Mississippi Agricultural Experiment Station.

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SNAP BEANS.

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AGRICULTURAL COLLEGE, MISSISSIPPI

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McNeill Experiment Station,

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Sir:—

I submit herewith manuscript for bulletin on snap beans with the hope that it will meet the demands of a number of prospective truckers in this state who apply to the stations for information about trucking and truck crops. The boll weevil has done more to convince the farmers of this state of the necessity for diversification than all the other influences that have been brought to bear and they are now on the alert for promising crops that may be grown in place of cotton and want primary information about them.

Respectfully,

E. B. Ferris,

Assistant Director.

W. L. Hutchinson, Director,

Mississippi Experiment Station.

SNAP BEANS.

E. B. FERRIS.

Introduction.—The following short treatise on snap beans is hoped to be the first of a series of its kind dealing with truck crops and based on the results of experiments that have been conducted at the McNeill Branch Station since 1902 in growing and marketing these crops. South Mississippi offers an attractive field to the trucker so far as natural advantages are concerned, having a soil almost physically perfect, a climate almost ideal, and, in many places, railroad facilities for placing the crops grown on the best markets of the country. It lacks the necessary labor for developing the industry, while the soils, which are generally poor from a chemical standpoint, have first to be built up to where most truck crops can be grown successfully.

Truck growing is quite a specialized industry, requiring more skill, if not more intelligence, on the part of those engaged in it than any other line of agriculture save, perhaps, the dairy business and experience here has been that the two may be operated together most successfully, the dairy cattle furnishing manure for building up the soils most economically and giving a market not only for the surplus truck crops themselves, but for restorative crops that should follow them. Trucking is at once capable of earning large profits for the successful individual or of causing equally as large losses to the unsuccessful, and the best of its followers are not exempt from frequent failures with a single crop. Except in rare instances the truck grower has to produce extremely perishable crops for limited markets in competition with a vast territory on all sides, and unless conditions beyond his control such as are determined by the soil, climate, and transportation facilities are suitable he cannot hope to succeed except at a great disadvantage. Under the most favorable circumstances it will require a knowledge of soils and fertilizers, of controlling insect pests and fungous diseases, and of the intricate matter of packing and distributing the products, that the producer of staple crops can only acquire by experience, and the writer believes it best to begin such work gradually. In fact, a practical understanding of all the sciences underlying agriculture in its broadest sense would hardly suffice to make one proficient in this work without the knowledge that comes with experience in growing and marketing such crops.

A large percentage of the soils of South Mississippi are light sandy loams with sandy-clay subsoils and not only mature the crops grown on them in a minimum length of time, but are capable of a high degree of improvement with a combination of animal manures, commercial fertilizers, and restorative crops. On such soils the trucker may reasonably expect to get his products on the highest priced markets

in the early spring, while at the same time climatic conditions here are such that he can raise the most of the standard truck crops in the fall and a number of them through the winter. Thus at McNeill early crops like beets, beans, cabbage, Irish potatoes and tomatoes are off the land by the middle of May, being followed by a number of staples such as corn, cowpeas, peanuts, and the like which in turn mature in time for fall and winter crops of many kinds. This station is now marketing, on December the twentieth, several acres of cabbage which are as fine as have ever been grown here in spring, and has altogether numbers of acres of rape, rutabagas, collards, beets, turnips, onions and grain crops which not only supply the surrounding towns with their produce, but furnish succulent feed for dairy cattle through the winter months.

The bush or snap bean is perhaps the easiest of all truck crops to grow and there is about as little experience necessary on the part of the producer. They do not require so rich a soil as do the most of the other truck crops, though they respond well to good fertilization. Being easy to plant, cultivate, and prepare for market, and requiring a minimum of expense for seed and fertilizer, they are an especially good crop for the beginner, and experience here has been that they are about as reliable as any for net returns.

Soils.—For early markets this crop requires a well drained sandy-loam soil which dries out and warms up early in the spring and brings the beans to the shipping stage in the shortest possible time. Such a soil is preferable to stiffer lands that might make much heavier yields but mature them a few days later, since a week's difference in the time of marketing such crops frequently makes the difference between profit and loss.

Preparation.—The first essential in growing most truck crops is to get a lot of humus, or partially decayed organic matter, into the soil and this can be best accomplished here and elsewhere by turning under leguminous crops like the velvet bean or better the manure from cattle that have grazed these beans. Here it is thought best to flat break the land for beans first and then pulverize same thoroughly with harrows, later laying off the ground into rows from two and one-half to three feet apart and distributing the fertilizer in the drill. The beds are then completed and later knocked off with drag or harrow to where they are only slightly higher than the average surface of the ground. This elevation is necessary because the beans are necessarily planted very early when, if drainage is poor, excessive rains are apt to rot them in the ground. The crop can be planted in very narrow rows but those three feet apart are to be preferred for field culture on account of being easier to work with ordinary farm implements. With

the ground prepared as above outlined the beans are planted with an ordinary corn planter with special bean plate or disc, or else the rows are opened with bull tongue and the beans dropped by hand three inches apart and covered about two inches deep. Ordinarily it requires from 5-8 to one bushel of beans to plant an acre, the quantity being determined both by the variety and by the width of the row. It requires, for instance, considerably more of the wax beans than of the green podded Valentine to plant a given area on account of the relative sizes of the beans in each.

Time to plant.—As a rule the earliest beans bring the best prices and every effort is usually bent towards getting them on the market at the earliest time possible. Experience here has been that beans planted the first of March will not likely be killed by frost though there may be light frosts after this time. Some of the most successful crops ever grown at McNeill have been planted considerably earlier than this but at the risk of being killed by cold.

Varieties.—The two varieties grown mostly by truckers in this section have been Wardwell's Kidney Wax and Improved Valentine, the first having a yellow pod and the last a green pod. Of these two the wax is about a week earlier, being ready for market in about fifty days after planting. The green bean has averaged yielding perhaps ten bushels more per acre and when both have been grown to perfection, the wax beans have sold for better prices and have been a lot easier to pick on account of the larger pods. Some of the earliest wax beans grown by this station have sold for as much as $3.50 per bushel hamper on the Chicago market, though, of course, this was an exceptionally high price. Up to 1904 the wax beans did remarkably well here but since that time anthracnose, or rust of the pods, has been so prevalent that they cannot be grown at all and the truckers have about discontinued planting them, depending entirely on the round podded green Valentine.

Though the Wardwell Kidney Wax bean has a flat pod and sells well on the markets, experience here has been that green beans with flat pods will scarcely sell at all and we would caution the truckers of this section against them. Other standard varieties of beans that might be expected to do well here are Black Valentine, Early Refugee, Stringless Green Pod, and Dwarf German Wax.

Fertilizers.—The bean does not require an excessively rich soil and has much to recommend it in this respect for the newly cleared lands of South Mississippi. In fact, this station made one of its most successful bean crops in 1902 on land that had been cleared only a few days before and from which the stumps had never been removed. While the bean is a leguminous crop, when grown for northern markets

it is planted so early in the season that we cannot depend on its getting its entire supply of nitrogen from the air. This station has conducted a number of tests with fertilizers under beans covering at least seven years, and a nnmber of these have been reported in detail in bulletins 79, 83, 87 and 94 of this station, and the following table gives the results for 1906 and 1908, the experiment in 1907 having been entiiely upset by a small white grub that hatched in the seed bean when planted and prevented germination:

Results with Fertilizers Under Beans, 1906 and 1908.

Number of Plat.	Cottonseed Meal—Lbs. per acre.	Nitrate of Soda—Lbs. per acre.	Acid Phosphate—Lbs. per acre.	Kainit—Lbs. per acre.	Yield of Beans in lbs. per acre 1906.	Yield of Beans in lbs. per acre 1908.
1	224	112			2320	5180
2			512		2608	2890
3				480	1744	2720
4	224	112	456	200	3920	4680
5	224	112	456		3744	5540
6			512	480	1904	
7	224	112		200	2592	4540
8	56	28	114	50	3312	3800
9						2240
10	224	112	250			5140
11	100	50	500			3950

From our entire experience here we would recommend a fertilizer for beans made about as follows: 125 pounds of cottonseed meal (or some carrier furnishing an equal quantity of nitrogen), 62.5 pounds of nitrate of soda, and 250 pounds of acid phosphate mixed together and applied in drills to an acre of ground shortly before planting the beans. The nitrogen of the nitrate of soda will feed the young bean while that of the cottonseed meal will feed the plant later. Really it would be better to apply the acid phosphate in such a mixture a few weeks earlier than the other ingredients provided the risk of having it washed off over the surface is not too great. An average of all results here would perhaps show that the addition of kainit to such a mixture has tended to lower rather than increase the yield of beans.

Cultivation.—After the beans are planted care should be taken to prevent a hard crust forming over them in case of heavy rains before the young plants show above the ground. When such a thing happens it is necessary that a light harrow or weeder be run over the ground to break this crust. After the beans are up the cultivation should be level and shallow and frequent enough to keep down weeds and grass and maintain a dust mulch. There is really slight difference between the cultivation of this crop and that of corn or cotton. Care should be taken not to cultivate beans while the vines are wet from rain or

dew, as this will cause dirt to stick to the leaves and they will have a tendency to develop disease.

Gathering.—The standard varieties of snap beans are ready to pick in from fifty to sixty days after planting. As stated before the wax bean has larger pods and is easier to pick than the round green bean. When ready to gather a lot of extra labor, consisting of men, women and children are usually put in the field after the dew has dried off each with a picking basket holding one-half bushel. As fast as these baskets are filled the beans should be poured into the hampers in which they are shipped and removed to the shade. A good hand should pick ten bushels or more a day and the price paid here for the work is from ten to twelve and one-half cents per bushel. Only the well developed pods should be picked and these should be tender enough to snap easily. As a rule it requires three or more pickings to gather the crop.

Packages.—Beans are shipped in boxes or hampers holding about a bushel each. For a long time the box was the standard package, but in recent years the hamper has almost entirely taken its place, the best markets frequently quoting beans in hampers at twenty-five cents more per bushel than in boxes. With beans, as with all other truck crops, care should be taken to ship only the best and if the markets are such that we think it advisable to ship poorer grades, let them be separated from the best and if possible under a different name. The hampers are easily packed, about the only precaution necessary being to see that they are well filled. With the boxes it is necessary to use much greater care in placing the top and bottom layers so as to have them show up well on the market.

Shipping.—Beans are quite perishable and must always be shipped by express or refrigerated freight. The earliest beans will always be shipped by express and the prices will usually justify the increased cost, but the bulk of the crop is nearly always sold at a price that will pay little more than express charges. The express rate to most of the best markets in reach of this territory varies from $1.25 to $1.75 per 100 pounds or from forty to sixty cents per bushel. Beans frequently sell for $1.00 a bushel or less, when if shipped by express they net the grower about enough for package and picking, whereas if shipped by refrigerated freight they will net enough to make the growing of them profitable. Ordinarily, about six hundred hampers are put into a car, and if the crop is reasonably good they should yield from fifteen to forty hampers at each picking, so that if as many as forty acres are grown in a community there should be no trouble about shipping the bulk of the crop by freight. In fact, beans, cabbage, and Irish potatoes are usually marketed about the same time and mixed cars of the three crops might easily be made up.

Diseases.—With the exception of 1907 when the beans were attacked in the ground by great numbers of small maggots that must have hatched out in the seed after planting, the crop here has been peculiarly free from serious damage by insect pests, much more so than a majority of other truck crops that have been tried here, but it has been seriously affected by anthracnose or cankers on the pods, a fungous disease quite hard to control. This disease has been so bad at McNeill in recent years as to cause the complete abandonment of the wax bean which variety seems to be much more liable to it than the green bean. A great deal of work has been done by the Experiment Stations of the country trying to find a remedy for this disease and it has proven a difficult one of solution. The conclusions arrived at have been that in order to control it the pods must be selected in the field each year and only those used for planting the next crop which show up free from any appearance of the disease, the beans from such pods having always been found free from the disease.

In addition to this the beans should be planted in bunches in the field and these clusters not allowed to touch each other in drill. The cultivation of the crop while the dew is on or the vines wet from rains also has a decided tendency to spread the disease. While some claim to be able to check it by spraying with Bordeaux mixture, results at McNeill have shown very little benefit from it. Wax beans planted here in 1905 and carefully sprayed twice during the growing period were so badly infested that when shipped they practically rotted before reaching the market although they had been carefully sorted before leaving here. The careful grower who will select his seed against this disease will surely make the growing of wax beans for Northern markets a profitable business here for they have always been the most popular bean for the very early market. The green beans are grown here with very little trouble from this anthracnose.

Conclusion.—The snap bean occupies the land less than seventy-five days and being planted on or near the first of March is out of the way before the middle of May so that it really interferes very little with the growing of ordinary farm crops. Like all truck crops it is very uncertain as to just what to expect in the way of net returns, but experience here has been that it is not any more uncertain than cabbage or Irish potatoes, besides being a cheaper crop to grow. In 1904 the station kept records of the returns from two acres planted to beans and received for them $173.30, shippers net, that is after freights and commissions had been deducted. One year later when about the same acreage was planted, largely to wax beans, the anthracnose was so bad that only a few hampers were shipped at all and these sold at a loss.