the soil has crusted badly before the beans are up, it may be necessary to use the rotary hoe or other machine, such as the harrow, to break the surface. Otherwise the "necks" of the beans may be broken, thus destroying the plants. The rotary hoe may be used for a number of operations after the beans are up, thus destroying weed seedlings before they become well established. Some growers blind cultivate their beans for weed control. Ordinary beet or corn tillage machinery may be used for subsequent tillage. Beans ordinarily require two or three machine cultivations and sometimes, in wet spring seasons, one or two hand weedings. Ridging the beans at the last cultivation facilitates irrigation and keeps the beans out of the water. Beans should not be cultivated when wet or while they are in bloom.

Irrigation

Beans respond better to frequent light applications of water than to fewer and heavier ones. This is particularly true where the soil is light and shallow with a low water-holding capacity. The soil auger may be used to determine the need for irrigation. Beans acquire a dark green color when soil moisture is short, as contrasted to a lighter green color when sufficient moisture is present. The development of a dark green color to the bean field serves as a warning that irrigation water should be applied

at once. Beans, unlike many other crops, must be kept at a more or less constant rate of growth throughout the season. They will not recover completely from a serious drought or cessation of growth due to hot weather.

Harvesting

The bean harvester consists of a 2- or 4-row machine equipped with knives which cut off the bean plants beneath the surface of the ground. In the case of small fields, an acre or less in size, and where mechanical bean-cutters are not available, the plants may be pulled by hand. Beans are ready to harvest when about three-fourths of the pods are yellow. It may be necessary to permit some shattering in order to get as few immature beans as possible, since immature beans reduce the quality and market value of the crop. After the beans have been cut they are gathered in windrows with a side delivery rake. Such raking and all other handling after cutting should be done only early in the morning when the vines are still slightly moist to prevent shattering. After curing for a time in the windrow, they should be bunched by hand into small, loose piles that permit rain water to pass through easily and that dry out readily. Beans may be threshed from the shocks, threshed directly out of the windrow with a combine, or they may be stacked to be threshed later. The latter is generally considered the best practice. Beans are often seriously damaged by fall rains during the harvest season. It is important, therefore, to get the beans threshed or stacked in the shortest possible time consistent with proper curing. A bed of straw should be used for the base of stacks in order to reduce spoilage. Capping the stack with hay or straw will also help to preserve the quality of the beans.

Special care should be exercised in threshing in order to reduce cracking to a minimum. A regular bean huller can be expected to handle the beans most satisfactorily. The newer type combines when properly adjusted are also satisfactory for threshing. Beans which are to be stored should be placed in a carefully prepared dry location.

Marketing

Most beans produced in western Nebraska are marketed through dealers who have equipment which cleans and grades the beans more economically than can be done by the grower. Threshed beans are handled in trade channels on the basis of U. S. grade standards.