MISSISSIPPI

Agricultural and Mechanical College

EXPERIMENT STATION.

BULLETIN NO. 40.

THE COW PEA.

S. M. TRACY AND E. R. LLOYD.

AGRICULTURAL COLLEGE, MISS.

DECEMBER, 1896.

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The Cow Pea.

The COW PEA, like corn, wheat, and many other standard crops, is a plant of which we cannot be certain concerning its origin and early history. It is doubtless of Asiatic origin, though the original wild type has never been identified. DeCandolle, in his "Origin of Cultivated Plants," states that it has been in cultivation at least three thousand years, and many varieties were in cultivation in England in 1776. We have no record of its introduction into the United States, but as it was quite common at the beginning of the present century, it was probably brought here from England by some of the earliest settlers of the country. Like corn, it varies greatly with different soils and climates, and our present cultivated varieties are so different from each other, and from any known wild forms, that it is impossible to state with certainty what are its botanical relationships, or, indeed, whether all our varieties belong to one or more species. A number of technical names have been given to our cultivated varieties indiscriminately, of which the one accepted by the United States Department of Agriculture, *Vigna sinensis*, is probably the best. Whether all our cultivated varieties have sprung from a single source, or have resulted from the crossing and hybridizing of four our five distinct species matters but little to the cultivator.
who desires simply a plant which will make good hay or pasture, and at the same time will soften, fertilize, and improve his soil, and what we have to say here concerning varieties applies only to the forms which are now found on the plantations without regard to their far-away origin.

**PLANTING.**

Whether peas should be sowed broadcast or in drills, should be decided by the object for which the crop is to be grown, the time when it is sowed, and the relative prices of seed and labor. In growing the crop for hay we have found the following method the most satisfactory. The ground is plowed broadcast, and harrowed immediately before the seed is sowed. We use an ordinary corn planter for sowing, putting the drills from two and a half to three feet apart, the greater distance being given on the richer soil. The sowing is done on a level, without any ridging, as is the more rational method on all well-drained soils, both for protecting the crop from injury in time of drouth, and to leave the ground smooth for the mowing machine. The crop is cultivated twice or three times with a five-toothed cultivator which runs very shallow, but breaks the crust between the rows so as to keep the plants in a thrifty and growing condition. No hoeing is required, as the crabgrass which grows in the drills is so soon shaded by the growing vines as to be entirely harmless, and the little which grows adds so much to the yield of hay. Drilling has the advantage of requiring very much less seed, it affords an opportunity to secure an increased growth by cultivation, and makes the crop much easier to cut for hay. Our experience has been that the increase in yield, of both seed and hay, has more than compensated for the additional expense in drilling and cultivating the crop.

When sown broadcast less labor is needed in the work, and the crop requires no further attention in the way of cultivation. The vines soon cover and shade the ground, and the crop costs absolutely nothing except for the seed, sowing, and the use of the land. More seed is required than when sowed in drills, the growth of the plants is less vigorous, and the crop is not as easily cut if wanted for hay. When seed is cheap and labor is scarce broadcasting is the more common plan, especially when
the seeding can be done early in the season. The cost of the seed for broadcasting is several times more than for drilling, from one to two bushels per acre being used, the smaller amount for the running varieties when planted early, and the larger amount for the more erect varieties when planted late. When planted in drills from six to sixteen quarts will seed an acre.

**VARIETIES FOR SPECIAL PURPOSES.**

The selection of the variety for planting should be determined by the use for which the crop is designed. If a heavy yield of hay is the principal object, the more vigorous and late maturing upright varieties, such as Clay, Unknown, and Whipporwill, should be used. Of these the Unknown is certainly one of the best, but if to be cut for hay should not be planted too early, as it finally becomes so trailing as to be difficult to cut with a machine, and it produces less seed when it has too long a season for growth.

If the crop is to be pastured, or is to be left to decay through the winter on the surface of the ground, trailing varieties should be used; the Unknown, Black, and Red Ripper being among the best. For this purpose they should be planted as early as possible.

For stock peas, Black, Clay, Speckled Crowder, and Unknown have given us the heaviest yields; but if peas are wanted for table use, the Large and Small Lady, Sugar,and Blackeye, will be among the best.

One of the common methods of growing peavines is to plant them between the rows of corn at the time of giving the last cultivation. In this way a crop is secured which costs absolutely nothing except for the seed and sowing, and which may be relied upon for a considerable amount of seed and grazing, and at the same time will make a cheap and effective fertilizer for the succeeding crop. In some cases the peas and corn have been planted at the same time, in alternate hills, but we have rarely found the practice economical. If running varieties are used they tie cornstalks together so as to materially reduce the yield of the grain, while if dwarf varieties are used they are so shaded by the corn as to make but little growth. When planted between the rows in June or July
they begin their most rapid growth after the corn begins to ripen, and the corn crop is gathered before the vines are large enough to be troublesome. When a crop of peas is grown in this way it cannot well be cut for hay, but will usually make a good yield of seed, and will afford a large amount of most excellent grazing for either cattle or hogs. For such late grazing the Black and the Red Ripper are among the best varieties, as the peas will lie on the ground a long time without injury.

**FERTILIZING.**

Although cow peas are grown principally for their fertilizing effect on the soil, and are among the best of nitrogen collectors, there is no crop which will respond more quickly to an application of fertilizer, and no crop on which it pays better to use fertilizers. The special value of the cow pea as a fertilizer is its power to assimilate nitrogen, the most expensive element of fertility, from the air. An increased growth of vines means a corresponding increase in the storing of nitrogen, as well as an increased crop for harvesting, and an increased amount of vegetable matter left in the soil, which are worth far more than the cost of the fertilizer necessary to produce the increase. When the vines are plowed under, or are left to decay on the surface of the ground, nearly or quite all of the fertilizing material consumed in their growth is left in the soil in the best possible condition for succeeding crops, and any trifling loss of phosphoric acid and potash which may occur through leaching will be more than balanced by the greater availability of that which was already in the soil. The fertilizer applied to the pea crop is not lost, but remains in the soil ready for the succeeding crop. The growth of a crop of peavines is a very sure indication of what may be expected from the succeeding crop, and any fertilizer which will increase the growth and vigor of the peavines will be still more effective in forwarding the growth of whatever may follow them, as the vines leave the soil in a much better condition than when they were planted.

The best fertilizer to apply depends on the character of the soil where the crop is to be grown. Vegetable matter is as essential to the growth of peas as to any other crop, and they will not make a satisfactory growth
on soil which is too hard and barren to make a fair growth of lespedeza. On such soils no fertilizer is so effective as stable manure, and when that cannot be had cotton seed is the best substitute. Whichever may be used should be plowed under before the peas are planted, so as to loosen and lighten the heavy soil as much as possible. On very light soils cottonseed meal is better than the seed, and should be used as a top dressing at the rate of 150 or 200 pounds per acre at about the same time when the peas make their second pair of leaves. On soils which contain even a moderate amount of vegetable matter manuring before planting is not essential, but a light top dressing of meal applied when the nourishment in the seed has been exhausted and before the plants are large enough to assimilate nitrogen from the air will always pay. On soils which are in "good condition" we have found it profitable to fertilize highly, though small applications of acid phosphate, 100 to 150 pounds per acre, have usually given a heavier crop of seed than has been secured without. Potash has rarely been profitable.

**DISPOSITION OF THE CROP.**

Whether peavines should be used for making hay, for pasture, or for plowing under as green manure, must depend upon the condition of the field in which they are grown. If the field is in fairly good condition it will usually be more profitable to make hay of them than to use them in any other way. The roots, and the leaves which drop from the vines, will, on all soils which are in good condition, be sufficient to still further improve their condition, and will furnish a sufficient supply of nitrogenous matter for the succeeding crop. Such a soil will yield at least two tons of hay per acre, and at the same time its supply of plant food available for succeeding crops will be greatly increased, so that the plowing under of the whole vines will be at a loss. In the weighings which we have made we have found the weight of the roots in the upper foot of the soil to be from one-fourth to one-third the weight of the vines. It is impossible to give the exact weight of the leaves which drop from the vines during growth, or of the stems and other parts of the plants which are left on the ground in making hay, but as the leaves are richer in nitrogen than is any other part of the
plant excepting the seed, they certainly add very largely to the fertilizing value of the crop.

The Louisiana Station (Bulletin 40) found the weight of the roots to be about one-third that of the vines, the proportion being about one-fifth in the running varieties, while some of the bunch varieties showed equal weights of roots and vines. Similar weighings have been made at other stations, with similar variations.

Chemical analyses show the roots to contain a smaller percentage of phosphoric acid and nitrogen and a larger percentage of potash than is found in the vines. In the work done at this station we have found the composition of vines and roots to be as follows:

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Vines</td>
<td>0.55</td>
<td>0.75</td>
<td>2.32</td>
</tr>
<tr>
<td>Roots</td>
<td>0.44</td>
<td>1.01</td>
<td>1.59</td>
</tr>
</tbody>
</table>

By these analyses, when a crop of two tons of hay is removed from an acre of land there is left 5.87 pounds of phosphoric acid, 13.47 pounds of potash and 21.31 pounds of nitrogen in the roots alone. As these analyses of the roots include the roots only, and not the leaves and other parts of the vines always left on the ground in making hay, the amounts of all the elements, especially of the nitrogen, which are left as fertilizing material are much too small.

Including the roots, the leaves which are dropped during growth, and the various losses which occur in harvesting, it is certainly safe to estimate the weight of the material usually left in the field as being not less than one-third the amount carried away, and in many cases the amount of vegetable matter left to decay in and on the soil is fully equal to that carried away as hay. Such an amount of green manure is ample for any soil which will produce two tons of dry hay per acre.

On poorer soils, where the yield of vines is light, it is often better to use the entire crop as a fertilizer, but the manner in which it should be used should be determined by the physical condition of the soil. If the soil is a heavy clay which needs to be made lighter and looser we have found it better to plow the vines under while green as they are then more effective in their aerating and mellowing action. If the vines are so heavy as to tangle and
make plowing difficult they should be grazed a few days previous to the plowing, but no longer than is necessary to enable the plow to cover what remains. One of the main objects of the work is to incorporate the green vegetable matter with the soil for its mechanical effect, and the plowing should be made to bury as much bulk of vines as is possible.

If the soil is sandy, and already too light, green vines should never be plowed under, but should be grazed or left to decay on the surface. When the vines are grazed the tramping of the stock improves the condition of the light soil, and the droppings of the animals will contain very nearly the same fertilizing elements originally in the peavines, so very little is carried from the field. Such a field should be grazed if possible, but if it cannot be pastured, the vines should be allowed to decay on the surface of the ground so as to protect the field from washing during the winter. When the vines are plowed under while fresh we have found it better to do the work not later than October, and then to sow oats for covering the ground during winter. If grazed, or plowed under early in the spring, the oat crop removes nothing permanently from the soil, and all the fertility made available by the pea crop will again be available after the decay of the oats.

The cow pea is one of the few crops which will yield an abundant crop of valuable hay and at the same time leave the soil on which it grew in an improved chemical and mechanical condition for a succeeding crop. It is the best "catch crop" which can be grown for hay, and is, by far, the best crop which can be grown on land from which wheat, oats, or other early crops have been harvested. In cultivating for hay it is important to select varieties which will be in a condition for cutting early in October, as that gives the whole of the growing season for the production of a heavy crop and brings the harvesting in the month when there is the least rain. If the crop is to have a long season for its growth, we prefer late ripening sorts, like the Black, Speckled Crowder, or Unknown; while if the planting is done late in the season we have secured better results by the use of early varieties like the Red Crowder or the Whippoorwill. The value of the hay increases very rapidly as the crop approaches maturity, while if allowed to become over ripe many of the leaves
drop and are lost, more or less of the seed will be shattered out and lost, and the hay secured is more hard and woody then when cut at the proper season. The best stage for cutting peavines for hay is when the first pods begin to ripen. When cut at that stage the vines cure much more easily and rapidly than when cut earlier, the total yield is at its heaviest, and, though the hay may not be quite so tender as when cut earlier, it will be eaten well and will have added much to its nutritive value.

Although the hay is regarded as somewhat difficult to cure, it is not so when cut at the proper stage of maturity and handled with care. We have saved five successive crops without the loss of a pound from mould or heating in the field or in the barn, by the following method. The mower is started in the morning as soon as the dew is off, and run until noon, or until as much has been cut as can be handled in the afternoon. As soon as the top of the cut vines is well wilted the field is run over with a tedder to turn the vines over and expose them more thoroughly to the air and run. When the crop is very heavy the tedder is used a second time, though this is seldom necessary. Vines which have been cut in the morning and teddered in the afternoon are usually dry enough to put into small cocks the next afternoon, and if the weather promises to be favorable they are left to remain in the cocks two or three days before they are hauled to the barn. If it should rain before the vines are put in cocks they are not touched until the surface is well dried off, and then teddered as though freshly cut. Those which are in cocks are not opened until well dried on the outside, and are then handled as little as is possible to secure a thorough airing. A light rain does very little damage to the hay, even after the curing has begun, if handled promptly and properly, and a heavy rain for a day or two may fall on freshly cut vines and do little or no damage. The essential point in making the hay is to do the work as rapidly as possible, and to avoid any handling of the vines when wet with either dew or rain. We find that it pays well to use a tedder for stirring up the freshly cut vines so as to admit sun and air freely, though if a tedder cannot be had the work can be done nearly as well, though more slowly, by using a fork.

It is not safe to bale the vines direct from the field. Of course that is the most convenient plan, but, as in many other cases, the quickest way is not the best. Al-
It is not safe to bale the vines direct from the field. Of course that is the most convenient plan, but, as in many other cases, the quickest way is not the best. Although the field cured hay may appear and feel perfectly dry, it still contains a considerable amount of moisture, and if packed closely at once, it is sure to undergo a heating and fermentation, the escape of the heat and moisture is prevented, and decay is the result. We find the only safe plan is to put the hay, for a few week, into a stack covered with straw, or still better into a barn where it should not be piled too deep. After a month it may be packed without danger of finding mouldy or dusty hay in the centers of the bales.

The quality of peavine hay compares favorably with that from red clover or any other leguminous plant, and is even richer in protein than are many of the common grain feeds. Jenkins and Wilton (Experiment Station Bulletin No. 11) give the averages of a large number of analyses as follows:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Protein</th>
<th>Carbohydrates</th>
<th>Fat</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowpea</td>
<td>16.6</td>
<td>47.7</td>
<td>2.4</td>
</tr>
<tr>
<td>Red Clover</td>
<td>12.3</td>
<td>38.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Timothy</td>
<td>5.9</td>
<td>45.0</td>
<td>2.5</td>
</tr>
<tr>
<td>Corn</td>
<td>10.3</td>
<td>70.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Oats</td>
<td>11.8</td>
<td>59.7</td>
<td>5.0</td>
</tr>
<tr>
<td>Wheat Bran</td>
<td>15.4</td>
<td>53.9</td>
<td>4.0</td>
</tr>
</tbody>
</table>

The approximate feeding values of these materials per ton, as calculated by the Connecticut Experiment Station, are as follows:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowpeas</td>
<td>$12.60</td>
</tr>
<tr>
<td>Red Clover</td>
<td>11.20</td>
</tr>
<tr>
<td>Timothy</td>
<td>10.48</td>
</tr>
<tr>
<td>Corn</td>
<td>17.72</td>
</tr>
<tr>
<td>Oats</td>
<td>16.72</td>
</tr>
<tr>
<td>Wheat Bran</td>
<td>13.76</td>
</tr>
</tbody>
</table>

These figures make the values of the different crops, per acre, as follows:

<table>
<thead>
<tr>
<th>Plant</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cowpeas, two tons</td>
<td>$25.20</td>
</tr>
<tr>
<td>Red Clover, two tons</td>
<td>22.40</td>
</tr>
<tr>
<td>Timothy, two tons</td>
<td>20.96</td>
</tr>
<tr>
<td>Corn, fifty bushels</td>
<td>24.80</td>
</tr>
<tr>
<td>Oats, forty bushels</td>
<td>10.71</td>
</tr>
</tbody>
</table>
Of course the cash valuations given above are only approximations, as they are based on the average market prices for the different feeds during a series of years, while the actual farm values will vary with the yields in different seasons, and with the local market.

SAVING SEED.

When the peavines are grown in the cornfield, or allowed to become over ripe before they are grazed, or the vines are to be left to decay on the ground it is usually more profitable to gather the seed than to leave it for its fertilizing effect. The yield is extremely variable, being sometimes almost nothing, while in other cases as much as forty bushels per acre have been secured. As ordinarily grown and gathered the yield probably does not average more than twenty bushels per acre. As the pods do not split open until long after they are matured, picking may be delayed until nearly all of the crop is ripe. After they are gathered the pods should be sunned until thoroughly dried, after which they may be stored in a dry place until wanted for planting, or may be threshed at once. Many prefer the former plan, as, when left in the pods the seed suffer less from weevils than when threshed and exposed. When kept in the pods they are bulky, and the pods do not afford a sure protection from insects, so we prefer to thresh as soon as the pods are well dried. We have never found any machine for threshing them which has been satisfactory, and so have been obliged to beat them out with flails. The man who will place on the market a cheap and effective pea thresher will not only have the thanks of every southern farmer, but will find that he has made an extremely profitable investment. After threshing, the peas are put in barrels, about two ounces of bisulphide of carbon is poured into each barrel, and the top covered with old sacks. This treatment will ordinarily be all that is necessary to prevent attacks from weevils or other insects, though when we have kept peas for very late planting we have sometimes found a second application of the bisulphide was needed in the spring. This treatment does not injure the peas, either for planting or for eating.
CLASSIFICATION OF VARITIES.

Of the so-called varities of cow peas there are an almost infinite number, though, as with corn and cotton, there are very few really distinct and permanent types. This Station has had more than fifty named sorts in cultivation; in 1895 the Louisiana Station cultivated sixty-three varieties; in 1895 the Georgia Station tested forty-seven varieties; while the Arkansas, Texas and other Southern Stations have also tested a very large number of sorts. In all these long lists of varieties there are very few forms described which can not be easily referred to some one of four or five types. In color of seed we have white, black, red, and cream colored, plain, and in almost every possible combination of colors. The flowers vary from white to yellow and purple, and the color of the flower gives no indication of the color of the seed. The seeds vary in shape from nearly spherical to kidney shaped, and in size some are fully three times as large as others.

No cultivated plant varies more quickly than does the cow pea, and with a little care in selection, a large number of forms may be produced within a very short time. In 1894 one plant was noticed in a field of the common "Clay" pea which produced dark colored seeds with a light eye. A few seeds from this were planted in 1895, when the product from this single plant showed colors ranging from light cream to dull red and black, though all the plants had the same general habit of growth. If the color of the seed only were to be considered, we had almost as many varieties as plants. While this was an extreme case, still few planters have failed to notice the great differences in the color of the seed as well as in the growth of the plants in different parts of the field, when any of the well marked varieties have been planted on different soils, or at different seasons. There are several varieties which, if planted in April, will grow through the whole season, making long and trailing vines which produce very little seed, while if the planting is not done until July will make a strong, erect growth and abundant crop of seed. Similar changes are brought about by change of latitude, and the time required for maturing a crop of cow peas varies almost as much as that required
for a crop of corn. Varieties which have been grown in the extreme South for many generations tend to ripen later, and to make a heavier growth of vines, while if gradually removed to more northern latitudes and shorter seasons they become acclimated, grow to only a moderate size, and mature more quickly.

In every locality where the cow pea is grown there are varieties which are well known under certain names, but many of these names are entirely unknown in other localities. A few names, like “Unknown,” “Whippoorwill,” and “Red Ripper” are known everywhere, while others like “Smith,” “Colvin,” and “Williams Hybrid” are unknown outside the localities where they originated, and in most cases are simply new names given to some of the older sorts. In some cases single varieties have received two or more names, and among those which have been cultivated here under different names, but which appear to be the same are “Speckeled” and “Whippoorwill,” “Quadroon,” “Wonderful,” and “Unknown,” “Gourd,” “Matthews,” and “Polecot,” “Everlasting,” and “Red Ripper,” “Small Red” and “Tory,” “Everlasting” and “Torg,” “Mush” and “Rice.”

Confusion in names has also been increased by the application of the same name to varieties which are quite distinct, as is the case with the names “Everlasting,” “Green,” “Red Ripper,” and others. The name “Crowder” is applied to almost any variety having a rather short and closely filled pod.

With plants which vary so readily with every change in their surroundings it is useless to give lengthy descriptions of all the many named forms, but they may be grouped conveniently as follows, very much as is done by Dr. Redding in Bulletin No. 26, of the Georgia Station:

1. **Form of Pea.**

   (a) Spherical. Most varieties having spherical seeds are what are termed “Crowders,” *i.e.* the seeds are packed very closely in the rather short pods. The common varieties in this group are Green, Purple Hull, Red Crowder, Small Lady, Speckeled Crowder, Sugar, White Crowder, and Williams.

   (b) Kidney Shaped. This group includes all varieties except those which are grouped as “Spherical.”
THE COW PEA.

2. COLOR OF PEAS.


(b) Buff or Cream. Clay, Everlasting, Green, Unknown.


(d) Mottled and Speckeled. Black and White, Calico, Chocolate, Coffee, Gourd, Granite, Indian, King, Lilac Redpod, Matthews, New Era, Redpod, Saddleback, Speckeled Crowder, White and Brown, Williams.

(e) Black. Black, Constitution, Congo, Shinny.

3. SIZE OF PEAS.


(b) Medium. Black, Blackeye, Browneye, Chocolate, Clay, Conch, Green, Large Lady, New Era, Pea of Backwoods, Pony, Purplehull Crowder, Quadroon, Red, Red Crowder, Redeye, Redpod, Shinny. Taylor, Unknown, White and Brown, White Brownhull, Whhippoorwill, Williams, Wonderful.


4. HABIT OF GROWTH.

Any grouping of varieties which is based on habit of growth must be almost wholly arbitrary, as the whole character of growth and fruiting may be entirely changed by early or late planting, and by planting on different soils. In the list given below we have endeavored to group the varieties as we have found them when planted in May and June, on upland soil of medium fertility.

(a) Trailing. Black, Black and White, Coffee, Conch, Everlasting, Large Red, Large White, Redeye, Tory, Williams.


When planted early, and on rich soil, nearly all of the varieties grouped as "Erect," assume, late in the season, more or less of a trailing habit, and so might be included in group (b), but when planted late, or on thin soil, they remain bushy and erect.

5. TIME OF MATURITY.

(a) Early. Black and White, Bluehull, Browneye, Chocolate, Coffee, Congo, Granite, Green, King, Large White, New Era, Red Crowder, Redeeye, Red Yellowpod, Rice, Saddlebach, Whippoorwill.

(b) Medium. Blackeye, Clay, Coffee, Green, Indian, Large Lady, Lilac, Redpod, Pony, Rice. Small Lady, White, White and Brown, White Brownhull.


Although we have made a great number of tests of varieties, the work extending through eight years, the results have been so variable and have been so plainly influenced by differences in soil and time of planting that it would be useless to give the details in full, and so summarize as above.