Velvet Beans in Mississippi

By E. B. FERRIS

AN ABUNDANCE OF FORAGE FOR WINTER GRAZING.
After the corn and velvet beans are harvested on the farms of Mississippi, the stalks and vines furnish great quantities of roughage for wintering the stock.

Mississippi Agricultural Experiment Station
Agricultural College, Mississippi
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By E. B. FERRIS

Probably no crop has ever received more wide spread recognition or been more generally adopted in so short a time, than has the velvet bean in Mississippi, which within one year has sprung from comparative insignificance to one of the chief crops of the state.

The writer's first experience with this crop, which promises much for the livestock industry and the worn soils of the South, was about the year 1897, when velvet beans were grown on experimental plats at the Mississippi Agricultural and Mechanical College. These first beans made an immense growth of vine but matured few if any seed, and the hay made from them was not only difficult to save but when cured was a very black and undesirable forage. Velvet beans were grown in Florida, however, several years prior to 1897, and were brought to the attention of the Florida experiment station in 1895 by people in the state who had used them for covering trellises and unsightly places about the farm.

As a result of a talk before a farmers' institute audience at McNeill, Mississippi, 1902, by Dr. H. E. Stockbridge, Agriculturist of the Florida Station, who laid much stress on the possibilities of the velvet bean on the lands of South Mississippi, the McNeill Experiment Station began growing these beans and a number of farmers introduced them in a small way. In this latitude, 30 degrees and 49 minutes, we got a good maturity of fruit, and since this introduction the small farmers of this section have used velvet beans very largely as a catch crop in their corn and have wintered their cattle on them almost to the exclusion of other crops.

Until twelve years ago the Florida speckled bean was the only variety grown, and it was not thought advisable to attempt growing it for fruit much above latitude 32 degrees. For this reason the U. S. Department of Agriculture began a systematic search for new varieties, which would be more hardy and which would develop in more northern latitudes. As a result velvet beans have been grown as far north as Pennsylvania where the seed of the 100-day bean ripened in 1916, according to statements from reputable seed houses. Prof. S. M. Traey of the United States Department of Agriculture now reports that about twenty distinct species of velvet beans have been introduced into this country. With these many hundreds of
hybrids and crosses have been made, developing varieties to meet the demands of almost any condition that may be found in the Southern states. Chief among these varieties are the Florida, the Early Speckled, the Yokohoma, Lyon, Chinese, Osceola, and Georgia. In growing the most of the above named varieties here we have found that the kinds that mature quickest are usually those that make the smallest growth of vine. The Yokohoma, one of the earliest maturing varieties, makes a very small growth of vine, while the Chinese, one of the latest, has made the heaviest growth. Best results are usually had, so far as yields are concerned, by the use of varieties that will continue to fruit up to frost, at the same time having a growing season sufficiently short to mature the bulk of the crop.

VARIETIES.

The Early Speckled—The Early Speckled is the most popular variety of bean so far introduced, and for three or four years in sections where beans are largely grown has been used almost to the exclusion of other varieties. This variety is said to have originated in South Alabama, and is very much like the old Florida bean except that it matures much earlier. It breeds true to type, and, unlike the Osceola, and some other new varieties, shows no disposition to revert to other types. The writer has visited crushing plants in Andalusia, Georgiana, and Greenville, Alabama, and at each place has found that this Early Speckled bean is the only one being used for crushing, the Chinese and Yokohoma having been tried with poor results, and the Osceola, though looked upon with great favor, not having as yet been grown in sufficient quantities to be used for crushing.

The Yokohoma—The Yokohoma is a shy bearer, and makes much less foliage and vine than other varieties; the beans also have a tendency to pop out in the field.

The Chinese—The Chinese is a heavy fruiter, with a long growing season and a very heavy foliage, but the proportion of bean to pod is much smaller than in the Early Speckled. The mills visited were not disposed to want the Yokohoma or Chinese at all, reporting that they were both harder to handle, more difficult to crush, and made a meal of lower feeding value than the Early Speckled. In fact, in those parts of the country visited where velvet beans and corn were being grown more largely than any other crop, not excluding cotton, we found a disposition to exclude all varieties except the Early Speckled and the Osceola, and the latter had been grown so little that, while very promising, its true value had never been determined.

The Osceola—The Osceola bean is a new variety introduced by the Florida Experiment Station, but has several advantages over
the Florida and Early Speckled varieties. It is free from the sting-
ing fuzz or velvet on the pods, which makes the other varieties very unpleasant to handle. It has larger beans and pods, making them less expensive to gather, and also is much earlier, at least than the Florida bean.

Fig. 1—CHOOSE YOUR VARIETY.

These four varieties together with the Osceola and Yokohoma make up the bulk of Mississippi’s million acre velvet bean crop.

At the McNeill station the following varieties of beans were planted April 14, 1916, in alternate rows with corn, and gave yields of dried beans in pods per acre as indicated, the beans having been gathered November 5, and dried until December 12, when they were weighed:

Chinese—4400 pounds an acre.
Yokohoma—850 pounds an acre.
Florida—1870 pounds an acre.
No. 1846D—2380 pounds an acre.
No. 1815C—1530 pounds an acre.
No. 1846C—1190 pounds an acre.
Early Speckled—2040 pounds an acre.
The Chinese beans made the heaviest foliage, and were followed by the others about in the proportion in which they gave seed.

All the seed for these plantings were furnished by Prof. S. M. Tracy, Agronomist, U. S. Department of Agriculture. The land was laid off into rows three feet apart, and alternate rows were planted to corn and velvet beans. The corn rows were fertilized with a mixture of acid phosphate and cottonseed meal at the rate of 300 pounds an acre; the beans, with acid phosphate alone at the rate of 200 pounds an acre.

**TIME OF PLANTING.**

When velvet beans were first introduced it was necessary to plant them very early in the season to give them time to mature the seed. This is still necessary with varieties like the Chinese and the Florida, but the introduction of quick maturing varieties like the Lyon, the Yokohoma, and the Early Speckled, has made it possible to plant these beans with almost as much latitude as is possible with cowpeas. Since they are always grown with corn, however, and since, other things being equal, it pays to plant corn early, it is usually found best to plant the beans early.

There is much difference of opinion among the large growers of velvet beans as to the best time of planting the beans in the corn, some planting the two crops at the same time, and some planting the corn and waiting several weeks before planting the beans. The consensus of opinion of a large number of growers of velvet beans seems to be, however, that it makes very little difference whether the beans are planted at the same time with the corn or a few weeks later. At the McNeill Station we prefer to plant the beans and corn in alternate rows, and to plant the corn row at least one month ahead of the beans.

Corn may be planted in early March, and will stand a considerable frost, while velvet beans are very sensitive to cold. Besides, if planted a few weeks in advance of the beans, the corn will reach maturity before the bean vines interfere with its development. It is deemed advisable by us, therefore, to plant the corn early in March, when the beans may still be planted in plenty of time to make maximum yields, even though six weeks are allowed to intervene between the time of planting the corn and the beans.

In an experiment conducted here last year we planted corn on the twelfth of April in alternate rows three feet apart. A few days later we began planting Early Speckled beans, in plats of four rows each, or one-tenth of an acre, and continued to plant these beans every two weeks up to July 1.
The yields were as follows, calculated in pounds of dry beans in the pods per acre:

Planted April 15—yield 2,040 pounds.
Planted May 1—yield 1,700 pounds.
Planted May 15—yield 1,530 pounds.
Planted June 1—yield 680 pounds.
Planted June 15—yield 680 pounds.
Planted July 1—yield 510 pounds.

When the last three plantings of beans were made, the corn had reached considerable size, and the shade from it interfered somewhat with the growth of the beans. Too, the later plantings of beans could not be cultivated so well as were the earlier plantings. If the corn and beans had both been planted later, we feel sure that the beans would have made a better showing.

We believe the Early Speckled bean will give fair yields, much better than those given above, if planted here with corn as late as July 1, but corn planted here as late as the 15th of June is often seriously injured by insects; and it is, therefore, much better to plant both crops earlier.

METHODS OF PLANTING.

In order that velvet beans may fruit well, they must be planted with some crop that will support them, or else must be supported with poles like any other running bean. Corn is the crop almost entirely used for this purpose, as it has been found by actual experience that the beans interfere very little with the yield of the corn. On the other hand they always leave large quantities of decaying vegetable matter upon the land, which, in a single season, will largely increase the humus and nitrogen content of the soil, as a consequence making it hold much more water. This improved condition of the soil leads to heavier yields of corn in later years. In talking with planters in South Alabama, where velvet beans have been so largely used to take the place of cotton, it was almost the universal opinion that a crop of beans did not reduce the yield of corn more than ten per cent, if so much; that they were a catch crop almost entirely; and that after gathering from one to two thousand pounds of beans per acre there was still left on the land a large amount of forage and undeveloped beans for cattle and hogs, besides more vegetable matter than could be put on the soil in any other way. While the beans were always planted with corn, different farmers had adopted various ways of doing this: some planting the beans and corn in the same row and at the same time; some, beans and corn in alternate rows at the same time; some, two or more rows of corn to one of beans; and others, the beans after the corn had
come up and been cultivated. A few of the most successful farmers planted alternate rows of corn and beans, with a hill of peanuts between each hill of beans, claiming that the two crops grew well in the same row and in the end made a well balanced ration for hogs.

Fig. 2—ROOM FOR BOTH.

Two rows of corn and a row of velvet beans has been found a good method of planting these two crops in Mississippi. The corn supports the beans but does not exclude the sunlight.

The writer, after fifteen years' experience in growing corn and beans, has come to the conclusion that the most satisfactory method is to plant either alternate rows of corn and beans, or two rows of corn to one of beans, planting the corn as early as possible with the beans a few weeks later, and covering the beans with a cultivator as the corn is worked, or better, using a regular bean planter.

Most of the people in our section plant velvet beans by hand and cover with plow and cultivator, but in sections where they are grown in large quantities the planting is done by machinery. Machines have been devised that will plant corn and velvet beans in the same row at the same time, accurately spacing the two; these planters will drop velvet beans and peanuts in the same way, dropping the regular peanut shelled or the Spanish peanut in the pod. There were two such planters being sold in the places visited, one called Cole Plain View Planter, made by the Cole Manufacturing Company, Charlotte, N. C.; the other called the Waters-Covington Planter, made by the Covington Manufacturing Company, Headland, Ala. The first mentioned planter sells for $16.50; the last named, for $13.50.
To show how extensively people in other states where conditions are much the same as are ours in South Mississippi, are planting velvet beans, I will state that in Andalusia, Alabama, there was one hardware store that had sold two hundred Cole planters during the season preceding the planting of the 1917 crop, and I was told that they had calls for as many more, which the factory could not fill.

**FERTILIZERS FOR VELVET BEANS.**

Velvet beans will grow on the poorest soils without fertilizer. They have reached their best development in sections of naturally poor soils, and it has usually been found that they do best on sandy soils that have to be fertilized for other crops. While the crop is a legume and gets its nitrogen from the air, it requires some of the mineral elements of plant feed on soils where these are deficient. At McNeill we have found the soils so poor in phosphorus that it is necessary to supply this element in order to get a maximum crop. While it is true that the crop will grow on very poor soils, it will be seen from the results that follow that the velvet bean, too, responds to good treatment, and will, like other crops, give the heaviest yields from applications of animal manures. In 1916 seven plats of land, of one-fourth acre each, that had been used for ten years for conducting permanent tests with fertilizers were planted in alternate rows to corn and velvet beans. Both crops were planted on April 15, the Early Speckled bean being used. These beans were picked and weighed when dry, and gave the following yields, calculated in pounds of the beans in the pods per acre:

- 200 pounds raw phosphate rock and 200 pounds cottonseed meal, 2,600 pounds of beans.
- 200 pounds acid phosphate and 200 pounds cottonseed meal, 2,400 pounds of beans.
- 200 pounds acid phosphate, 200 pounds cottonseed meal and 200 pounds kainit, 2,160 pounds of beans.
- 12 tons of animal manure and 200 pounds raw phosphate rock, 3,080 pounds of beans.
- 200 pounds of acid phosphate alone, 2,120 pounds of beans.
- 200 pounds raw phosphate rock alone, 2,160 pounds of beans.
- 12 tons of animal manure alone, 2,880 pounds of beans.

In sections around Greenville, Georgiana, and Andalusia, Alabama, the planters were fertilizing the corn, generally putting no fertilizer under the beans. We do not doubt that small applications of phosphate under the beans would pay them. The soils near the places mentioned are naturally much more productive than the soils near McNeill, growing cowpeas well without fertilizer, while at McNeill cowpeas will make nothing without some acid phosphate.
at least. In South Mississippi generally we would recommend the use of from one hundred to two hundred pounds of acid phosphate an acre under the beans, results here apparently showing that there is sufficient potash in these soils to meet their present needs.

VELVET BEANS AS A FEED.

For more than ten years the farmers of this section of the state have been using velvet beans for wintering their cattle, letting the cattle run on the ranges as long as they could get feed enough to support them and then turning them on their bean fields. It is the only crop we know that can be left in the field through all kinds of rainy and cold weather without being ruined, the tough pod in which the bean is borne withstandimg almost any weather condition and the vines themselves being eaten by cattle with more relish after frost has killed them than before. While the common practice of letting the cattle gather the beans is apparently a very wasteful one, since it would naturally be supposed that they would tramp a lot of the beans in the ground and ruin them, in practice the loss is nothing like so great as it would seem, for if the cattle are followed by hogs, practically every bean will be found and eaten. At McNeill we have even plowed under velvet bean vines, on which a few of the pods had been left, have planted the ground to oats, and later, on grazing the hogs on these oats, have had them smell the buried beans, and in rooting for them almost destroy the stand of oats. The fact is, both cattle and hogs prefer the beans after the pods have been softened by moisture and the beans have swollen, and a great many successful stock men in this country follow the practice of letting cattle and hogs gather all the beans, never picking any of them. In recent years, however, the practice has grown of picking the best of the beans before the cattle are turned in and using these picked beans in the hulls as a feed for cattle or hogs. Both eat them ravenously, the cattle eating pods and beans, the hogs eating the beans and discarding the pods.

Where machinery is available for hulling the beans, it will pay to separate them from the pods where they are to be fed to hogs, and then to use the pods as feed for cattle. These bean hulls have a higher feeding value than cottonseed hulls, and are now selling on the market at fifteen dollars a ton.

A number of feeding tests have been carried on at this station to determine, in rather a rough way, the feeding value of velvet beans as compared with cottonseed meal. When grown purely as a catch crop with corn, so as to interfere as little as possible with the corn, we have found the beans to be worth, for dairy cattle, about ten dollars an acre, as compared with cottonseed meal at twenty-five dollars a ton. The land on which these beans grew was mak-
ing about fifteen hundred pounds of beans and twenty bushels of corn an acre, the corn having been gathered before turning the cows on the beans.

The beans grown at the station in 1916 were nearly all picked and fed in the pods, without grinding or soaking, to dairy cattle. They were fed along with silage, and practically as much milk was obtained from the herd when fed eight pounds of beans in the pod and thirty pounds of silage as when fed four pounds of cottonseed meal and the same amount of silage.

A great advantage that beans have over cottonseed meal as a feed for dairy cattle is that the quantity fed can be increased almost indefinitely without injury to the cow while it is dangerous to feed more than four pounds of cottonseed meal per day to a cow except for a short period. In these feeding tests a number of varieties of velvet beans were used, and while we were not able to tell any difference in the feeding value of the several varieties on account of the rather crude way in which we were compelled to carry on the work, we did find that the Early Speckled bean was the most satisfactory from a physical standpoint, this variety being easier to handle on account of its having a smaller proportion of pods to beans and it being less susceptible to injury from mold, or other causes, than the large podded kinds.

MARKETS FOR BEANS.

While, as has already been stated, the farmers of several of the Southern states have for years been growing velvet beans and marketing them through cattle and hogs, or as seed, up to three years ago, so far as the writer knows, there was not wide market for the beans themselves as a commercial feed crop.

When the boll weevil struck South Alabama about the time that the price of cotton dropped so low following the European war, the merchants and planters of some of the most progressive places began to look for some crop that would in a way take the place of cotton as a money crop, and they decided to try the velvet bean, marketing them not only indirectly through cattle and hogs, but also directly as a feed crop, by grinding them and putting them on the market in competition with other feeds. In getting this work started, these people had the advantage of a rather centralized control of the labor, the farms having been owned in large tracts and to a considerable extent by the supply merchants in the market towns, who were in a way able to so control the labor, or the farmers they supplied, as to force them to do their bidding. In this way, largely as a result of the foresight and energy of a few thinking men, these people began planting beans and corn rather extensively in 1915. They marketed large quantities of beans as seed, for there
was then a heavy demand for them, but they soon found that other markets were needed even that year, and so methods of crushing were looked into. This resulted in the establishment of one or more crushing plants in 1915.

On account of the extremely tough pod, the velvet bean proved a very hard thing to crush or grind. Bur mills would not grind them on account of the rather large percentage of oil they carried, and other kinds of mills that would grind hay or corn in the ear were unequal to the task of grinding the tough podded beans. Then, too, it was difficult to keep the bean meal when ground on account of its becoming rancid, which was found to be due to an excess of moisture left in the beans before grinding. This necessitated drying facilities, which had to be devised. The pioneers in this business had to go through all the trouble also of getting freight rates to the mills on the raw beans and from the mills on the bean meal.

These freight rates have been adjusted to the satisfaction of all concerned, not only within the state but also without the state, and the business of crushing velvet beans is increasing by leaps and bounds. Nearly every town of any size over a wide section in South Alabama and extending into Georgia either has a crushing plant now or is contemplating starting one. Merchants, farmers, and citizens of the town all agree that the velvet bean has saved the day for them, and point with pride to the fact that they have put the country on a cash basis; that the merchants are selling as much now for cash as they ever sold on credit when cotton alone was the money crop; that the lands are being rapidly built up as a result of the beans; and that, while much labor has left the country recently on account of the exodus of negroes to the North, the owners of the land are now able to get more revenue out of it with cattle, hogs and the companion crops, corn and beans, than they were with more labor when cotton was at its best. And the greatest change, after all, has been that the owners of these lands under the new order of things have to do a great deal more thinking and hustling and much less fishing and frolicking than they did when cotton was the one money crop.

**MACHINERY FOR GRINDING BEANS.**

As has been stated, on account of the hardness and the moisture absorbing qualities of the velvet bean hulls, especially built and very heavy machinery has to be used in grinding them. We found two different machines successfully grinding or, rather, crushing these beans; each could be used also for crushing unhusked corn and various hays. The heaviest of these mills was built by the Williams Patent Crushing and Pulverizing Company, St. Louis, Missouri. There were three sizes in three different plants: No. 0,
with a capacity of fifteen tons in ten hours; No. 1, with a capacity of 30 tons in ten hours; and No. 3, with a proportionately greater capacity. The lightest of these machines sold for $1,250.00; the second size, for about $3,000.00; we did not learn the selling price of the third size. In one plant, a machine, manufactured by the Gruendler Patent Crusher and Pulverizing Company, also of St. Louis was being successfully used. This machine worked on the same principle as the Williams machine but was lighter and sold for less money. Both machines crush the beans by means of a large number of flat hammers that hang loosely on several shafts inside of a cage made from heavy iron in the nature of a screen.

The fineness of the product is governed by the size of holes in the screen, these holes varying in size from one-eighth of an inch to five-eighths of an inch in diameter. The finer the product is ground, the better it sells on the discriminating markets that use it in making mixed feeds. We found one large mill that run its meal through an attrition mill, such as is used for grinding cotton seed cake, after it had been ground in one of the Williams mills as above described.

While some small mills were crushing beans without first drying them, the large crushing plants insisted that it was absolutely necessary to dry the beans before crushing them, and each plant had dry kilns for doing this. These drying kilns were made by the Alabama Machinery and Supply Company, Montgomery, Alabama, and by the B. F. Sturdevant Company, Boston, Massachusetts. In the kilns hot air was used as a means of drying, this air being heated with the exhaust steam from the engines and blown through the kilns by fans. In both kilns the beans were carried through by means of chain belts that travel over a series of shelves, moving the beans in thin layers from three to five times through the dryer, which subjects them to a drying process for about one hour. Drag belts are used entirely in conveying the beans, screw conveyors, such as are used for cottonseed, having proven unsatisfactory. The storage space necessary for handling beans, either at the crusher or by the merchants who buy them, is enormous, and in the towns where they are being bought, both the merchants and the crushing plants are finding it necessary to greatly increase their present storage facilities.

In most of the plants visited we found the boiler capacity necessary to run the mills varying from one hundred to one hundred and twenty-five horse power; with the capacity of the engines about seventy-five horse power. Both boiler and engine power were considerably greater in the larger plants where other work was done at the same time. The investment necessary to buy and equip such plants is in the neighborhood of twenty thousand dollars. In addition to this, money would have to be borrowed through the crushing
season to pay for the beans as they are bought; this, however, can be easily handled through the banks. The mills already in operation in the three towns visited had beans in sight that would keep them busy throughout the year. In this respect it would appear that these mills have a decided advantage over the average cotton seed crushing plant, which frequently does not run more than six months of the year, and necessarily must lose a lot in idle capital as well as in salaries paid to employees, which must go on for the entire year.

Usually the building in which the crushing machinery was installed had been built for other purposes. In one instance an old ware house was used, and in another, a discarded cedar mill where pencil slats had been sawed.

The only house that had been built especially for such work was 100 feet long, 80 feet wide, and 36 feet high, divided into two stories. The old cedar mill was 40 by 160 feet, with two stories, each about 12 feet high, and with a seven foot basement. One of the mills had a storage house 70 by 100 feet, with walls 20 feet high; this was reported not half big enough.

The cost of crushing velvet beans is between one and two dollars a ton; of sacking about two dollars a ton under present conditions, while the net loss in drying and cleaning as the beans go through the kiln amounts to about 250 pounds to the ton. The prices paid the farmers during the past winter varied from $12 to $24 a ton, while the bean meal varied in price from about $25, at the beginning of the season to $35 a ton, f. o. b. factory, at the present time. All mills report an unlimited demand for the meal, which is used largely for feed for cattle in its original state, and in mixed feeds for horses and mules. The market for the meal is by no means confined to the Southern states, as it is fast coming into use by feeders and mixers all over the country. In view of the fact that this meal has been on the market so short a time, it seems remarkable that it has found such an unlimited market at such good prices.

This fact alone speaks volumes for its worth, and gives a good insight into the unlimited possibilities for velvet beans in the South. A popular mixed feed for horses is made by the use of velvet bean meal, 50 pounds; alfalfa, 150 pounds; oat straw, 50 pounds; shelled corn, 100 pounds; oats, 50 pounds; all ground, and mixed with 50 pounds of black strap molasses. In other popular mixed feeds, with which fine results have been obtained when fed to horses, velvet beans and pods up to 25 per cent of the mixture are used.

For cattle velvet bean and pod meal should be used the same as cottonseed meal, and should be mixed with other feeds, such as hulls, hay, and silage. Since animals must be educated up to eating it with a relish, it should gradually be made to take the place of the
cottonseed meal. For hogs the shelled beans should be used. If ground, they should be fed as are pure gray shorts, though it is not necessary to grind these beans for hogs. Some of the most successful feeders soak the whole pods for about twenty-four hours and feed in troughs.

The following table gives the analyses of velvet bean feed meal, velvet bean meal, corn meal, wheat shorts, rice polish, and cottonseed meal, in order that they may be easily compared:

<table>
<thead>
<tr>
<th></th>
<th>Water</th>
<th>Protein</th>
<th>Fats</th>
<th>Fibre</th>
<th>Ash</th>
<th>Nitrogen Free Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Velvet bean feed meal</td>
<td>12.0</td>
<td>18.0</td>
<td>4.0</td>
<td>14.0</td>
<td>4.0</td>
<td>48.0</td>
</tr>
<tr>
<td>Shelled velvet bean meal</td>
<td>12.0</td>
<td>23.0</td>
<td>6.5</td>
<td>7.6</td>
<td>3.0</td>
<td>48.0</td>
</tr>
<tr>
<td>Corn Meal</td>
<td>15.0</td>
<td>9.2</td>
<td>3.8</td>
<td>1.9</td>
<td>1.4</td>
<td>68.7</td>
</tr>
<tr>
<td>Wheat Shorts</td>
<td>11.8</td>
<td>14.9</td>
<td>4.5</td>
<td>7.4</td>
<td>4.6</td>
<td>56.8</td>
</tr>
<tr>
<td>Rice Polish</td>
<td>10.0</td>
<td>11.7</td>
<td>7.3</td>
<td>6.3</td>
<td>6.7</td>
<td>58.0</td>
</tr>
<tr>
<td>Cottonseed Meal</td>
<td>8.2</td>
<td>42.3</td>
<td>13.1</td>
<td>5.6</td>
<td>7.2</td>
<td>23.6</td>
</tr>
</tbody>
</table>

Fig. 3—VELVET BEANS AS SOIL BUILDERS.
Tons of humus are returned to the soil by a crop of velvet beans.

It should be remembered that the analysis of cottonseed meal given is considerably above that of the meals now placed upon the market, which are nearly always adulterated with cottonseed hulls—frequently to the point where the protein is no higher than that contained in velvet bean meal. When the feeding value of velvet bean meal is compared with that of other high grade feeds, and the prices
VELVET BEANS IN MISSISSIPPI

at which they are now selling are taken into consideration, there is no wonder that the markets have so greedily taken hold of this commercially new feed.

VELVET BEANS AS A SOIL BUILDER.

As a restorative crop for exhausted soils, velvet beans are superior to cowpeas, soy beans, or peanuts, for they not only make a greater tonnage of vegetable matter but on account of their habits of growth they also leave a heavier percentage of this vegetable matter on the ground to decay and form humus.

The following table, taken from Bulletin No. 60 of the Florida Experiment Station, shows the enormous quantity of dry matter that an acre of these beans will produce, and what an acre of these beans would be worth for nitrogen alone if turned into the soil and the land so cropped as to conserve all of the plant feed:

<table>
<thead>
<tr>
<th></th>
<th>Ala.</th>
<th>La.</th>
<th>Fla.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt. of green material from acre</td>
<td>19,040 lbs.</td>
<td>22,919 lbs.</td>
<td>21,132 lbs.</td>
</tr>
<tr>
<td>Wt. of dried material from acre</td>
<td>8,240 lbs.</td>
<td>7,495 lbs.</td>
<td>5,953 lbs.</td>
</tr>
<tr>
<td>Wt. of dried roots from acre</td>
<td>1.258 lbs.</td>
<td>191 lbs.</td>
<td>690 lbs.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Ala.</th>
<th>La.</th>
<th>Fla.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wt. of nitrogen in vines from acre</td>
<td>201.3 lbs.</td>
<td>170.0 lbs.</td>
<td>131.5 lbs.</td>
</tr>
<tr>
<td>Wt. of nitrogen in roots from acre</td>
<td>12.6 lbs.</td>
<td>2.9 lbs.</td>
<td>9.7 lbs.</td>
</tr>
<tr>
<td>Total nitrogen in crop from acre</td>
<td>213.9 lbs.</td>
<td>172.9 lbs.</td>
<td>141.2 lbs.</td>
</tr>
</tbody>
</table>

At the prices for which nitrogen is now selling, an acre of beans such as those given for Alabama, would be worth for nitrogen alone more than fifty dollars not counting the value of the potassium, and humus that they leave on the land.

HARVESTING VELVET BEANS.

On account of its habit of growth the velvet bean makes a very poor hay crop. The vines grow so long and entwine so freely that we do not regard it at all as a hay crop. For the same reason we would not attempt to use it as a silage crop. We know of several high class farmers who grew velvet beans with corn or sorghum and cut the two crops together with corn knives, for use either as silage or dry forage, but it is our opinion that other crops or combinations of crops are better suited to either purpose.

In most instances where cheap labor can be had, it will pay to pick the best of the beans. Even though, with the common varieties usually grown this is an unpleasant task on account of the stinging hairs on the pods, a considerable saving is undoubtedly effected by picking. The price paid for this picking varies from fifteen to thirty cents a hundred pounds; at such prices the labor can
make as good wages as are usually made in picking cotton. Every farmer wants a money crop and is compelled to have one. According to information we have at hand, there is no crop that comes so near to cotton in this respect as does the velvet bean. With the introduction of the crushing plants, which will undoubtedly be built all over the lower South, there should always be a good market for velvet beans, and with increased competition on the part of the trade, the market price ought to increase to the producer.

With cattle and hogs to turn on the bean fields, it is by no means necessary to pick the beans if labor is scarce and high priced, for the animals will get the greater part of them. If both cattle and hogs are being fed to fatten, we doubt that there would be any economy in picking the beans. If, on the other hand, they are being fed only maintenance rations, they will of course, use the feed more economically if the beans are picked and fed in small quantities than if they have free access to the beans in the fields. Large owners of stock ought to be able, with hired help, to grow great quantities of corn and beans for a few months during the early spring; the corn and beans can then be left alone until the corn ripens when it can be harvested and the beans left to be gathered by the livestock at any time during the winter. In this way a maximum quantity of land can be handled with a minimum of labor, for there is nothing to prevent the use of labor saving implements in handling the two crops except when it comes to harvesting, which, on account of the bean vines, must be done by hand.

To show just how the presence or absence of velvet beans in quantity will affect the number and value of the cattle of given communities, we will repeat the record of the New Orleans market as given by one of the commission houses of that city. This record showed that during the three months of January, February and March, of 1917, ninety per cent of the cattle coming to that market were from the velvet bean districts of Alabama and Florida, and that practically all the fat cattle sold there during these three months were from this same territory. A car of cattle fed on velvet beans at Andalusia, Alabama, sold at New Orleans during this time for $1,950; on the same day a car of cattle from Calcasiea Parish, Louisiana, sold for a little less than $900.00. This difference was due largely to the influence of velvet beans, either directly or indirectly. Another fact showing the influence of velvet beans on the progress of communities in which they are grown is that Andalusia, Alabama, a comparatively small town surrounded by land once cut-over from long leaf pine timber, has a packing plant in which is slaughtered daily five or six hundred hogs. It is the money paid out to the farmers for these hogs, for their velvet beans, and for their cattle which makes the air of prosperity everywhere prevalent in this
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town, and enables the merchant to smile and tell you that he is selling more goods now for cash than ever before on credit.

HULLING VELVET BEANS.

In this section of the country very few velvet beans are hulled except for seed; this work is usually done by hand. If the beans are allowed to dry thoroughly, and are then placed in the sun for a few hours, they may be beaten out fairly well with flails, either after placing them on floors or putting them in sacks. One of the best times to hull beans is in the winter when the weather is very cold and the hulls frozen, as at this time the pods are very brittle and separate easily. Two men with flails can beat out ten bushels a day.

Except in the case of the individual small farmer who wants seed or a few beans to feed, one cannot afford to depend on hand methods of hulling. Where the beans were grown in quantity, we found a number of machines for hulling them being used successfully. A Case thresher with a regular bean cylinder and a No. 18 separator, pulled by a twelve horse power engine, will thresh eight hundred to one thousand bushels a day. We saw also a number of machines sold by the International Harvester Company, known as the New Racine, Junior and Senior, threshing beans successfully; the smaller machine can be run by an eight horse power engine. Both makes of this machine would thresh oats, pick peanuts, or shell corn.

A machine very highly recommended by large handlers of beans is made by the Coger Manufacturing Company, Morristown, Tennessee. This will shell sixty or seventy bushels of beans an hour, is run by a ten horse power engine, and sells for about $350. A much cheaper machine than the ones above mentioned may be used for hulling beans, the Star Pea Huller, which costs about $65, and can be run by a two horse power engine.

This machine is made by the Star Pea Huller Manufacturing Company, Memphis, Tennessee, and would doubtless meet the demands of a number of small plants to be scattered widely over the country where velvet beans would be hulled for toll or for a fixed money charge. At Georgiana, Alabama, there was such a mill that made a business of grinding beans in the pod, corn in the husk, shelled corn, hay or any other forage; also of hulling velvet beans, and of grinding the shelled beans. This plant consists of a building one story high, 36 by 70 feet, in which is installed a No. 0 Williams feed and bean crusher, costing $1,250, with a capacity of 15 tons a day; a Star pea huller, No. 12, costing $65, and having a capacity of shelling forty bushels an hour, a 35 horse power engine and 50 horse power boiler placed in a shed room at the end of the main building. Mr. Weathers grinds for the public,
charging one-sixth, or twenty-five cents per 100 pounds, for crushing beans; twenty-five cents a bushel for hulling beans; and the customary prices for other work. He also buys beans and crushes them for the market. He has no dryer, thinking the drying process not absolutely necessary though it would facilitate the grinding considerably. This opinion is at variance with the opinions of the larger mill owners by whom it is thought that drying is absolutely imperative. Eliminating the process of drying does seem to reduce the cost of crushing considerably, the cost being in the neighborhood of a dollar a ton when the beans are not artificially dried. One hundred pounds of beans in the pods will give an average of sixty pounds of shelled beans and forty pounds of hulls, these hulls having about ten per cent of their weight in poorly matured beans that will not hull, which adds greatly to their feeding value. Such hulls were selling for fifteen dollars a ton when the bean feed was being sold at thirty-five.

QUANTITY OF SEED TO PLANT AN ACRE.

The cost of seeding velvet beans is perhaps the lowest of any other market crop, the amount of seed necessary varying with the variety used; the larger the bean itself, the greater the amount of seed necessary to plant a given area. One peck of beans like the Chinese, Osceola, and Lyon will plant an acre; less than half a peck of the Early Speckled or Florida Speckled will do the same under average conditions. This makes the cost of seeding with home-raised seed almost negligible. To illustrate how quickly these velvet beans multiply themselves, we will relate a fact told us by a large supply merchant at Andalusia, Alabama. Three years ago this merchant got a few of the Early Speckled beans when they were first introduced. He gave a peck of these seed to a friend, who planted them, and from the beans grown sold the following winter $437 worth of seed, at the rate of $4 a bushel, saving twelve bushels for home use. The man to whom these seed were given plants one row of corn and one row of ground peas, puts the velvet beans two feet apart in the peanut row, and uses the beans he does not gather and all the peanuts to fatten cattle and hogs in the fall and winter.

PREPARATION OF LAND AND CULTIVATION.

On well drained land such as is usually planted to velvet beans the ground should be flat broken as for corn, well disced and smoothed, and then laid off into rows three to four feet apart as preferred. As stated, we prefer at McNeill to have the rows three feet apart if alternate rows are to be planted to corn and beans, or three and one-half feet apart if two rows of corn are to be used to one of beans. In the event of planting corn and beans in every row
we believe these rows should be four to four and one-half feet apart. This laying off is done with an ordinary Georgia stock with scooter point, and, even where planters are used, this will be found satisfactory. When beans are dropped by hand in the furrows they are usually covered with cultivators as the corn is worked or covered, as the case may be; when planters are used the beans are covered by plows attached to the planters. When seed are fresh they nearly always come up to a good stand; under no circumstances, however, would we use seed more than a year old, as germination in such seed will be practically nothing.

Good stands of velvet beans are much more easily had than of soy beans or cowpeas, as they send up a strong plant that can push through almost any crust, which cannot be said of the other two crops.

Cultivation may be done with any ordinary cultivator, sweep, or harrow, and does not differ in any particular from that given cotton or corn, with the exception that harrowing with smoothing harrows after the plants are up, as is so often done with corn, is not recommended, never having been tried here with beans.

CONCLUSION.

After fifteen years' experience on the cut-over lands of South Mississippi—and these lands are representative of millions of acres of land in other Southern States—the writer believes that cattle and hogs with corn and velvet beans will come nearer solving the problem of profitable agriculture for the section as a whole than all other things combined. From this statement it is not intended, however, that inference shall be made that there is not great value in many other crops for field cultivation or for pasture.

As a matter of fact a great many other crops that grow well on such soils, such as oats, peas, soy beans, peanuts, sorghum, lespedeza, and some of the clovers will greatly add to the possibilities of the two major crops, but with the exception of lespedeza for meadows and pasture, we believe the acreage devoted to corn and beans should generally equal that of all the others combined under average conditions. With corn and beans to furnish concentrates and some roughage, lespedeza for hay, and other crops mentioned as supplementary thereto, there is no reason why the small two-horse farmer, who now and always will do the most of the actual work of developing these lands, may not so increase his income as to be able to live in a way that others, seeing his good work, may be willing to do likewise, and in the end develop at least a part of the millions of acres of our idle lands.