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Michigan State University Extension Service
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Photo Courtesy of O. J. McNaughton

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PRODUCING BEANS IN MICHIGAN

H. R. Pettigrove and C. R. Oviatt

Michigan produces one-third of the nation's bean crop; the State's contribution to the total includes 90 per cent of all pea beans and 50 per cent of all red kidney beans.

Production methods, quality, and yield are factors which determine the profit on this crop. A careful study of these factors is important to every grower.

Soil

The field bean grows best on fertile sandy loam, silt loam and clay loam soils. On all types of soils it is important that a crop rotation be used which will conserve and renew the supply of organic matter available for plant food.

Rotation

Beans are best included in a rotation consisting of a cultivated crop followed by a small grain seeded to a legume with the latter, after one or more years of harvesting, turned under as green manure

Fig. 1—In Many Rotations Sweet Clover Seeded in Grain the Previous Season is Plowed Under in the Spring for Beans.

for the succeeding bean crop. A good short rotation consists of a small grain seeded to sweet clover which will serve as green manure for beans the following spring. Beans are harvested early and the condition of the soil, after harvest, facilitates the planting of fall or spring seeded crops with a minimum of preparation.

Drainage

Surface water injures bean plants and reduces the yield. Both tile and surface drains are advisable on land where water runs off slowly. Adequate disposal of rainfall promotes growth and vigor and results in more even ripening.

Seed Bed Preparation

A seed bed should be thoroughly worked over a period of time to pulverize and firm the soil, prepare it in such a manner that the moisture will be conserved, and create a condition which will encourage the germination of weed seeds so that subsequent operations will destroy the young growth. Either barnyard or green manure should be plowed under early in May to allow partial decomposition of the organic matter and to conserve soil moisture.

The cultipacker, disc, spring and spike-tooth harrow used in succession after plowing pulverize the sod, firm and level the seed bed, and create a fine tilth and texture. The intermittent stirring of the soil by these implements is likewise effective in destroying weeds.

Fig. 2—Harrow and Cultipacker are Valuable Tools for Seed Bed Preparation.

Fertilization

Proper fertilization of the bean crop will hasten maturity, promote uniformity of ripening and increase the yield per acre. Most satisfactory results are secured when carefully chosen commercial fertilizer is used in combination with green or barnyard manure to provide a balanced plant food for the development of the crop.

Contact with fertilizer may injure the germinating seed or young plant so it is advisable to either broadcast or drill it in with a grain drill before the beans are planted or drill the fertilizer and beans in one operation with the grain drill set to distribute fertilizer through all of the holes excepting those sowing beans. The latter method represents a saving of time and effort but it may not result in the fertilizer being drilled to the most effective depth. The advantage of broadcasting or drilling before planting lies in the opportunity for thorough incorporation of the fertilizer with the soil at a depth where the plants may utilize it. Plowing fertilizer under also gives good results.

An application of 200 pounds of fertilizer per acre is recommended for drilling with a grain drill, all holes open, while planting beans. Small amounts of fertilizer may be drilled in the row with the beans, but the rate should not exceed 50 pounds to the acre. When the fertilizer is broadcast or drilled in deeply before the beans are planted, larger quantities, up to 400 or more pounds per acre, may be used.

FERTILIZER RECOMMENDATIONS FOR BEANS*

Sands and Light Sandy Loams

	Group 1	Group 2	Group 3
	No manure or leguminous green manure used within last two years.	Clover or alfalfa grown within the last two years.	Manured within the last two years.
Fertilizers For Beans	4-16-4	2-16-2 or 4-16-4	2-16-6 or 0-20-0

Heavy Sandy Loams, Silt Loams and Clay Loams

	Group 4	Group 5	Group 6
	No manure or leguminous green manure used within the last two years.	Clover or alfalfa grown within the last two years.	Manured within the last two years.
Fertilizers For Beans	2-16-2 or 4-16-4	2-16-2 or 0-20-0	0-20-0

*"Fertilizer Recommendations for 1931," Circular Bulletin No. 53, Michigan Agricultural Exp. Sta.

Seed

Bean seed should be of the highest quality obtainable—true to type, uniform in size, shape and color, free from disease. Seeds conforming to a single type ripen evenly, facilitating the harvest. Regularity in size insures an even distribution in the row.

Extreme care should be exercised in handpicking the beans to discard all discolored and irregular seed. Diseases may be carried in imperfect beans and they may develop into centers of infection for a whole field. Handpicking may not entirely eliminate the disease carriers, but it will reduce the possibility of serious damage.

The Michigan Crop Improvement Association, East Lansing, is an agency which registers and certifies crops seed, including the Robust variety of pea bean. Seed may be purchased directly from the members of this association or from their sales agencies.

Types

About 90% of the beans grown in Michigan are of the pea bean type, while most of the remainder are kidney beans. The pea bean has a vine-type of growth as compared with the bush type of the kidney bean, which makes the former easier to handle in harvesting, as the plants cling together in raking and forking.

Varieties

Pea Beans

Robust, a selection from a commercial lot of pea beans, was developed at the Michigan State College. Resistance to disease and high yielding ability are outstanding qualities of this variety. It is immune to the mosaic disease and resistant to anthracnose and blight, which are likely to develop because of temperature and moisture conditions during the growing season. This variety has proved its high yielding characteristic in field results and in competitive trials under uniform conditions over a period of years.

Other pea bean varieties, such as the Early Wonder, 1200-1, 1000-1, Early Prolific and Vermont, are usually mixed and lack outstanding qualities to warrant certification for seed. All of these beans are susceptible to disease. They mature but two or three days earlier than Robust.

Red Kidney Beans

There is no specific variety of the dark red kidney bean. Until an outstanding variety is developed the grower must be content with the general run of kidney beans. The dark red kidneys are susceptible to all bean diseases.

The light red kidneys are similar to the dark red, excepting that they mature a few days later and the Wells strain is resistant to a few forms of anthracnose.

Planting

Field beans should be planted between May 28 and June 8. During this period conditions favor prompt germination, so that, with steady growth and development, the crop matures in early September.

Beans are usually drilled with a grain drill or special beet and bean drill in rows 28 inches apart. Drilling in the row is preferred over any system of planting in hills or check rows, since evenly distributed plants are more successfully pulled and raked by machinery. Planting of beans in hills may be advisable under very weedy field conditions or for hand harvesting.

Pea beans should be planted at the rate of 40 pounds per acre and kidney beans at the rate of 80 pounds per acre. These amounts of seed will give a spacing of two to three inches in the row, which should insure the desired distribution of plants.

Planting is recommended in a firm seed bed at the minimum depth which will secure good coverage and sufficient moisture to promote quick germination and growth. Plantings at less than one inch may lack moisture, while deep planting may hinder or prohibit the seedlings from breaking through the surface and may add to the possibility of damage by the bean maggot. Insufficient coverage or lumpy soil are conditions which may be improved by the use of the cultipacker after planting.

Cultivation

Effective cultivation begins in the early and thorough preparation of the seed bed and continues at intervals after the beans are planted and during the growth of the plants. Promptness of effort is of great importance in this work, which is aimed primarily at the control of weeds and the condition of the surface soil.

The use of the rotary hoe, spike tooth harrow, or weeder on the second or third day after planting, again as the seedlings begin to break the surface, and followed by a third application about four days later, is a most effective and inexpensive method of destroying the weeds and maintaining a loose surface condition. It is advisable to vary the direction of this surface work, which should also be performed in the afternoon when the plants are less turgid, so as to reduce the possibility of damage to the plants. Weeds can be most easily destroyed shortly after they have germinated, while they are still light in color, and before the true leaves have developed. Additional surface work during the first two weeks of growth of the crop may complete the cultivation.

Fig. 3—Weed Competition Should be Reduced by Thorough Cultivation.

If the cultivator is the only implement to be used, it is important that the first operation take place soon after the beans are out of the ground and while the seedlings are in the two-leaf stage, so that considerable soil can be thrown into the row to cover the weeds among the plants. This first cultivation should be fairly deep, but the use of wing shovels or sweeps at a shallow depth are advised for later cultivation. A general practice among growers is to avoid the cultivation of the crop while wet from dew or rain, because of the possibility of spreading disease. Weeds which survive cultivation should be eliminated by hoeing or clipping, since, in addition to producing seed, they cut down the yield and seriously hinder the harvesting and curing of the crop.

Harvesting

More attention should be paid to reducing the loss of beans during the harvest season. This is a critical period for the crop. Harvesting should be delayed until most of the beans are hard and the pods are dry, reducing to a minimum the amount of time required between pulling and completion of the harvest. Beans may be damaged through standing too long in the field before pulling, but, under common harvesting practices, most of the loss comes while the crop is curing in windrows or bunches, and this dangerous period is lengthened when the beans are not ripened sufficiently before pulling.

The two-row horse-drawn puller and the four-row tractor equipment are the two types of implements in general use for the first harvesting operation. This is followed by the side delivery rake with which eight rows of plants are rolled into a windrow. Shattering of the pods will be reduced if this work is done while the dew is on the plants.

Fig. 4—Threshing Beans Directly from the Field.

The crop is partially cured in windrows but the time consumed in this process must be short because of the possibility of weather damage. Then the beans are forked into small bunches to cure completely before being hauled to the stack, barn, or thresher.

Three different plans for the final stage of harvesting are in common use. They are: (1) hauling the beans from the small bunches in the field directly to the thresher; (2) storing the crop in buildings or large stacks; (3) allowing the final curing to take place in small, well made stacks built around posts set in the field.

The first of these involves the greatest risk of weather damage since all the beans or a considerable acreage of the crop must be ready for threshing at one time.

The second system reduces the possibility of damage since the operation may be confined to a part of the acreage. However, it involves a weather risk while the crop is being cured to the proper condition for removal from the field and the harvest may be prolonged until the standing beans become damaged. The crop must be well cured before being stored in a large mass and enough time must elapse before threshing to allow the beans to go through the "tough" stage.

The third plan is known as the McNaughton system and it produces the maximum amount of high quality beans. In the tall, narrow stacks the crop will cure satisfactorily even when the ripeness of the beans is not uniform. Under this system, the beans are stacked immediately after they have been pulled and raked toward the center of a 32-row strip. A wagon carrying posts and straw is driven between the windrows and the posts are firmly set at intervals as they are required. From 10 to 14 six-and-a-half foot posts are used per acre,

Courtesy O. J. McNaughton, Mulliken.

Fig. 5—Ideal Stacks Made According to the McNaughton System.

depending on the volume of the vines and the condition of the crop. Damage from soil moisture is prevented by making a straw bed four inches thick on the ground around the post over the full area to be covered by the stack.

Tall, narrow stacks, about three and a half to four feet wide and about twice as high as their width are best proportioned for most satisfactory results.

In addition to its value as a safe, satisfactory curing method, the McNaughton system also makes possible the preparation of the soil and the seeding of wheat around the stacks before the beans are threshed. The area covered by the stacks may be seeded before the stacks are erected or after they are removed.

Stacks should be allowed to stand until the beans are evenly and properly cured. Growers prefer to thresh from the stacks since the work can be done out of doors and the pods can be blown under cover.

The continued use of this system over a number of seasons should prove very profitable in the maximum production of quality beans. Quality greatly affects the profit in bean production since it influences the amount of marketable beans, the cost of processing for market, and the demand for the crop.