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EAST LANSING

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BULLETIN No. 6

EXTENSION SERIES

APRIL, 1917

SOME BEAN POINTERS.

"CLEAN SEED WILL GROW CLEAN BEANS."

Plant clean, plump, viable, Michigan-grown seed.
Cull out discolored, diseased and immature seed.

PLOW BEAN LAND EARLY.

Give the seed bed time to settle.
Prevent damage from bean maggot by early plowing.

FIT SEED BED THOROUGHLY.

Firm with roller to break clods and fill air spaces.
Follow roller with harrow to save moisture.

DISC AND HARROW AT WEEKLY INTERVALS.

Kill weeds as they germinate.
Lessen labor of later cultivation by thorough fitting.

FERTILIZE FOR BUMPER CROP.

Phosphates increase yields and hasten maturity.
Complete fertilizers also effective.

PLANT ON WELL-WARMED SEED BED.

Planting time ranges from June 1 to 25.
Plant three pecks per acre in rows 28 or 32 inches apart.

CULTIVATE FREQUENTLY.

Shallow after thirty days to avoid root pruning.
Do not cultivate wet plants. Disease spores are easily spread.

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BEAN GROWING.

J. F. COX, DEPARTMENT OF FARM CROPS.

The United States looks to Michigan more than to any other state for her bean supply, and in the present food crisis, Michigan can render invaluable service by greatly extending the production of beans within her borders.

Though Michigan ranks first in bean production, there is great opportunity for a marked increase in bean growing.

The section of highest production in the state is located south of Saginaw Bay, extends several counties to the west and south and includes the Thumb district to the east, though beans are grown to some extent in nearly every county in Michigan. This widespread distribution indicates that the area of high production is capable of considerable expansion.

COMMERCIAL BEAN VARIETIES.

The types of commercial beans most widely grown in Michigan are the Pea bean, Medium bean and Red and White Kidney beans. Of these the White Pea bean is in the greatest demand on the market, and is considered the most dependable to grow, since it will do best under the widest range of conditions. The Medium bean is similar to the Pea bean, though somewhat larger and more oval in shape. The White and Red Kidney beans are considered to require more fertile soils than the Pea or Medium beans. Owing to the more limited market demand, Kidney beans fluctuate considerably in price as compared to the Pea and Medium.

SEED BEANS.

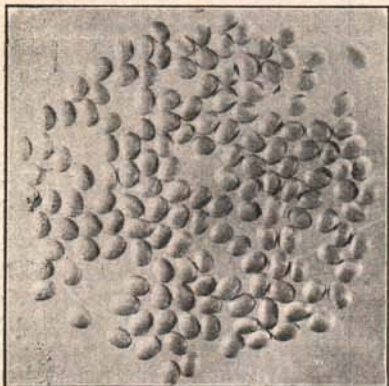
Good seed is of the highest importance in bean growing. The loss caused by bean diseases is very largely due to the planting of infected seed. That "clean seed tends to yield clean beans" is a saying current among bean growers.

Good seed beans should be clean, free from diseased or otherwise discolored beans, immature beans, and foreign material. They should be of good viability and of uniform type. Careful hand picking of beans to be used for seed is strongly recommended. Hand picking, however, even if carefully done, will not make good seed of a badly diseased lot, since apparently clean beans may come from diseased pods. Beans of high pick should not be used for seed purposes no matter how carefully picked over. No dips, sprays or seed treatments are known which are effective in making a diseased sample fit for seed.

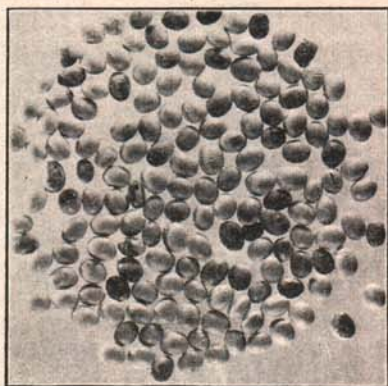
Sending north for seed does not always result in securing clean beans, for the bean diseases have of late spread widely over the northern bean districts. Northern grown seed is only superior when the beans come from clean fields. When possible samples should be secured and carefully inspected before buying, and information secured in regard to conditions under which they were produced.

Native beans from the far west have been suggested as being superior for seed purposes on account of their freedom from anthracnose, but it is doubtful as to whether Western beans will be found adapted to Michigan conditions. A number of Western varieties have been grown at the Experiment Station, but all proved too late in maturing for successful production in Michigan.

As a general rule, it is wisest to use beans for seed purposes grown in the home locality, carefully hand picking the home grown beans of lightest pick. Home grown seed from fields seeded with clean beans from the north is depended on in many localities as a source of good seed.



No. 1—Good seed, clean, plump and free of diseased or otherwise discolored seed.



No. 2—Poor seed, numerous anthracnose and blight-spotted beans. Planting such seed may result in crop failure.

SUCCESS IN BEAN GROWING DEPENDS ON PLANTING THE RIGHT KIND OF SEED.

BEAN DISEASES.

A serious handicap in bean growing is the injury done each year by blight and anthracnose. During years favorable to the spread of these diseases, as in 1915, the damage may reach enormous proportions. The blight and anthracnose damage the crop by decreasing the yield and increasing the pick, or the amount of cull beans that must be hand picked from the beans as harvested. All who are engaged in bean growing should be familiar with the superficial appearance of blight and anthracnose in order to recognize diseased plants and diseased seed.

A full discussion of bean diseases is given in Special Bulletin 68 by J. H. Muncie. This bulletin can be secured on request from Director R. S. Shaw of the Michigan Agricultural Experiment Station, East Lansing, Michigan.

SOILS FOR BEANS.

Beans are best adapted to well drained, fairly open fertile loams. Good yields of beans are not secured on poor soils. Acid or sour soils are not suited to bean growing, for like most legumes, the bean plant does best on soils carrying limestone, or on soils which have been well supplied with lime. Muck soils and soils very rich in organic matter

tend to produce a rank growth of vine and a late maturing crop. Heavy clay soils are inclined to be somewhat late and wet for beans, though when well drained and well supplied with organic matter high yields are obtained. On muck and clay soils bean diseases do most damage, while on well drained loams or sandy loams the bean diseases do comparatively less injury. Light soils are likely to be too droughty but may be improved for bean growing by applying manure or turning under green manure crops.

FERTILIZING THE BEAN CROP.

Under usual conditions manure is an effective fertilizer for beans. It should be applied, where possible, to the previous crop. Soils in Michigan are as a rule deficient in phosphorus. Six to eight tons of manure to the acre, supplemented with two hundred to three hundred pounds of acid phosphate should pave the way for a big crop of beans. Where acid phosphate is used, either in connection with manure or alone, the bean crop tends to ripen more evenly and at a noticeably earlier date. On soils which have been cropped hard, complete fertilizers carrying nitrogen, phosphorus and potassium may prove profitable. Complete fertilizers of 2-8-3 or 2-10-4 formulae are effective, but owing to the present high price of potash, acid phosphate and ammoniated phosphates are most profitable. It is best to apply commercial fertilizers broadcast before seeding. When beans are planted with a grain drill, the fertilizer attachment may be used. In this case the fertilizer should not be fed in the same row with the beans unless but a small amount is used, since the bean seedlings are very liable to injury. Acid soils should be limed previous to seeding with beans. On such soils the lime should be applied in preparation for a clover crop rather than just before planting beans.

BEANS IN ROTATION.

For continued success in production, the bean crop must be included in a good rotation. Beans cannot follow beans successfully year after year owing to the rapid decrease in organic matter and the increased injury due to bean diseases and insects. A good clover sod is considered the best preparation for the bean crop. Such a rotation as the following is well adapted to beans:

- 1st year—Beans.
- 2nd year—Wheat, rye, barley or oats, seeded with clover.
- 3rd year—Clover.

Corn or potatoes can be included in such a rotation either before or after beans. If the clover sod is very weedy or plowed late, or if strawy manure has been applied late in the spring, corn, because it is a gross feeder, will do better under such conditions than the bean crop.

A longer rotation can be secured by seeding timothy or alsike or both with the clover and using two or more years for hay and pasture.

The following are suggested as strong rotations:

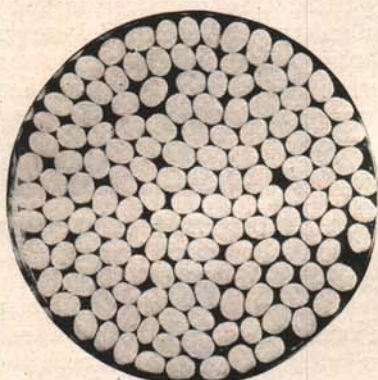
- 1—On farms with little live stock—
 - (1) corn; (2) oats; (3) clover; (4) beans; (5) wheat; (6) clover.
- 2—For combined stock and crop farming—
 - (1) corn or beans; (2) oats or barley or wheat; (3) clover, alsike, timothy (hay); (4) pasture.

PLOWING AND FITTING LAND FOR BEANS.

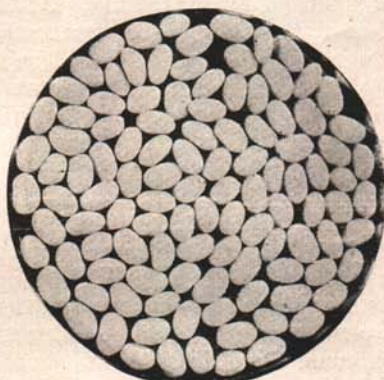
It takes at least four to six weeks after plowing to get a seed bed in the best condition for planting beans. Plowing should be done in the fall or as early in the spring as possible. Early plowing gives opportunity for the seed bed to settle and gives time in which to secure a seed bed comparatively free of weeds by proper use of the harrow and disc. On cloddy soils the roller is often useful in packing and pulverizing. Beans planted on late plowed fields, particularly if shallow plowed, are likely to be affected more by diseases and are more difficult to keep free from weeds during cultivation. Early plowing and proper fitting will greatly lessen the labor of later cultivation and will effectively control the bean maggot, which often causes injury on newly plowed clover sod or on newly manured land.

PLANTING AND CULTIVATING.

The period during which beans are planted in Michigan ranges from June 1 to June 20. About June 10 is the usual date over most of the bean district. It is best to wait until the seed bed is well warmed and



No. 1—Small Pea Bean.



No. 2—Medium Pea Bean.

THESE ARE MICHIGAN'S MOST IMPORTANT COMMERCIAL TYPES.

in good condition, rather than to plant when cold or wet, for even germination and a uniform start is secured only under proper conditions.

The amount of seed used in planting an acre varies with the variety. About three pecks of ordinary Pea beans (less if they run small), four pecks of Medium beans and five or six pecks of Kidney beans is the usual rate. An ordinary eleven-hoe grain drill is commonly used in planting. Every fourth hole is left open and the drill wheel allowed to follow its own track on the return, thus planting three rows with each passage, twenty-eight inches apart. A two-horse corn planter equipped with special bean plates and narrowed up to plant twenty-eight inch or thirty-two inch rows may also be used in drilling beans.

The first cultivation should be given early or as soon as the plants are high enough so that the rows can be easily followed. This cultivation should go close to the plants and fairly deep. The next cultivation, coming after a week or ten days should be further from the plants and not so

deep. The following cultivations should be shallow, not more than two inches deep, since the feeding roots of the bean plant come close to the surface. Cultivators carrying numerous small or medium sized shovels or blades are more desirable than broad shovel types, particularly for the later cultivations. The number of cultivations will depend largely on the degree of thoroughness used in fitting the seed bed. Four to five cultivations are, as a rule, necessary. Beans should not be cultivated when wet with dew or rain since at that time the bean diseases are carried most easily from plant to plant.

HARVESTING AND THRESHING.

The early method of harvesting was to pull the mature bean plants by hand, cure on stakes or in piles in the field and thresh with a flail. At present the bean harvester is used. This implement consists of a frame on wheels which carries two heavy knives. These blades slip along under ground just beneath the surface, cutting and throwing together two bean rows at a time. Harvesting should be done when the plants are mature but should not be delayed until the pods are too ripe as considerable loss may be caused by shattering. After "pulling" the beans are forked into piles, or if the field is free from stones and trash, the side delivery rake may be used. The cocks should be built high and small at the bottom so as to allow a more rapid curing and lessen the damage from weathering. When sufficiently cured to avoid all danger of heating the cured plants should be hauled into the barn. It is considered a good indication that the beans may be safely stored in the mow when pressing with the thumb leaves but slight impression on the bean seed.

Threshing is done from the barn or stack, a special bean thresher being used. The bean thresher carries one cylinder which is operated at a low speed and a second which is operated at a high speed. When the plants carrying the beans are fed through the cylinder going at low speed the riper beans are threshed out with a minimum of splitting. The plants which come from this cylinder unthreshed, which are as a rule not so well ripened, then pass through a rapidly revolving cylinder which finishes the work of threshing. Bean straw is a valuable roughage, particularly for sheep, and should be carefully saved.

The average yield per acre of beans for the state of Michigan for the past ten years is about 12 bushels. Yields of eighteen to twenty bushels to the acre are considered good yields. Very high yields of thirty-five bushels or more are not infrequently reported.

FIELD SELECTION OF SEED BEANS.

Planting clean seed is advocated as the most effective means of controlling bean diseases. Reliably clean seed is only produced from clean fields or from disease-free plants. While it is impossible to find bean fields in Michigan entirely free from diseases, there is, nevertheless, a great difference in the degree to which certain fields are diseased. There is also a noticeable difference in the susceptibility to diseases of certain varieties, and certain individual plants under the same conditions. Seed from fields less affected by disease is better than seed from badly diseased fields. If selection is carried further and the cleanest plants taken from

the less diseased fields, or section of field, a still higher grade of seed can be secured. If such selection is carried on year after year, more and more of the seed will come from plants which tend to resist diseases under our conditions.

Proper field selection, as well as measurably controlling bean diseases, also influences the yield, maturity and uniformity of the crop. A study of the average bean field will show a great range in the yield, time of maturing, and character of vine growth of various individuals. That "like begets like" is one of the established truths of farm practice, and the wise selection of proper plants for seed purposes cannot help but result in the improvement of the bean crop.



The type of plant to select in the field for seed purposes—erect, bushy, heavily-podded and free of disease.

HOW TO FIELD SELECT.

Plants best adapted as seed producers are those which are as free as possible from disease, uniformly ripened, heavily podded, carrying pods well off the ground, and with seed of uniform type. Diseased, late maturing, or viney plants should be avoided.

In making the selection a practical method is to enter the field at time of maturity, and pull for seed purposes, clean, heavily podded, erect, early maturing plants growing under average field conditions. Any discolored or diseased pods on selected plants should be removed. These plants should be handled apart from the general crop and threshed separately by flailing upon a clean floor, or by beating out the seed in clean sacks. The seed should be properly stored in sacks or bins which have not contained "field run" beans.

Another method which some consider more easily performed, but which is not so effective, is to mark off an area in the general field where growth is best. The selected section should be large enough to furnish ample beans for seed. When cultivating this area, remove all diseased, small, or otherwise undesirable plants. At harvest time pull all plants which are objectionable, leaving only the most desirable. The remaining plants which meet the requirement above mentioned are harvested, carefully inspected for diseased pods, threshed, and stored separately for next season's seed. Large growers can improve the crop by "field selecting" enough seed to plant a seed plat each year which will supply ample seed for large fields.

The progress made in the improvement of the bean crop by the methods outlined will depend largely upon the judgment used in selection. Many factors must be considered in field selecting, and no particular characteristic should be developed at the expense of others. For instance, if too much attention is given in selection to the securing of high yielding plants without considering also the maturity factor, the growing season may be so lengthened as to bring about loss through improper ripening or frost damage. High yielding plants tend to ripen late, and on the other hand, very early maturing plants do not as a rule yield heavily. Both yield and early maturity are desirable factors to be sought for in selecting. Where such a conflict occurs a wise compromise must be made and the highest yielding, properly maturing plants selected.

The field selection of beans for seed purposes, if rightly carried out, enables the bean grower to secure reasonably clean seed from high yielding, adapted strains. The wide-spread planting of such seed will result in rapidly increasing the yield and improving the quality of Michigan's bean crop.

Michigan Bulletins available on beans—

Sp. Bul. 68, Two Michigan Bean Diseases.

Cir. No. 28, The Bean Maggot in 1915.

Illustrations in this bulletin furnished by J. H. Muncie, Dept. of Botany, M. A. C.