THE COWPEA AND SOY BEAN IN ILLINOIS.

By Dwight S. Dalbey, Assistant in Agronomy.

Many farmers in Illinois, especially in the central and northern sections of the state are not familiar with the cowpea and soy bean. In some parts of southern Illinois, cowpeas are grown extensively, and where the value of this crop is known it constitutes one of the chief forage crops. Soy beans are of more recent introduction, and this crop is not so well known as cowpeas. In some cases farmers have given one or both of these crops a trial but, through the use of varieties not adapted to their climate, unsatisfactory results have been obtained, and consequently they have pronounced these plants unsuited to Illinois conditions. Others have been more successful in their growth, and find them worthy of a prominent place in the rotation. As a matter of fact, both crops have been grown in this state long enough and to such an extent that they have passed beyond the purely experimental stage, and in places they are already considered as important factors in Illinois agriculture.
PLATE I.

COWPEA PLANT
2 1/2 mo. old.
The cowpea is a native of south-eastern China, and the soy bean of Japan. Being semitropical in origin, both plants are naturally best suited to a warm climate, and the introduction and cultivation of the cowpea in America has been largely limited to the south, although in recent years certain varieties have become so acclimated as to mature in the latitude of Michigan, Wisconsin, and Minnesota. The soy bean has been grown farther north since its introduction, consequently there is no question as to the adaptability of both crops to the soil and climate of Illinois. However, there are varieties grown in the south which are not suitable for this state, and will not mature if planted here. One of the first essentials in the successful culture of these crops, therefore, is the selection of varieties adapted to the conditions of climate and soil.

Varieties.

There are over seventy varieties of cowpeas, differing greatly in character of growth, development of vine, yield of seed, and length of time required for maturity. The so-called bunch varieties grow upright, while others under the same conditions are running varieties, sending out trailers or running vines sometimes fifteen to twenty feet long. Often the same varieties vary greatly in their character of growth upon different soils. For instance, the Whippoorwill grows an upright, starchy plant upon poor thin soil, while upon rich black soil, it makes a very rank growing trailer. The varieties more commonly grown in Illinois are Warren’s Extra Early, New Era, Whippoorwill, Early Black Eye, Black, Red Ripper, and Warren’s New Hybrid. Probably the most commonly grown variety is the Whippoorwill, which is not a prolific seed producer, but has a tendency to a very rank growth especially on the rich soils of central Illinois, although on the light clay soils farther south it grows starchy. The best variety to plant depends upon the purpose for which the crop is grown. Where the crop is to be turned under as a green manure a rank growing running variety, as the Whippoorwill, can be used; but where the crop is grown for seed or hay, a more dwarf-like seed producing variety is preferable.

Variety Tests for Yield.

In the season of 1902, twenty-two varieties of cowpeas were planted under the same conditions with the object of comparing the
yields of seed. The following were the yields per acre of the varieties tested:

<table>
<thead>
<tr>
<th>Name of Variety</th>
<th>Yield—Bu. per Acre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Warren’s Extra Early</td>
<td>38.7</td>
</tr>
<tr>
<td>Warren’s New Hybrid</td>
<td>38.3</td>
</tr>
<tr>
<td>Old Man’s</td>
<td>33.5</td>
</tr>
<tr>
<td>New Era</td>
<td>31.7</td>
</tr>
<tr>
<td>Red</td>
<td>24.2</td>
</tr>
<tr>
<td>Iron</td>
<td>23.0</td>
</tr>
<tr>
<td>Early Black Eye</td>
<td>22.3</td>
</tr>
<tr>
<td>Gray Goose</td>
<td>21.7</td>
</tr>
<tr>
<td>California Black Eye</td>
<td>18.7</td>
</tr>
<tr>
<td>Whippoorwill</td>
<td>15.6</td>
</tr>
<tr>
<td>Black</td>
<td>15.0</td>
</tr>
<tr>
<td>Southdown</td>
<td>13.2</td>
</tr>
<tr>
<td>Large Blackeye</td>
<td>12.0</td>
</tr>
<tr>
<td>Couch</td>
<td>10.0</td>
</tr>
<tr>
<td>Indian</td>
<td>10.0</td>
</tr>
<tr>
<td>Red Ripper</td>
<td>8.1</td>
</tr>
<tr>
<td>Holly Brook</td>
<td>8.0</td>
</tr>
<tr>
<td>Wonderful</td>
<td>6.0</td>
</tr>
<tr>
<td>Lady</td>
<td>5.0</td>
</tr>
<tr>
<td>Clay</td>
<td>Not mature</td>
</tr>
<tr>
<td>Taylor</td>
<td>Not mature</td>
</tr>
</tbody>
</table>

All of these varieties were planted June 14th in drills three feet apart and all had equal conditions of soil, moisture, and cultivation, so that the differences shown are due to the variety planted. The late planting, together with an early frost, prevented some of the later varieties from maturing. Another variety, Northern Prolific, was planted upon the same kind of soil two weeks earlier and yielded at the rate of 40 bushels to the acre.

This test revealed the fact that for seasons like 1902, at least, there are several varieties of cowpeas, which in the matter of yield of seed, are far superior to the Whippoorwill, which is probably more commonly grown than other varieties in this state. When a tendency to seed production was noticed a more dwarfed growth was evidenced and vice versa. The Warren’s Extra Early, Warren’s New Hybrid, Old Man’s, Northern Prolific, and New Era varieties possessed the bunch habit of growth and yielded the greatest
amount of seed. These varieties are early maturing, easy to cure for hay and on rich soil are among the best varieties for these purposes. The Whipporwill, Red Ripper, Clay, and other late varieties grew more to vine, yielded less seed, matured later, and were more difficult to handle and cure for hay on account of their very heavy growth of vine and leaf.

PLATE III—Row of Old Man's Cowpeas, showing peculiar dwarfed, bunchy growth and prolific seed production. The row to the left is the Clay and on the right the Taylor, two very rank growing, late maturing varieties. These rows were planted 36 inches apart, and the plants thinned to 12 inches apart in rows.

VARIETY TESTS OF SOY BEANS.

The soy bean has not been grown in this country long enough for the development of very many different varieties. From information furnished by the United States Consular Service, it seems that there are but few varieties of soy beans grown in Japan, its native country. Last year a test of several varieties to compare the yields was made with the following results:
Name of Varieties.                                      Yield—bu. per Acre

Medium Green                                      41.7
Early White                                        38.2
Ito San                                            37.8
Medium Yellow                                     35.6
Early Yellow Dwarf                                 32.3
Early Black                                        27.8
Late Mammoth                                       Not mature
Brown from Japan                                   Not mature

The relative time of maturity of different varieties of soy beans is indicated by their names. The Early Yellow Dwarf is a large seeded yellow variety, while the Medium Yellow has smaller seeds and is later maturing. The Black variety is a large black seeded early variety but is not a very prolific yielder. The Medium Green is very prolific in seed production and a valuable variety for hay since it usually retains its leaves better than most other varieties. The Early White and Early Yellow are excellent for seed or for “hogging off,” but they drop their leaves readily. The Late Mammoth is good to use for hay or ensilage, but does not ordinarily mature seed in this state. As a general rule, it may be said that soy beans are better adapted to the north than cowpeas, since they are not so sensitive to frost.

Plants.

The preparation of the seed bed for cowpeas and soy beans is the same as for corn and in fact the entire culture of these crops is similar to that ordinarily given corn. Cowpeas and soy beans require a warm seed bed for perfect germination, as the seed of both plants is liable to rot if planted in cold or wet soil, consequently, the time of planting should be delayed until the soil is well warmed. Immediately after corn planting is a very good time for planting these crops.

Early planting of cowpeas promotes a luxuriant growth of vine, with consequent increased tendency for the vines to run and tangle, often resulting in a decreased yield of seed. On the other hand, rather late planting tends to promote seed production and reduce the growth of vine. For the latitude of central Illinois, May 15th is early enough to plant either cowpeas or soy beans and the earlier varieties will frequently mature if planted as a catch crop after the oats are taken off in July.

Two general methods of planting are practiced, broadcasting and drilling. In some respects the latter method is preferable since the crop can then be cultivated and a considerable saving of seed is
Plate IV  Plat of medium green soy beans, planted June 14th.  View taken Sept. 1st.
made, which is quite an item of expense in raising these crops. Where cowpeas or soy beans are sown broadcast, a seeding not less than 1 1/2 bushels per acre is required, while if drilled in rows 32 inches apart a good stand can be secured with 1/3 bushel per acre. On the other hand, the hay made from cultivated cowpeas or soy beans is liable to become much coarser than when the crops are grown broadcast on well smoothed land.

The proper thickness of planting cowpeas and soy beans varies with soil and the purpose for which the crops are grown. On poor soils a thicker seeding should be made than on rich soils, and, if the crop is grown for hay, thicker planting should be practiced than when seed is the object sought. Cowpeas and soy beans are great lovers of sunlight, and, if crowded so that the plants shade one another, a corresponding reduction in the development of plant and yield of seed is the result. The Arkansas Experiment Station found that on the same soil one peck of cowpea seed per acre produced a higher yield of seed than either two, three, four, or six pecks per acre.

In the season of 1902, Mr. Fred W. Ladage of Sangamon county co-operated with the writer in some experiments with methods of planting cowpeas. In his test the New Era variety was used and the seed was drilled in rows 3 feet apart, with the distance apart in row varying from 3 to 9 inches.

Plat 1—3 inches apart in row, 27.5 bushels per acre.

" 2-6 " " " " 32.5 " " "

" 3-9 " " " " 42.5 " " "

The results of this experiment show that the maximum yield was produced with the peas 9 inches apart in the row.

Mr. Charles A. Rowe of Morgan county uses a sugar beet drill set to plant the rows 20 inches apart, and then cultivates with the two-row sugar beet cultivator. Mr. Rowe has the Early Yellow Dwarf variety which stands crowding better than the larger growing varieties.

Mr. H. B. Rice of Fulton county uses an ordinary 42-inch drill corn planter, straddling the rows, making them 21 inches apart. Mr. Rice's yield was 28 bushels per acre. He recommends a distance of 24 inches between rows.

Dr. Robert C. Morris is a pioneer and very successful grower of soy beans in Richland county. He uses the New Superior disc
grain drill arranged so as to plant the rows 32 inches apart, and
cultivates with the ordinary corn cultivator.

Many different implements are used for planting, but from
observation the best instrument with which to plant cowpeas or soy
beans is a grain drill with feed governed by a revolving plate with
a wing or bar on one side which does not crack the seed as an
ordinary force feed does. The hoes or discs are usually 8 inches
apart and the distance between rows can be easily regulated by
stopping up part of the flukes. For instance, if a distance of 32
inches is desired, stop up all flukes except the first, fifth and ninth,
thus planting three rows at a time. From experience and observa-
tion a distance of about 32 inches apart between rows on most soils
seems preferable for drilling both cowpeas and soy beans, as they
are easier to cultivate at that distance. In the rows there should be
from 2 to 4 plants per foot and, in this manner, about \( \frac{1}{2} \) bushel of
seed per acre is required, varying, of course, with the size of the
seed. If it is desired not to cultivate the crop, probably 16 inches
apart is the best distance, and from \( \frac{1}{2} \) to \( \frac{3}{2} \) bushel per acre should
then be planted.

Soy beans and cowpeas are frequently used with corn or after
oats as fertilizer or catch crops. When sown in corn, they should
be either sown broadcast ahead of the last cultivation, or drilled with
a one-horse drill immediately following. When drilled in corn, one
or two rows should be planted in each space between corn rows.
When sown after oats, the soil should be disced and the seed
sown with a grain drill usually in rows 8 or 16 inches apart.

Cowpeas are frequently used as an orchard cover crop to good
advantage. Judge W. R. Wilkinson a prominent apple grower of
Jackson county drills in Red Ripper cowpeas between the rows of
apple trees, cultivating them throughout the season, and pasturing
off the crop with hogs in the fall.

**Cultivation.**

If soil conditions are right beans and peas will come up quickly
and the cultivation may begin early. When they first appear above
ground, the young plants are tender and break easily, so that care is
required in working among them. Neither the harrow nor weeder
should be used on the field at this time, though the weeder can be
very successfully used after the plants have formed several leaves
and the stems have become somewhat toughened. Cultivators of
various designs are used. The wheel tools, as beet cultivators, cultivating two or more rows at a time, are used to some extent. The ordinary six-shovel corn cultivator does very well, and the outside shovel on each side may be removed, when the beans or peas are planted closer than corn.

The culture required by these crops is similar to that of other inter-tilled crops. The cultivation should be frequent enough to keep the weeds from getting a start and prevent the formation of a crust upon the surface of the soil. After the plants are grown, they shade the soil enough to keep the weeds in check, so that, ordinarily, two or three cultivations suffice. Cultivation should not be given while the leaves are wet with dew or rain as the leaves are then broken off very readily and, furthermore, the soiling of the leaves seems to favor the development of disease.

Harvesting.

The proper stage of harvesting cowpeas and soy beans depends upon whether they are to be used for hay or seed. For hay soy beans should be cut when in bloom or very soon after, as, if allowed to mature some of the leaves, which are the most nutritious part of the plant, will be lost and the stems will then become coarse and unpalatable. Cowpeas should be mowed for hay when the peas are well formed and the pods are just beginning to turn yellow. At that stage the leaves are all on and the peas are not ripe enough to shatter.

Cowpeas or soy beans should be cured the same as clover for hay, although they are more sappy than clover and consequently require more time to cure out properly. When the Mammoth variety of soy beans is used for hay, they may be harvested and bound in bundles with a corn binder. Doctor Robert C. Morris of Richland county grows this variety, which attains a height of four feet, and harvests with his corn binder, shocking the bundles in the field like corn until cured, after which he shreds the soy bean bundles and his corn fodder together for feed.

In curing cowpea or soy bean hay, the hay tedder and side-delivery hay rake are useful tools to facilitate quick and uniform drying. The main point in curing the hay is to remove the extreme moisture from the plant and retain the leaves, and if allowed to wither and dry up in the sun a great many leaves are lost, and the nutritive value and palatability of the hay is decreased. A very
Successful method of curing the hay from these plants is to pile up the vines in small, well built cocks after the beans have begun to wither, and then allow the hay to cure out in the cock. Unless heavy rains intervene, the hay will come out much brighter than it will when made by any other method.

Where cowpeas or soy beans are left for seed they should be allowed to fully develop, but not to get so ripe that the seed shatters out in handling. It is best to cut them slightly green and then allow the seed to get perfectly dry before threshing. Formerly beans and peas were picked by hand, but now the work is done almost exclusively by machinery. The bean and pea harvester or cutter is a two wheeled machine, having two long steel blades so adjusted that as the machine passes down the rows they sweep along just at or below the surface and cut the bean stalks. The blades are set obliquely sloping backwards and towards each other, so that the two rows of beans which are cut at one time are moved toward each other and left in a single row. The beans or peas may be left in this windrow until threshing, or piled up in small bunches with a fork. After drying one day or more the bunches should be turned so that all will dry out thoroughly. If drying weather prevails, they will become fit for threshing or storing in barns without further turning, but, if the weather is unfavorable, the bunches must be frequently turned to prevent the beans in the pods resting on the ground from becoming damaged. Wet weather does not seriously injure the crop (especially the soy bean crop) provided the pods are not allowed to rest on the wet ground too long at a time. When thoroughly dry the vines are stored in barns or threshed immediately. The threshing is best done by specially constructed machines in which the first cylinders are reduced in speed, and the rest of the separator maintained at ordinary speed. Threshing is best done with a bean thresher, such as that made especially for the purpose by The Bidwell Thresher Company, of Batavia, New York, but a wheat separator may be used with all blank concaves and running as slowly as the machine will permit and not clog the shakers.

After threshing, care must be taken in storing the seed, particularly the soy bean, as it is so rich in oil that any external moisture sets up a fermentation which may produce heat enough to cause injury to its vitality. The seed should be thoroughly dry before threshing and may be stored in loose woven sacks or bulked in bins if tile or brick are used. The expense of growing, harvesting, and
threshing cowpeas or soy beans, according to the Kansas Experiment Station, is about 55 cents per bushel for an average crop.

FEEDING AND FERTILIZING VALUE.

Cowpeas and soy beans are valuable crops for improving the soil. Both are legumes, and like clover, alfalfa, vetches, and other members of this family, they bear tubercles upon their roots inhabited by bacteria, which take nitrogen from the air, not only for their own use, but for succeeding crops on the same soil. Cowpeas and soy beans grow fairly well upon some soils where clover cannot be depended upon to make a successful crop, and for some purposes they possess an advantage over clover as fertilizing crops in being quick growing annuals well adapted to short rotations.

Aside from their value as soil improvers, cowpeas and soy beans are very valuable for stock feed, especially in the corn belt of Illinois, since both the hay and seed of

PLATE V—Matured soy bean plant of early white variety. Planted May 18th and matured for “hogging off” August 21st.
these crops combine well with corn to make a balanced ration for feeding. The following table of feeds compiled from Henry's "Feeds and Feeding" shows the feeding value of cowpeas and soy beans compared with other common feeds in Illinois:

**Digestible Constituents of Cowpeas and Soy Beans in Comparison with Other Feeds.**

<table>
<thead>
<tr>
<th></th>
<th>Water per cent.</th>
<th>Ash per cent.</th>
<th>Protein per cent.</th>
<th>Carbohydrates per cent.</th>
<th>Fat per cent.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Soy bean seed</td>
<td>10.8</td>
<td>4.7</td>
<td>34.0</td>
<td>28.8</td>
<td>16.9</td>
</tr>
<tr>
<td>Cowpea seed</td>
<td>14.8</td>
<td>3.2</td>
<td>20.8</td>
<td>55.7</td>
<td>1.4</td>
</tr>
<tr>
<td>Indian corn grain</td>
<td>10.6</td>
<td>1.5</td>
<td>10.3</td>
<td>70.4</td>
<td>5.0</td>
</tr>
<tr>
<td>Linseed meal</td>
<td>10.1</td>
<td>5.8</td>
<td>33.2</td>
<td>38.4</td>
<td>3.0</td>
</tr>
<tr>
<td>Soy bean hay</td>
<td>11.3</td>
<td>7.2</td>
<td>15.4</td>
<td>38.6</td>
<td>5.2</td>
</tr>
<tr>
<td>Cowpea hay</td>
<td>10.7</td>
<td>7.5</td>
<td>16.6</td>
<td>42.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Clover hay</td>
<td>15.3</td>
<td>6.2</td>
<td>12.3</td>
<td>38.1</td>
<td>3.3</td>
</tr>
<tr>
<td>Alfalfa hay</td>
<td>8.4</td>
<td>7.4</td>
<td>14.3</td>
<td>42.7</td>
<td>2.2</td>
</tr>
<tr>
<td>Indian corn fodder</td>
<td>42.2</td>
<td>2.7</td>
<td>4.5</td>
<td>34.7</td>
<td>1.6</td>
</tr>
<tr>
<td>Soy bean ensilage</td>
<td>74.2</td>
<td>2.8</td>
<td>4.1</td>
<td>6.9</td>
<td>2.2</td>
</tr>
<tr>
<td>Cowpea ensilage</td>
<td>79.3</td>
<td>2.9</td>
<td>2.7</td>
<td>7.6</td>
<td>1.5</td>
</tr>
<tr>
<td>Indian corn ensilage</td>
<td>79.1</td>
<td>1.4</td>
<td>1.7</td>
<td>11.0</td>
<td>.8</td>
</tr>
<tr>
<td>Corn and soy bean ensilage</td>
<td>76.0</td>
<td>2.4</td>
<td>2.5</td>
<td>11.1</td>
<td>.8</td>
</tr>
</tbody>
</table>

This table shows the high feeding value of both the cowpea and the soy bean as either hay or grain. Compared with corn the soy bean grain is three times as rich in digestible ash, protein, and fat. It will be seen that soy bean grain is rich in the constituents that corn lacks, and *vice versa*, so that the two combine to make a balanced ration for stock. It will also be seen that the cowpea grain is much richer in protein (the muscle-making constituent) than corn. Cowpeas and soy beans make a very rich, nutritious hay that compares favorably with clover and alfalfa for roughness, and a very excellent feed is produced by mixing green cowpeas or green soy beans with corn for ensilage. The results of feeding tests by Experiment Stations and by farmers bear out the results of chemical analysis and show the high value of soy beans and cowpeas for feeding purposes.

**Conclusion.**

The value of the cowpea and soy bean crops to the Illinois farmer is established. To the grain farmer these crops enter into a rational rotation of crops to maintain fertility, and to the feeder they furnish a valuable supplementary feed to balance his corn ration,
so, all things considered, the cowpea and soy bean crops are certainly entitled to a place in the agriculture of Illinois.

Summary.

1. Cowpeas and soy beans are leguminous plants and compare favorably with clover as soil improvers, and for some purposes possess an advantage over clover, in their quick maturity. Both are annual plants and they can be used to good advantage as catch crops with corn, or after other crops when clover would be less practicable.

2. Cowpeas and soy beans produce large yields of both hay and grain, the former being equal in feeding value to clover hay and the latter practically equivalent to linseed meal and other concentrated feeds.

3. Experiments show that cowpeas and soy beans need plenty of room for their full development; frequently they are planted too close for maximum yields of seed. A seeding of about \( \frac{1}{2} \) bushel per acre drilled in rows about 32 inches apart seem best for the production of seed.

4. Failure to mature seed is commonly due to too close planting or to the use of too late varieties.

5. There are varieties of both cowpeas and soy beans which are well adapted to Illinois, and their success as a crop for this state is established.