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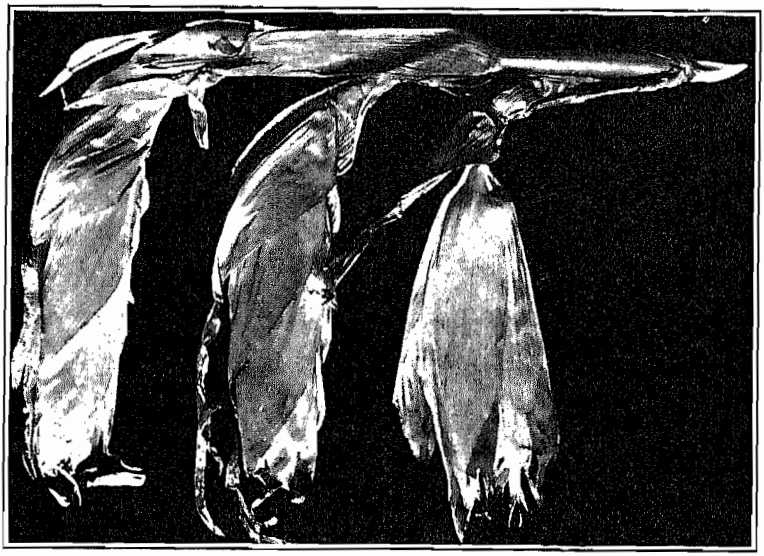

AN EXAMPLE OF PROLIFIC CORN

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INCREASING THE YIELD OF CORN

BY

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KNOXVILLE, TENNESSEE

A cooperative experiment between the Tennessee Experiment Station and the Bureau of Plant Industry, U. S. Department of Agriculture.

THE AGRICULTURAL EXPERIMENT STATION

OF THE UNIVERSITY OF TENNESSEE

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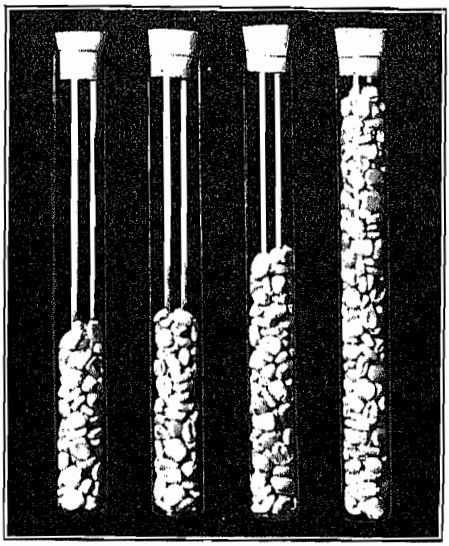
INCREASING THE YIELD OF CORN

INTRODUCTION



TUBES OF GRAIN

(1) Actual yield, (2) yield if every stalk had produced a small ear, (3) yield if every stalk had produced a good-sized ear, (4) yield if every stalk had produced two ears.

Corn is one of our most valuable crops. Cotton bears the palm as a money crop, but corn has furnished the brawn and muscle by which the cotton crop has been made. By reason therefore of the growing demand for cotton the improvement of corn and its increased production become matters of great concern to the South. While other cereals can be successfully and profitably cultivated, corn, because of its vigorous growth, hardihood, and adaptability to a wide variety of soils and climatic conditions, is preeminently our leading cereal crop. A growing urban population, accounted for by the development of manufacturing, will consume an increasing amount of corn, and the necessity of having a grain rich in carbohydrates to feed in conjunction with cotton-seed meal to the thousands of cattle annually raised calls for double the quantity of corn grown today. It is thus evident that corn bears a direct relation to the prosperity of the cotton farmer and that there is as urgent a need of increasing its production as that of any crop grown.

The question naturally arises, Can the yield of corn be profitably increased? The answer is, Yes. How can this very desirable change be brought about? First, by the adaptation of varieties to the soil types of the State. Few states have as great a diversity of soil and climatic conditions as Tennessee. There are three general types of soil which deserve special mention—those known as the light uplands; the second bottoms and medium uplands; and the first bottoms. Naturally, the light uplands are the poorest; some of these being extremely poor, as in the case of most of the land found on the Cumberland plateau. The second bottoms and medium uplands constitute the greater part of the soil cultivated in the State. These

lands are at least of average fertility and in many instances are rich, particularly so in the valleys of East Tennessee and in the great Central Basin of Middle Tennessee. The alluvial soils are found for the most part along creeks and rivers throughout the entire State. These creek and river bottom soils are sometimes very rich and sometimes poor, depending partly on their location and partly on the method of cultivation followed. Where properly treated these lands should produce from 50 to 100 bushels of corn per acre.

From a consideration of the soil types of the State it is evident to the ordinary observer that varieties of corn must be sought out, developed and adapted to the needs of the farmers living on these various kinds of soil. And it is by this means that one of the greatest improvements in the general cultivation and yield of corn in the State can be effected; for it is not unusual to see farmers attempting to grow on the light uplands, coarse-growing varieties of corn which are adapted only to the river bottoms, and vice versa. The results are disastrous, and it seems that one experience is not sufficient to teach the lesson thoroughly. What the farmer must do is to select, adapt and develop a variety for his specific locality. He can do this better for himself than anybody else can do it for him.

The importance of adapting varieties to locations has been studied at the Experiment Station and it has been shown that in a favorable season a river bottom variety of corn might do fairly well on uplands, yielding sometimes from 40 to 50 bushels, but in an unfavorable season the yield would go down to 8, 10 or 12 bushels; whereas a small variety of corn suitable for cultivation on medium uplands would yield 30 and 40 bushels per acre even in an unfavorable season.

Another means by which the yield of corn can be increased is better culture. Much of the land intended for corn is not properly broken. Corn is one of the grossest feeding plants cultivated on the farm. It develops within a short time and the soil must be in condition to permit the roots to penetrate it rapidly and in every direction in order to gather the vast amount of water and food which it requires. How can corn be expected to make a satisfactory yield on land that has been broken only 4 inches deep for years? A hardpan has formed through which its roots can not penetrate. Break the soil deep—6, 8, 10 or 12 inches—and go down from 1 to 6 inches deeper at least once every three years. After all, the greatest need of the corn plant is water. It seems absurd to make such a statement when 54 inches of rainfall is the record of the State and no serious droughts have been recorded for a number of years. But in spite of the record droughts come every season. They may not last for more than three or four weeks, but in a humid climate where the rainfall has been abundant and then ceases for several weeks, a plant suffers more than one that has been used to a small amount of water from the inception of growth. If enough of the rainfall can be conserved in the soils by deep cultivation and the use of crops that will make the soils retentive of water the yield of corn can be increased at least from 5 to 10 bushels per acre. Such is the record made on the Station farm for several years past.

The fertilizers used will have an influence on the yield of corn obtained. Tennessee soils are probably most deficient in phosphoric acid and

humus, or vegetable matter. Many of them are fairly well supplied with potash. That they need phosphoric acid is shown by the large per cent of barren stalks found in the average corn field. True, this may be due in part to the failure to select seed carefully, but it has been shown that where liberal applications of phosphoric acid are made to these soils there is frequently a decided increase in the yield of corn. As phosphoric acid is chiefly useful for the formation of grain, the necessity of making applications to soils devoted to the cultivation of corn is apparent. By the use of vegetable matter in the form of green crops plowed under or of farmyard manure, the water-holding capacity of the soil can be increased and the injury from drought mitigated.

A rotation of crops will also do much to increase the yield of corn. It happens far too frequently that corn is cultivated year after year on the same land, and as a result the yield has decreased in some instances from 100 bushels per acre on favored soils to 25 or 30 bushels. There is no reason why these soils should not make as much within five years from now as they ever did, provided a suitable rotation be followed and a system of soil feeding instead of soil robbing be practiced.

The yields of corn can also be increased through the destruction of barren stalks, which are much more common than they should be. These barren stalks do not all come from a lack of plant food; and even in fields where corn has been judiciously selected for years they are likely to occur. The farmer should make it his business to go through his corn field, especially through that part of it devoted to the growth of seed corn, and destroy the tassels on all stalks that do not show an embryo ear, before they have an opportunity to fertilize the silks on stalks that give promise of yielding a satisfactory ear. By this means the tendency to sterility, which is inherited, would be lessened from year to year.

IMPORTANCE OF CULTIVATION

Another matter having an important bearing upon the increase in yield of corn is an improvement in its cultivation. In many instances corn is cultivated two or three times and then left to take care of itself. No greater mistake could be made. The corn plant draws heavily on the moisture supply of the soil; according to King an acre of corn requires from 1800 to 2000 pounds of water in order to develop properly in Wisconsin. In Tennessee the rainfall runs off faster and evaporation is greater, so that the cultivation ordinarily given is far from adequate. Corn should be cultivated every week or ten days until the ears are glazed, and then enough moisture will be available to insure the transition of the plant food into the ear and the final development of a large, vigorous, firm grain. A great deal of the corn that is not firm on the cob and shows a shriveled grain could just as well have been developed perfectly by persistent cultivation.

Corn should be cultivated after the showers that fall during the growing season, so as to prevent the formation of a crust on the surface of the earth and maintain a dust mulch that will hold the water in the ground and force it out through the tissues of the plant. Given a plentiful supply of moisture, a large yield is certain. The practice of cultivating corn two

or three times and then allowing it to grow up with weeds and the ground to become baked so the rainfall runs off over the surface and is evaporated directly into the atmosphere is a practice which detracts materially from the yield of the corn crop. Let the cultivation commence with the weeder, even before the corn breaks through the ground in a dry season. Then cultivate once or twice with the same implement to destroy the small weeds and preserve a dust blanket. Follow with a two-horse cultivator every week or ten days until the corn gets too high to permit its passing through the rows. Then use a one-horse cultivator every week or ten days until the grain is perfectly glazed. The cultivation should be shallow from beginning to end. Those who will follow this practice should be able to make a crop of corn even in an adverse season. In seasons when the rainfall is abundant and well distributed cultivation need not be so persistent, but this is rare. Cultivation is very important in a dry season. Droughts often affect the corn crop when the plants are in silk and tassel. Unless there is plenty of rainfall the pollen and silk will not develop freely enough to insure the formation of a perfect ear, and hence a few days of dry weather may result in a reduction in the yield of corn through improper pollination by one-third to one-half. Can the farmer afford to plow and fertilize his land and cultivate it for weeks and then because of the lack of one or two cultivations at a critical time allow the yield to be cut down to such an extent? A careful consideration of the methods suggested will insure better cultivation of the corn crop in the future.

VARIETIES

A great many varieties of corn have been cultivated on the Station farm for several years past. In all some 62 varieties have been grown, but only 36 of these are reported on at the present time; namely, those grown for four, three and two years. The table gives a complete history of these varieties. The yield for four years is shown, and the accompanying data unless otherwise stated refer to the crop of 1903. All the varieties were planted 3½ feet apart each way and two stalks per hill. Considerable variation is shown in the number of days required to mature the crop, the largest and coarsest varieties requiring the longest time. Some of the varieties grown matured in about 100 days, and these were as a rule best adapted to the lighter and thinner upland soils, which would be most likely to suffer from drought. It is important to use the early maturing varieties on soils of this character, for that is one of the best means of insuring a good crop. The larger and coarser varieties of corn require more plant food, more moisture, and a longer growing period, and the lighter and thinner soils can not supply these needs except in very favorable seasons. In many instances it is possible to double the yield of corn by using for light uplands early maturing varieties of medium size. Some of the larger varieties require two or three weeks longer to mature than others. In a dry season this would mean the difference between a good crop and no crop at all. Huffman matured in 102 days, Shaw's Improved in 130 days, and Watson in 115 days. Shaw's Improved and Huffman are river bottom types and Watson is well adapted for fertile uplands. Huffman made fully

as large yields of green crop per acre as Shaw's Improved, the difference in height being made up for by the stoutness of the stalk. Varieties all have their peculiarities, and these must be studied carefully and adapted

TABLE I—*Varieties of corn*

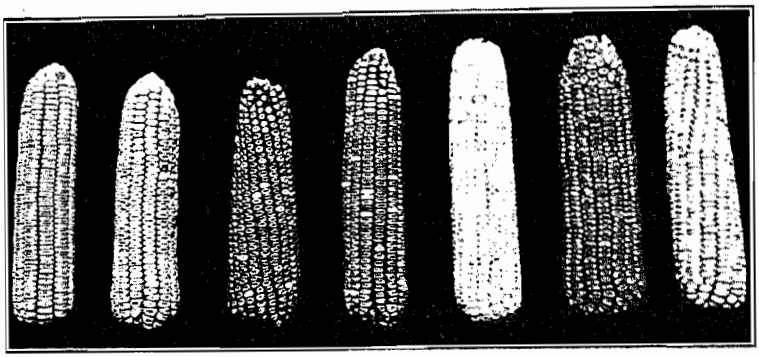
Number	Name of variety	Date of ripening	No. of days maturing	Height of crop—inches	Yield of green crop per acre—tons	Yield of stover per acre, green—tons	Yield per acre of ears—tons		Yield of grain—bu.					Per ct. of cob in dry ears	Wt. of dry ears per bu. grain
							Green	Dry	1900	1901	1902	1903	Avg.		
						1900-3									
1	Huffman	Sept. 10	128	102	11.70	9.99	1.71	1.04	29.23	8.93	59.48	24.55	30.55	17.76	68.08
2	Wild Goose	Sept. 1	119	116	10.51	8.22	2.92	1.23	44.86	1.41	50.45	35.71	36.61	16.66	67.19
3	White Rockdale	Sept. 5	123	118	10.33	8.07	2.27	1.38	65.18	14.73	55.02	31.70	41.66	15.48	66.25
4	Va. Ensilage	Aug. 31	118	106	10.29	8.25	2.04	1.30	56.25	18.98	51.34	31.25	39.45	15.04	65.90
5	Cocke's Prolific	Sept. 1	119	108	10.12	8.07	2.04	1.28	29.85	25.68	51.88	40.41	36.95	19.18	69.28
6	Yellow Creole	Sept. 8	126	115	9.85	8.19	1.66	.99	34.59	11.61	39.73	21.88	26.95	23.78	73.47
7	Hickory King	Aug. 30	117	100	9.26	6.91	2.34	1.51	71.20	38.39	49.78	28.13	46.87	13.09	64.43
8	Champion W. P.	Aug. 18	105	90	8.78	6.24	2.53	1.48	61.60	29.25	53.57	29.24	43.41	17.88	68.18
9	Imp. Leaming	Aug. 17	104	100	8.71	6.22	2.48	1.47	56.69	29.02	44.87	37.95	42.13	19.76	69.78
10	Early Mastodon	Aug. 18	105	94	8.30	6.01	2.28	1.27	46.19	25.89	48.76	31.70	38.13	15.04	66.61
11	Pride of Nishna	Aug. 18	105	100	8.22	6.05	2.16	1.21	38.84	21.43	50.11	31.25	35.41	18.06	68.34
12	Iowa Silver Mine	Aug. 18	105	89	8.17	5.79	2.38	1.37	51.55	24.34	51.00	32.37	39.81	18.64	68.82
13	Early Leaming	Aug. 17	104	98	8.10	5.64	2.47	1.43	58.48	25.45	49.55	32.81	41.51	18.96	68.67
14	Large W. Flint	Aug. 24	111	104	7.90	5.86	2.03	1.15	39.00	10.71	40.28	33.04	30.76	25.07	74.77
15	Iowa Gold Mine	Aug. 18	105	97	6.91	4.70	2.20	1.31	36.37	35.95	48.66	30.81	37.95	18.89	69.03
						1901-3									
16	Va. Horsetooth	Aug. 31	118	110	11.04	8.07	2.37	1.44	39.95	.....	48.55	38.40	42.30	17.89	68.08
17	Osbourne	Sept. 8	126	122	9.36	7.25	2.11	1.26	.....	18.53	58.48	35.71	37.58	16.49	67.05
18	Mexican June	Sept. 12	130	120	8.90	7.61	1.29	.78	.....	22.11	21.43	23.21	22.25	20.13	70.11
19	Reid's Y. Dent	Aug. 24	111	108	8.15	5.59	2.56	1.44	.....	27.68	50.76	50.89	43.11	16.18	66.79
20	100 Day Bristol	Aug. 24	111	104	8.05	5.77	2.27	1.36	.....	26.78	44.53	45.54	38.95	19.81	69.90
21	Golden Beauty	Aug. 29	116	104	7.06	5.79	2.17	1.26	.....	20.53	49.67	36.61	35.61	20.28	70.76
22	Wis. E. W. Dent	Aug. 4	101	106	7.59	5.14	2.46	1.47	57.35	22.32	50.89	.....	43.52	17.11	67.56
23	Blunt's Prolific	Aug. 14	101	84	7.16	5.20	1.96	1.22	.....	23.89	47.08	35.27	35.48	18.58	68.77
24	Golden Comb't'n	Aug. 19	106	96	7.05	5.07	2.02	1.12	.....	19.43	49.18	32.14	33.58	16.05	66.69
25	White Cap Y. D.	Aug. 13	100	98	6.44	4.35	2.09	1.24	40.00	.....	35.71	29.91	35.21	20.44	70.43
						1902-3									
26	Shaw's Imp	Sept. 10	128	130	11.82	9.19	2.81	1.60	.....	.....	52.01	37.95	44.98	21.29	71.14
27	No. 3389	Aug. 18	105	155	11.74	8.98	2.76	1.74	72.09	28.57	.....	.....	50.33	19.01	69.14
28	Watson	Aug. 20	116	115	10.09	7.76	2.33	1.44	54.00	.....	.....	31.25	42.63	17.11	67.56
29	Chester Co. Mam	Aug. 18	105	102	9.69	7.36	2.33	1.34	45.75	.....	.....	31.48	38.62	19.30	69.39
30	F'mer'sInt.W.D.	Aug. 20	107	108	9.27	6.92	2.34	1.25	.....	27.02	.....	39.29	33.16	25.78	75.39
31	Mosby's Prolific	Sept. 12	130	120	9.14	7.25	2.46	1.59	42.18	.....	51.11	50.45	50.78	14.72	65.66
32	Golden Supberb	Aug. 13	100	130	8.00	6.21	1.80	.99	41.74	16.96	.....	.....	29.57	16.37	66.96
33	New Klondike	Aug. 16	103	120	6.72	4.52	2.20	1.27	.....	34.82	.....	.....	38.28	15.61	66.35
34	Best of All	Aug. 17	104	96	6.59	4.47	2.12	1.29	.....	.....	43.53	33.26	38.40	16.62	67.18
35	Pride of the N'th	Aug. 14	101	93	4.94	3.58	1.37	.84	.....	23.89	.....	25.90	24.90	17.00	67.47

to the conditions prevailing on the farm in order to insure the best results. The yield of green crop with the larger and coarser varieties ranged from 10 to 12 tons per acre; with the smaller from 6 to 8.

INFLUENCE OF WEATHER AND SOIL

That the weather and soil conditions influence the yield of grain is shown by the following examples: Observe that Huffman, a river bottom type of corn, when grown on medium uplands made a yield of 29.23 bushels

in 1900, 8.93 bushels in 1901, 59.48 bushels in 1902, 24.55 bushels in 1903, and an average of 30.55 bushels for the four years. In 1902, when it had conditions favorable to its best development, it made a splendid yield. It did very well in the years 1900 and 1902, soil type and season considered, but in 1901, an unfavorable season, it went all to pieces. This is no reflection on the variety but is simply an illustration showing, first, the influence of season and moisture content on crop yield, and second, the necessity of adapting varieties to the soil location. In a favorable season, as 1902, Huffman made a better yield than any other variety that has been grown for four years, but in an unfavorable season, as 1901, it was not to be compared with Hickory King, a small early maturing variety well suited to cultivation on medium or light upland soils. The illustration selected is typical of many that might be drawn from the experiments.



Hickory King Early Leaming Iowa Silver Mine 1st Day Bristol
Champion White Pearl Iowa Gold Mine New Klondike

VARIETIES OF UPLAND CORN

The average results of four years' work with several varieties of corn show that Hickory King made the best yield, with 46.87 bushels. It was followed closely by Champion White Pearl, with 43.41 bushels; Improved Leaming was third, with 42.13 bushels; Early Leaming fourth, with 41.51 bushels; and White Rockdale fifth, with 41.66 bushels. These yields are all satisfactory when soil and climatic conditions are taken into consideration.

The highest per cent of grain in the dry crop, 40.75, was shown by Improved Leaming. Early Leaming was a close second, with 39.09 per cent. Several other varieties were above 35 per cent; but some went very low—too low to insure a large yield—showing that the variety was not very well adapted to the soil type, or that the amount of stalk and ear was out of proportion to the yield of grain obtained, a defect that should and could be corrected through selection.

PER CENT OF COB

The smallest per cent of cob in dry ears was shown by Hickory King, 13.09; the largest per cent by Large White Flint, 25.07; Yellow Creole was a close second, with 23.78; and Improved Leaming third, with 19.76 per cent. It is easy to see that the variation in the per cent of cob may amount to nearly 10 per cent; and as the cob is by far the poorest part of the crop, being innutritious and indigestible, the breeder and grower of corn should strive to reduce the per cent of cob to a minimum. As emphasizing the importance of reducing the amount of cob, attention is called to the last column of the table, which shows that 74.77 pounds of ears of Large White Flint was required to produce a bushel of grain, as compared with 64.43 pounds in the case of Hickory King.

Of the varieties grown for three years Wisconsin Early White Dent made on an average the largest yield—43.52 bushels per acre. Reid's Yellow Dent was a close second, with 43.11 bushels; and Virginia Horsetooth third, with 42.30 bushels. These yields are not quite so large as those made by Hickory King and Champion White Pearl, grown for four years, but they show that these varieties are well adapted to our conditions. Mexican June made an average for three years of only 22.25 bushels of grain. It has been heralded far and wide as a wonderful variety of corn, but it has failed to live up to its reputation on the Station farm.

Of the varieties grown for two years No. 3389 shows the largest yield. No. 3389 is a selected variety of Cocke's Prolific which shows it to be an excellent variety for Southern conditions. Shaw's Improved, a large river bottom type of corn from Georgia, and one that was in fact out of place on the character of soil on which it was grown, made a good yield for two years, 44.98 bushels. On rich bottom lands it would mature larger and more perfect ears; and the principal objection to it is the high per cent of stalk and the low per cent of grain produced. The per cent of cob is also high.

From the foregoing table some very important deductions may be made for the guidance of the farmer. The leading varieties adapted to Tennessee are named below and the endeavor has been made to classify them according to the soil types for which they are best suited. The classification is not absolute, nor is it intended that the varieties recommended shall be used to the exclusion of all others, but in the judgment of the authors these are the best adapted to the different soil types mentioned. Judgment is based on a close observation and study of more than 60 varieties grown during the last four years.

ADAPTATION OF VARIETIES TO SOIL TYPES

For light uplands Hickory King is certainly one of the best varieties that has been grown. It is medium in size, matures rather early, does not make a large amount of stalk, has a very small cob, and produces one or two medium-sized ears per stalk and a hard, flinty grain of excellent quality. It is one of the best general purpose corns that have been tested at the Station. Other varieties of corn that are well adapted for soils of the character mentioned are Early Leaming, Iowa Gold Mine, 100 Day Bristol,

and Golden Beauty. These corns can be adapted to the character of soil on which it is desired to grow them, and the per cent of grain and stalk increased or decreased as deemed desirable through variation in the distance of planting.

For soils of medium fertility, such as second bottom and rich uplands, Cocke's Prolific, Virginia Ensilage, Osbourne, and Virginia Horsetooth are all excellent varieties. Probably the best of these is Cocke's Prolific. It has one drawback in that the stalk is somewhat weak. This defect can be corrected by careful selection. The ears are placed too high in some instances, and particularly is this the case on very rich soil. By the selection of ears placed lower down on stout stalks this difficulty can be obviated, and Cocke's Prolific will then become one of the most desirable and best

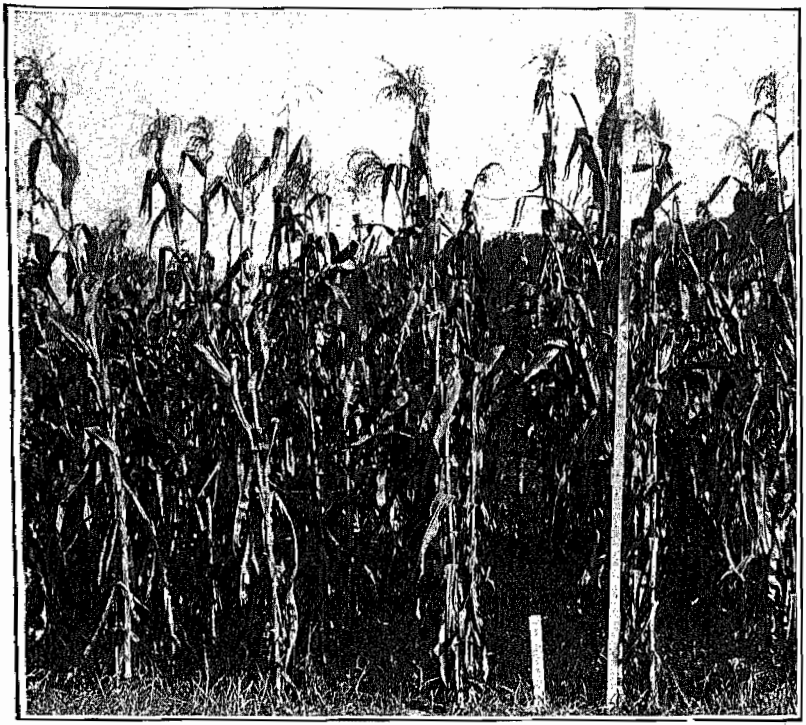
APPEARANCE OF HICKORY KING CORN ON AUGUST 13, 1902

This is a good variety for uplands. The stalks are well covered with foliage.

varieties that can be grown on medium uplands. It is a prolific vareity, frequently yielding two ears per stalk. It does not produce the very large, coarse ear that is so much admired, but which as our experiments have shown does not yield as large a per cent of grain as two ears of medium size with a small cob. Cocke's Prolific is a variety that seems to be well adapted for cultivation on soils of the type mentioned in every section of the State. The other varieties can also be utilized to good advantage in places where Cocke's Prolific does not prove satisfactory. Huffman will also do well on rich uplands. Where a large ear and a strong stalk are desired it can be utilized to advantage. The importance of adapting corn

to the type of soil best suited to its needs can not be urged too strongly, because no other plant is so sensitive to environment as corn.

For rich river bottoms Huffman is probably one of the best varieties of corn that can be grown. It is a strong, hardy variety, growing a large stalk and fine ear, and on rich lands often bringing two ears to the stalk. The number of rows per ear varies from 16 to 24 in well selected specimens and we regard the shape of the grain as approaching perfection. The grain is also flinty and rich in protein. Special attention should be given



COCKE'S PROLIFIC CORN PHOTOGRAPHED AUGUST 13, 1902

Notice the slender nature of the stalks, a defect that can be overcome by selecting seed from the stoutest plants. A good variety for second bottoms and rich upland soils.

to the cultivation of this corn on soils to which it is suited. It will soon show whether it can be profitably grown; and if it will not yield readily to improvement it should be discarded and some other variety used. Cocke's Prolific and Osbourne will do well on bottom lands. Shaw's Improved, another distinctly river bottom type of corn, yields a larger and coarser ear than Huffman and a stouter and taller stalk. It is a good variety in many respects, but not so valuable as those previously mentioned.

It should not be a difficult matter for the farmer to find a variety suited to his needs in the foregoing list. The authors believe that Tennessee farmers must select and improve their corn as much as possible. It is not necessary to do this in an elaborate and expensive way to secure results of value in a short period of time; for there is probably no other plant that yields so readily to improvement as corn, and owing to the size and individuality of the plant, ear and grain, there is certainly no other that can be so easily selected.

Some people believe that seed corn should be imported into the State every year, or every few years, at least, in order to maintain desirable qualities. This is a great mistake. The varied soil and climatic conditions referred to show that the farmers will never obtain varieties of corn well suited to their needs until they undertake to improve some of the standard varieties and adapt them to their local conditions. While there are hundreds of varieties grown there are only a few that have special merit, and the attention of the farmer should be centered on the cultivation of these to the exclusion of the great number of new varieties that are constantly being placed on the market by people who are anxious to make money at his expense. A half dozen varieties of corn could be selected out of the list given and in the course of ten years as satisfactory results could be obtained in the different locations in which they were grown as if 50 or 100 varieties had been tried. At the end of ten years well established varieties would be at the command of the farmer and he would understand their peculiarities, how to prepare the seed bed, and how to grow and handle them to the best advantage; whereas, at the end of ten years, if he used ten different varieties, he would still be dissatisfied.

IMPROVING SOUTHERN VARIETIES

While Southern corns have many excellent qualities they also possess some qualities which are not desirable, and an effort should be made to correct these by developing others of greater value in their place. Climatic conditions favor the development of an undue amount of stalk. On rich river bottoms it is not unusual to find the ears placed so high that one riding on horseback can scarcely reach them. There is enough stalk to produce two or three ears of the size usually obtained. This tremendous development of stalk is due in part to the large number of clear days during the growing season and to the prevailing high summer temperature and the large amount of rainfall. That the climate is responsible for the growth of these gigantic stalks and ears has been demonstrated many times. When seed corn is brought in from the North and planted it does not make a large stalk the first year but produces more grain in proportion to stalk than varieties of Southern origin. Corn from seed originally from the North planted the second year will have a larger stalk and the percentage of grain will decrease; and in three years one could not tell which was originally Southern and which was originally Northern corn. As no effort has been made to combat the tendency to develop a large stalk, it is not surprising that this has become a well established characteristic of Southern corn.

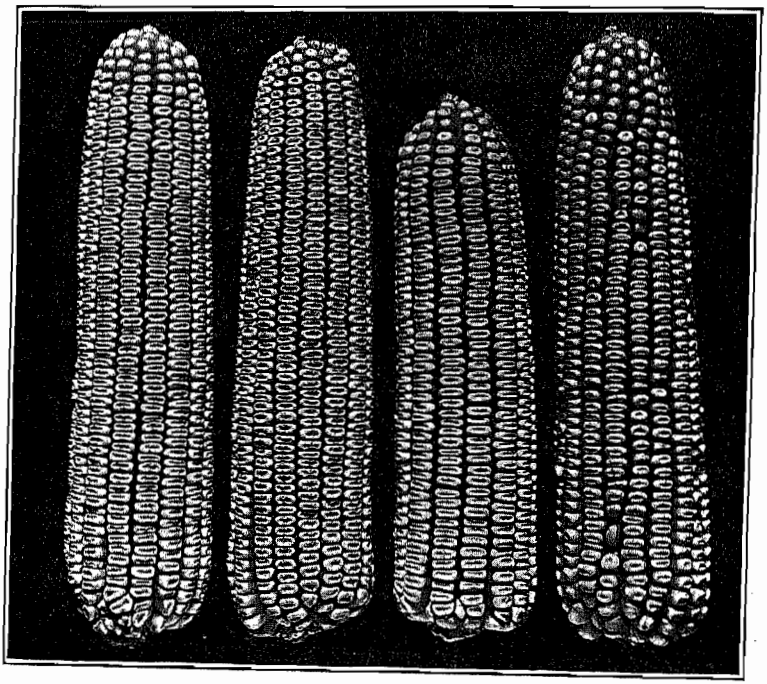
What has been said of the stalk in a measure applies to the ear. The farmer who has given any attention to the selection of corn has chosen only the largest ears for seed upon the mistaken notion that he would thus obtain the largest amount of grain. A large cob was sought because it was believed that it would accommodate the largest number of rows of kernels and this would increase the percentage of grain. It is now known that this reasoning is false; that two medium-sized ears with small cobs will produce a larger amount of grain than one large ear per stalk with a coarse cob. Southern corn needs improvement in two directions; first, a

SHAW'S IMPROVED

A river bottom type of corn. The stalks are very coarse and pithy in character and are objectionable on that account.

lessening of the height and the coarseness of the stalk; second, an increase of the yield of grain. The stalk is so coarse that a considerable per cent of the protein, nitrogen-free extract, and fat are not digested—a fact brought out by investigations made at the Maine Station. It was shown that the average yield per acre of green fodder from Southern corn was 34,761 pounds, the amount of dry substance 5036, the amount of digestible matter 3251 pounds; and the percentage of digestibility was 65. The Maine field corn averaged 22,269 pounds of green fodder, 4229 pounds of dry

substance, and 3376 pounds of digestible matter, with a percentage of digestibility of 73. This comparison shows the necessity of reducing as far as possible the size of the stalk instead of encouraging a greater development. The change desired can be brought about in two ways which are within the reach of the farmer without the use of Northern seed corn. By selecting ears low on the stalk from short, stout stalks he can reduce the height of the crop; and by closer planting he can make the stalks smaller and still not affect the yield of the grain, though he may reduce the size of the ear. The wide planting practiced at present, frequently 5 feet apart in



EARS OF HUFFMAN CORN

The photograph shows the general characteristics of this variety. Notice the straight rows and the uniform development of the kernels. Ears of this variety are large and well filled out. It gives its best results on rich soils, preferably bottom lands.

each direction, and one stalk to the hill, permits the sunshine to enter freely and favors the growth of a great, coarse stalk. The farmer has no use for that character of fodder; to utilize it as a foodstuff is a waste of energy on the part of man and beast. The size of the cob and ear may be reduced in the same manner without affecting the quality of the grain, while increasing the quantity obtained from an acre of ground. The farmer should never forget that in growing corn he is after two things, grain and fodder; and he should employ any means not detrimental to the vitality or strength

of the crop that will enable him to increase the yield of corn and the feeding value of the stalks. Common practice is opposed to the closer planting of corn, owing to the prevalent notion that the larger the ear the larger will be the amount of grain. Custom sanctions many things that are at variance with common sense; and the methods of growing corn as followed in the South are certainly not in keeping with the best interests of the farmer.

CULTURE TESTS

That the yield of corn can be improved in the ways suggested is brought out clearly by experiments undertaken on the Experiment Station farm several years ago with this object in view. The results cover work with two varieties, Hickory King and Cocke's Prolific. The corns were planted in checks, two stalks to the hill at six different distances—30, 36, 42, 48, 54 and 60 inches. Thirty inches would be regarded as very close, but the better yields of corn obtained in the North are due largely to the closer planting which is practiced there. If by the selection of smaller growing varieties and closer planting the yield of grain and fodder can be increased in quantity and quality in the South, the matter is worthy of serious consideration. Thirty inches will not give the best results where grain is desired, but where fodder is the end in view it may often prove a desirable distance. Fodder corn should form an excellent feeding adjunct

TABLE II—*Culture tests with corn*

Number	Name of variety	Dist. between rows—inches	Height of crop—inches	Yield of crop per acre—tons		Yield of ears per acre—tons		Yield per acre of grain—bu.				Wt. of dry ears per bu. of grain		Per ct. of cob in dry ears	
				Green	Dry*	Green	Dry*	1901	1902	1903	Average	1903	Average	1903	Average
								1901-3							
1	Hickory King...	30	107	10.01	4.14	2.61	1.64	42.50	65.71	38.57	48.93	65.85	67.07	14.97	16.46
2	Hickory King...	36	113	8.76	3.71	2.39	1.51	41.96	56.64	36.79	45.15	66.83	66.88	15.57	16.28
3	Hickory King...	42	112	8.53	3.91	2.24	1.42	38.16	53.85	35.45	42.49	65.11	66.84	18.99	16.22
4	Hickory King...	48	117	7.99	3.18	2.20	1.43	38.89	49.03	39.63	42.52	65.58	67.26	14.60	16.75
5	Hickory King...	54	110	7.08	2.99	1.95	1.25	33.75	44.16	34.42	37.44	65.15	66.77	14.05	16.14
6	Hickory King...	60	110	6.25	2.80	1.68	1.09	27.00	40.07	30.62	32.56	65.26	66.95	14.19	16.32
								1902-3							
1	Cocke's Prolific	30	109	12.64	5.44	3.05	1.90	.....	75.89	32.32	54.11	73.03	70.22	23.50	20.26
2	Cocke's Prolific	36	110	10.78	4.68	2.84	1.79	.....	68.60	33.93	51.27	70.74	70.03	20.83	19.81
3	Cocke's Prolific	42	112	11.28	4.86	2.88	1.81	.....	67.46	35.45	51.45	71.00	70.35	21.13	20.41
4	Cocke's Prolific	48	119	10.43	4.58	2.73	1.76	.....	59.80	40.96	50.38	69.90	69.87	19.88	19.85
5	Cocke's Prolific	54	114	9.10	3.97	2.38	1.53	.....	58.71	27.19	42.95	76.08	71.24	26.98	21.41
6	Cocke's Prolific	60	111	6.92	3.12	1.80	1.15	.....	36.89	27.96	32.43	71.69	70.91	21.88	21.04

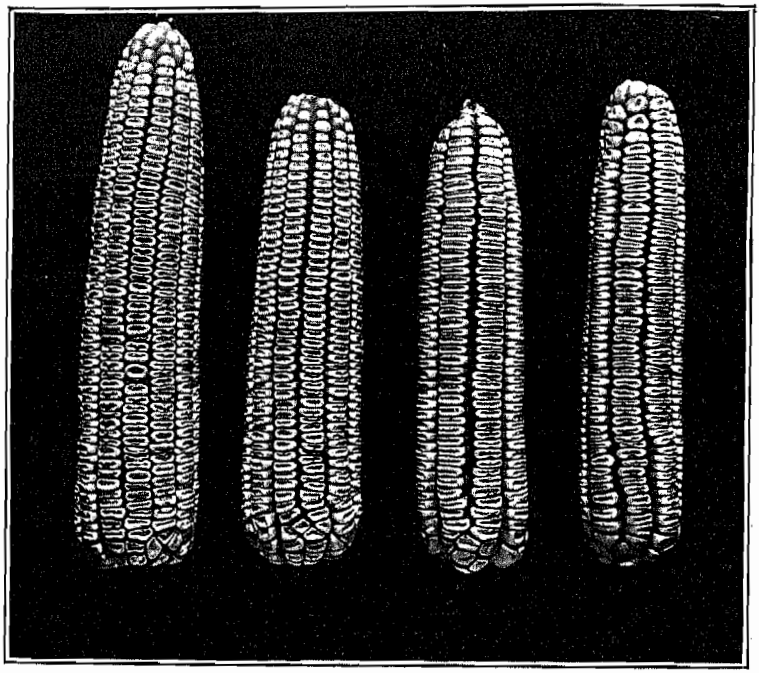
*Average for 1902 and 1903.

on many farms. The idea in growing fodder corn is to get a smaller ear on each stalk. The stalk, grain and all are then chopped up and fed together without the corn having to be shucked and the grain handled separately. The method of feeding is economical and very satisfactory when it is desirable to winter cattle and other classes of farm stock on a cheap maintenance ration.

To obtain good yields on poor soils it will be necessary to plant the corn farther apart than on rich soils. Where one desires to grow a very large ear and stalk wide planting is the only system that will prove satisfactory. The variety must be adapted to the distance of planting. Hickory

King, which is a short, small-growing variety, if it has been consistently selected for several years along the lines suggested, can be planted very close on light uplands. Huffman when planted equally as close on the same type of soil would be an utter failure; but when planted relatively as close on bottom lands it would make as good yields in proportion as Hickory King on light uplands.

Farmers frequently make the mistake of attempting to grow varieties unsuited to their soil, and it is important to throw out a word of warning with reference to this matter in conjunction with the discussion of the



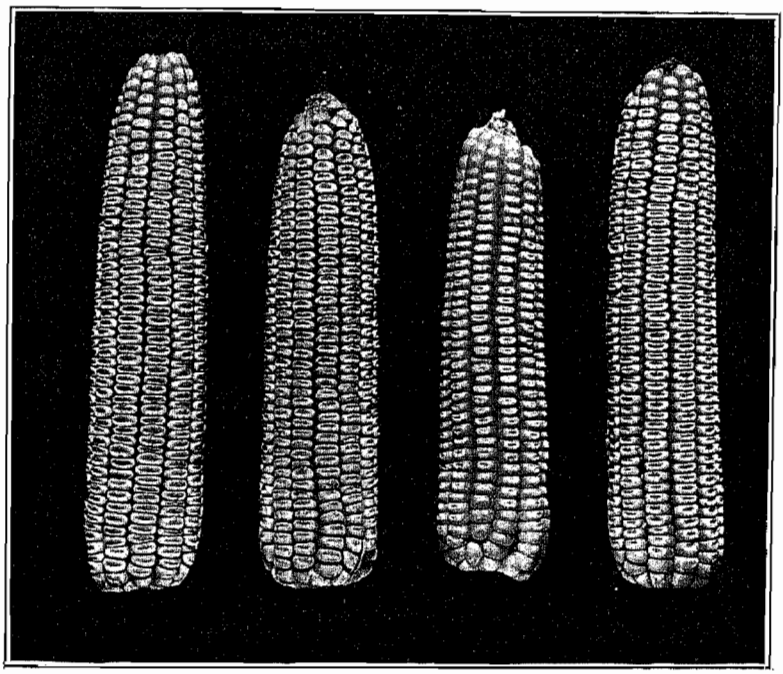
EARS OF HICKORY KING CORN

The grains of this variety are broad and rather short, but it has a very small cob. The ears fill out well under favorable conditions but there are not many rows to the ear. Two ears are frequently produced on a stalk and the variety is one of the best adapted for growing on upland soils.

influence of distance of planting on crop yields. The experiments show that where the object is to obtain a large per cent of fodder accompanied by a fair grain yield close planting is desirable, but it is well to remember that too close planting makes small ears—so small that they can be profitably fed and handled only in the form of fodder. Too close planting makes a weak stalk, another thing that must be guarded against. Where a large yield of stover for the winter feeding of cattle is required nearly one ton more fodder will be obtained by planting 30 inches apart than by plant-

ing 60. Hickory King at 30 inches yielded 4.14 tons of dry fodder; at 36 inches, 3.71 tons; at 42 inches, 3.91 tons; at 48 inches, 3.18 tons; at 54 inches, 2.99 tons; and at 60 inches, 2.80 tons. The decrease in the yield of fodder at varying distances of planting was approximately the same as with Cocke's Prolific.

In 1901 and 1902 Hickory King, which was grown for three years, shows a gradual decrease in the yield of grain per acre from plantings 30 inches apart up to 60 inches. The results were not so uniform in 1903. The average for three years is as follows: 30 inches, 48.93 bushels; 36 inches,



EARS OF COCKE'S PROLIFIC CORN

An excellent variety for creek and river bottoms and rich uplands. The ears are rather long and slender, and frequently two or more are produced to the stalk. The grains are not quite so broad and short as those of Hickory King.

45.15 bushels; 42 inches, 42.49 bushels; 48 inches, 42.52 bushels; 54 inches, 37.44 bushels; and 60 inches, 32.56 bushels. The results were similar with Cocke's Prolific. While the yield of grain obtained at 30 inches was the largest, the ears were small and deformed. At 48 inches the ears were satisfactory in form and character and the grain obtained was of good quality; while the yield was only from 3 to 6 bushels pere acre below that obtained from closer planting, but from 5 to 10 bushels greater than that obtained at from 54 to 60 inches. Similar results were obtained with Cocke's

Prolific corn. It seems safe therefore to recommend the closer planting of these varieties on medium upland soils, the type of land on which the experiments were made.

These experiments demonstrate the necessity of determining the best distance of planting for the leading varieties of corn cultivated in the State, and prove that closer planting can be practiced to the material advantage of the grower, increasing the yield of corn or fodder as may be desirable. The importance of close planting is illustrated by the following statement: 100 acres of Hickory King planted at 48 inches would have yielded 500 bushels more grain than if planted at 54 inches and 1000 bushels more grain than if planted at 60 inches. It would not be difficult to increase the yield of grain on many Southern soils by utilizing a suitable variety and planting it closer than is ordinarily done.

Closer planting will enable Southern farmers to obtain yields more nearly approximate to those obtained by Northern farmers, but a very careful selection of varieties will have to be made. And the work of improvement can not be accomplished in one year. It is not necessary or advisable that every farmer attempt to select seed corn, but a sufficient number can certainly afford to undertake the work to supply every community with the variety of grain best adapted to the local environment.

SELECTION

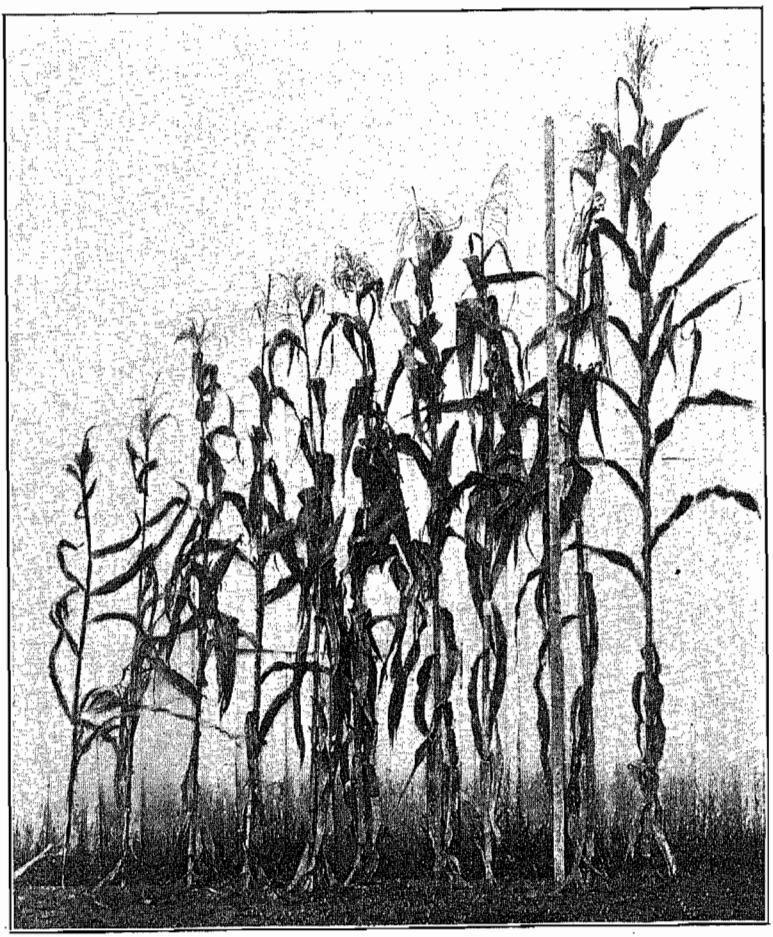
Frequent reference has been made to the importance of selecting corn for the purpose of increasing the yield and improving its qualities generally. An endeavor is being made at the Station to improve Cocke's Prolific and Hickory King corn through the medium of selection; the idea being to adapt them better to our needs and to see what improvement can be effected through selection and what will be the best system to follow to secure largest yields with the least outlay of labor. The work is in its intial

TABLE III—*Selection of seed with Cocke's Prolific corn*

No. of ear	Date of ripening	Height of crop—inches	No. of strong stalks having two good ears properly placed	Yield of crop, green —tons	Yield of grain —bu.	Per cent of firing
1	Sept. 5.....	116	18	10.46	60.71	50
2	Sept. 12.....	124	26	11.62	67.14	25
3	Sept. 18.....	128	33	12.08	68.00	5
4	Sept. 24.....	136	24	14.00	59.30	25
5	Sept. 21.....	128	22	12.14	68.00	5
6	Sept. 14.....	126	11	9.8	54.65	25

stages and no results of value can be presented, but it may not be out of place to discuss some points that should be considered in the selection of corn. Cocke's Prolific has been selected for the purpose of obtaining two medium-sized ears per stalk. Six ears planted separately show the following variations: There was first of all a variation of from 7 to 19 days in the dates of ripening, and this would have an important bearing on the

utility of the crop in many seasons. The yield of green crop varied from 9.8 to 14 tons per acre, the yield of grain from 54.65 to 68 bushels per acre, and the number of strong stalks having two ears properly placed on the stalk from 11 to 33. There was also a wide variation in the height of the

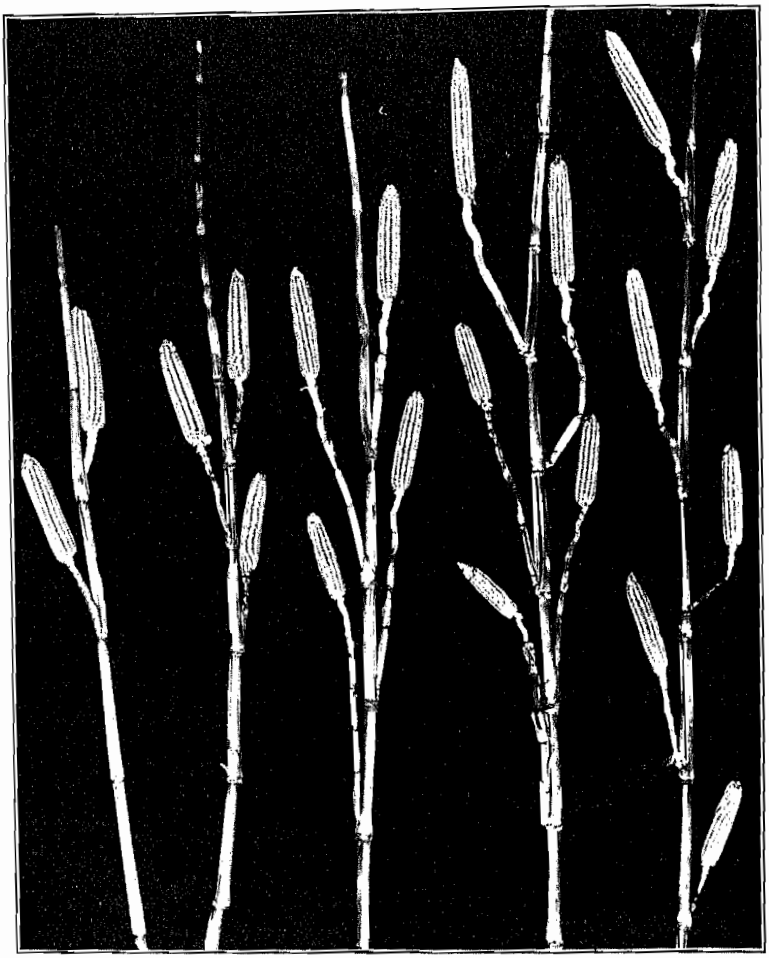


VARIATION IN SIZE OF STALKS OF DIFFERENT VARIETIES

The size of the stalk varies greatly with the variety. Some stalks are more than twice as large as others and this is often a great disadvantage, as the ears are hard to harvest and so high as to cause the stalks to break down. A smaller, leafier stalk, which can be obtained through careful selection, will not decrease the yield of corn obtained, but will facilitate the handling and shredding of the crop and improve the quality of the feed. Reading from left to right, the varieties are as follows: Iowa Gold Mine, 100 Day Bristol, Improved Leaming, Hickory King, Golden Beauty, Va. Ensilage, Cocke's Prolific, Huffman, Shaw's Improved, Mexican June.

crop. Considering that the grain from each of the ears was planted separately on a uniform piece of land, these results are rather remarkable and

show the wonderful possibilities of selection. One ear yielded at the rate of 13.35 bushels more per acre than another. Ear No. 3 produced just three times as many stalks containing two ears as ear No. 6. The grains from



STALKS OF COCKE'S PROLIFIC SHOWING FROM 2 TO 6 PERFECTLY DEVELOPED EARS

This is a very prolific variety of corn. The illustration shows that it is capable of great improvement. Contrary to general opinion, two or more medium-sized ears per stalk will produce more grain per acre than one large ear.

ear No. 1 produced stalks of an average height of about 116 inches; those from ear No. 4 produced stalks of 136 inches—an average difference of 20 inches in height. These tests show the necessity of studying the individual

corn plant; for one might select for years from one parent type without securing results of value, whereas, by selecting from another type one would obtain a decided improvement in the course of a few years. In fact some improvement will be witnessed the first or second year after selection has commenced.

It is evident that in attempting to select corn the farmer must have a special seed patch and that each ear chosen must be planted by itself so that its individual characteristics may be ascertained. If the grain from all the ears had been shelled and mixed up together the yields might have been better than ordinary, but the differences shown by the several ears could never have been discovered. The individual ear and its progeny furnish the basis for successful selection of corn. It will pay to plant the selected ears separately on a well prepared piece of ground in the center of the corn field; and then to harvest the yield from each separately so as to ascertain which are the best to select from for future planting. The variations in these six years show that the characteristics of the corn plant can be changed with comparative ease.

In order to obtain satisfactory results from seed selection one must commence the work of improvement in the field by selecting the ear from the individual stalk, and the process must be continued from year to year. It is a waste of time to go to the corn crib and select out a big ear when ready to plant. It is but little better to go into the field and select the biggest ear from the biggest stalk, because the qualities desired may not be produced the next year. You must know the history of each ear to achieve success in the selection and improvement of corn.

Another matter which has an important bearing on the yield of corn obtained and to which practically no attention has been given is the effect of barren stalks. These may produce pollen which will fertilize the silks on other plants. The ears thus fertilized may show fine qualities and may be selected for field planting. Imagine the farmer's surprise when he finds a larger per cent of barren stalks next year. This is simply the hereditary trait coming out. These barren stalks tend to reduce the yield, and if selections are made under the same conditions for a number of years it is not surprising that the yield sometimes decreases. It is a simple matter to destroy the barren stalks before the silks have formed and thus prevent their pollinating the more vigorous plants. By this means alone it will often be possible to increase the yield of corn several bushels per acre.

FERTILIZERS

Experiments were made with fertilizers on Hickory King in the years 1900 and 1902, and with Cocke's Prolific in 1902. The second year these varieties were grown side by side on exactly the same kind of land and fertilized in the same manner. The table will give the reader all the information desired with reference to the amounts and kinds of fertilizer used. The same amount was applied each year to Hickory King corn. These results are very remarkable in that the same fertilizer used on Cocke's Prolific and Hickory King corn gave splendid results in the former case, whereas, in the latter it proved of but little value. A number of farmers have said that Hickory King was a good variety for poor land and these

results would seem to prove it. It is remarkable that one variety should respond readily to the use of fertilizers and the other not be materially affected. Similar cases have come to the attention of the authors in their experimental work before. It is therefore not unreasonable to conclude that some varieties are more readily affected by fertilizers than others. Some varieties do not seem to have the capacity to take up large quantities of commercial plant food, while others utilize it immediately and to the best advantage.

The yields obtained from the use of various fertilizers on Hickory King corn showed the following gains over the yield where no fertilizer was used: From lime 7.28 bushels; from farmyard manure an average of 6.77 bushels; from muriate of potash, nitrate of soda, acid phosphate, etc., the gains were not much over 3 bushels. On Cocke's Prolific farmyard manure increased the yield over no fertilizer 22.10 bushels; lime, 20.9 bushels; and a complete fertilizer consisting of 100 pounds of nitrate of soda, 150 pounds

TABLE IV—*Fertilizers with Hickory King corn, 1901-2*

Plat No.	Fertilizer used		Cost of fertilizer per—		Yield per acre of green crop—tons			Yield per acre of ears—tons		Yield per acre of grain—bu.			Incr. over no fertilizer—bu.	Cost of bu. of incr.—grain	Wt. of dry ears per bu. grain	Per cent of cob in dry ears
	Name	Amount—lbs.	ton	acre	1901	1902	Average	Green	Dry	1901	1902	Average				
1	No fertilizer				8.70	9.60	9.15	2.21	1.40	37.68	46.21	41.94			66.76	16.13
2	Farmyard manure	8 tons	$9.40	$3.20	9.13	11.37	10.25	2.46	1.64	45.31	52.11	48.71	6.77	$0.47	67.33	16.84
3	Nitrate of soda	200	40.00	4.00	9.60	10.82	10.21	2.37	1.45	39.01	50.21	44.61	2.67	1.49	65.00	13.86
4	Acid phosphate	300	12.60	1.80	9.17	10.25	9.71	2.37	1.49	42.41	49.55	45.98	4.04	.44	64.81	13.60
5	Muriate of potash	100	45.00	2.25	9.22	9.80	9.51	2.20	1.36	39.28	43.75	41.51			65.52	14.56
6	Nitrate of soda	100	28.20	2.90	8.70	10.15	9.43	2.34	1.47	39.73	52.89	46.31	4.37	.66	63.48	11.79
	Acid phosphate	150														
7	Nitrate of soda	100	41.67	3.13	9.02	10.50	9.76	2.37	1.52	40.64	52.68	46.66	4.72	.66	65.15	14.05
	Muriate of potash	50														
8	Acid phosphate	150	20.00	2.00	7.95	11.80	9.63	2.33	1.48	37.50	55.35	46.42	4.48	.45	63.76	12.18
	Muriate of potash	50														
9	No fertilizer				8.70	9.60	9.65	2.21	1.40	37.68	46.21	41.94			66.76	16.13
10	Farmyard manure	8 tons	.40	3.20	9.13	12.50	10.54	2.46	1.64	45.31	52.11	48.71	6.77	.47	66.95	16.84
11	Lime*	25 bu.	1.50	1.50	8.00	12.35	10.63	2.44	1.58	43.30	55.14	49.22	7.28	.10	64.20	12.78
12	Nitrate of soda	100	26.66	4.0	8.62	10.05	9.64	2.22	1.50	37.94	50.00	43.97	2.03	1.74	68.23	17.08
	Acid phosphate	150														
	Muriate of potash	50														

*Applied in 1901 only; half cost figured in crop of each year.

of acid phosphate and 50 pounds of muriate of potash, 18.31 bushels. The increase obtained from acid phosphate and muriate of potash was 11.82 bushels; from acid phosphate alone, 10.27 bushels; from nitrate of soda, 11.82 bushels; and from nitrate of soda and acid phosphate, 13.18 bushels. These results are very satisfactory. They show that Cocke's Prolific, which is a stronger growing variety than Hickory King, needs a plentiful supply of vegetable matter in the soil and that it responds readily to the use of acid phosphate, lime and a complete fertilizer. Had the results with Hickory King not been satisfactory in the year 1901 the difference might have been accounted for by the fact that the season was very dry. In a dry season the plant is unable to take up the fertilizer and utilize it; but the results were practically the same in 1902, when every condition was favorable to the development of a large corn crop and the fertilizers should have given returns which they failed to give. This strengthens the belief

that there is a vast difference in the capacity of different crops to assimilate and profitably utilize artificial fertilizers. It opens up a phase of investigation of unusual interest, but unfortunately adds to the confusion of the farmer as to what is the best method of fertilizing corn. There is only one thing for him to do; that is to make simple test plats on his farm and use the different mineral elements singly and in combination. It is certain that in most instances the soils of Tennessee will be benefited by the use of farmyard manure. Where this is not available green crops should be utilized, either plowed down or pastured off on the land. Phosphate will give good returns on almost any of our soils. Potash is not needed so much. Lime seems to be an excellent fertilizer for corn and other crops on which it has been tried on the Station farm, and from 25 to 50 bushels should be applied once every second or third year. When fertilizers are

TABLE V—*Fertilizers with Cocke's Prolific corn, 1902*

Plat No.	Fertilizer used		Cost of fertilizer per—		Yield per acre of green crop—tons	Yield per acre of ears—tons		Yield per acre of grain—bu.	Increase over no fertilizer—bu.	Cost of a bu. of increase—grain	Weight of dry ears per bu. of grain	Per cent of cob in dry ears
	Name	Amount—lbs.	ton	acre		Green	Dry					
1	No fertilizer				7.60	1.85	1.16	33.03			70.24	20.28
2	Farmyard manure	8 tons	$10.40	$3.20	12.27	3.20	2.08	55.13	22.10	$0.14	75.45	25.79
3	Nitrate of soda	200	40.00	4.00	10.37	2.80	1.60	44.85	11.82	.34	71.35	21.51
4	Acid phosphate	300	12.00	1.80	9.55	2.50	1.47	43.30	10.27	.17	67.89	17.53
5	Muriate of potash	100	45.00	2.25	8.70	2.12	1.26	35.03	2.00	1.12	71.94	22.16
6	Nitrate of soda Acid phosphate	100 150	23.20	2.90	9.20	2.57	1.61	46.21	13.18	.22	69.68	19.64
7	Nitrate of soda Muriate of potash	100 50	41.60	3.12	8.85	2.41	1.50	42.41	9.38	.33	70.74	20.84
8	Acid phosphate Muriate of potash	150 50	20.00	2.00	8.82	2.42	1.57	44.85	11.82	.17	70.01	80.65
9	No fertilizer				7.60	1.85	1.16	33.03	17.40		70.24	20.28
10	Farmyard manure	8 tons	.40	3.20	10.65	2.67	1.75	55.18	22.10	.14	75.56	25.79
11	Lime*	25 bu.	1.50	1.50	10.32	2.83	1.85	53.12	20.09	.04	69.65	19.61
12	Nitrate of soda Acid phosphate Muriate of potash	100 150 50	26.66	4.00	9.90	2.65	1.76	51.34	18.31	.22	68.56	18.33

*Applied 1901; half cost figured in crop of 1902.

used they should be applied well away from the seed and for corn are probably best used under the drill row, as they are then most likely to be readily available to the plant and will therefore stimulate its growth during the early stages of development. If the plant makes a strong, vigorous growth at the outset and gets its roots down into the soil, it is less likely to be affected by drought than if it is slow in starting. Thorough cultivation is essential in order to obtain the best results with fertilizers.

CONCLUSIONS

1 The best average yields of corn for four years were made by Hickory King with 46.87 bushels, Champion White Pearl with 43.41 bushels, Improved Leaming with 42.13 bushels, Early Leaming with 41.51 bushels and White Rockdale with 41.66 bushels.

2 The smallest per cent of cob to dry ears was shown by Hickory King, 13.09, the largest per cent by Large White Flint, 25.07; Yellow Creole was a close second with 23.78, and Improved Leaming third with 19.76 per cent. The variation in the per cent of cob may amount to nearly

10 per cent. The cob is by far the poorest part of the crop, being innutritious and indigestible, and the breeder of corn should strive to reduce the per cent of cobs to a minimum.

3 Of the varieties grown for three years, Wisconsin Early White Dent made on an average the largest yield, 43.52 bushels per acre; Reid's Yellow Dent was a close second with 43.11 bushels; and Virginia Horsetooth third with 42.30 bushels.

4 For light uplands Hickory King is certainly one of the best varieties that has been grown to date. Other varieties are Early Leaming, Iowa Gold Mine, 100 Day Bristol, and Golden Beauty.

5 For soils of medium fertility, such as second bottoms and rich uplands, Cocke's Prolific, Virginia Ensilage and Virginia Horsetooth are all excellent varieties. Probably the best of these is Cocke's Prolific. There is one drawback to it in that the stalk is somewhat weak, a defect that can be corrected by selection.

6 For rich river bottoms Huffman is one of the best types. It is a hardy variety, growing a large stalk and a fine ear. The ear is almost ideal in many respects; the grain is flinty and rich in protein. Cocke's Prolific and Shaw's Improved also give satisfactory results on river bottom soils.

7 The farmer should remember that in growing corn he is after two things—grain and fodder, and not a large, coarse stalk containing a high per cent of indigestible matter and a large per cent of cob.

8 The common practice of planting 5 feet each way and one stalk to the hill is not compatible with the best yields. To show the importance of planting closer than is commonly done the following statement is presented: 100 acres of Hickory King planted at 48 inches would have yielded 500 bushels more grain than if planted at 54 and 1000 bushels more grain than if planted at 60 inches.

9 The importance of selecting corn is shown by the fact that there was a variation of 7 to 19 days in the dates of ripening and from 9.8 to 14 tons per acre in the yield of green crop and from 54.65 to 68 bushels of grain per acre with ears of Cocke's Prolific corn planted in single rows. Cocke's Prolific is a well established variety, yet the results obtained from planting single ears show remarkable variation.

10 In a general way corn planted on soils of moderate fertility will respond to the use of fertilizers, particularly to phosphates and potash. Corn loves a soil well supplied with vegetable matter and this can generally be supplied through the medium of farmyard manure or green crops more cheaply than in a commercial form.

11 In tests to compare the effect of fertilizers on Hickory King and Cocke's Prolific corn some remarkable results are noted. It seems that Hickory King did not respond freely to the use of fertilizers, whereas, Cocke's Prolific gave greatly increased yields, as much as 22.10 bushels with farmyard manure, 20.9 bushels with lime, and 18.31 with a complete fertilizer, consisting of 100 pounds of nitrate of soda, 150 pounds of acid phosphate and 50 pounds of muriate of potash. These facts explain why farmers sometimes fail to secure satisfactory results with the use of fertilizers, as varieties seem to vary widely in their capacity for utilizing the same.