BREEDING AN EARLY, RAPID FRUITING AND PRODUCTIVE COTTON.

By R. L. Bennett.

IN CHARGE COTTON BREEDING.

The presence and spread of the cotton boll weevil in the cotton region has made an earlier and better cotton necessary for a successful crop, and in undertaking to supply this need the cotton breeding work jointly conducted by the Bureau of Plant Industry, U. S. Department of Agriculture, and the Texas A. & M. College Experiment Station has very clearly determined the factors that control early fruiting, rapid fruiting and productiveness of the cotton plant. This new information, first published last fall, enables the cotton grower to know how and why a plant fruits early and rapidly and matures early. It enables the grower to recognize such a plant as soon as he sees it in the field at any age after fruiting begins. In addition, this information clears away confusion as to early fruiting, rapid fruiting, and early maturity, and it also removes the imagined necessity of searching for and importing seed at great expense from the Eastern States and from the northern limit of the cotton belt. The result of these investigations clearly informs the grower how he may, from the native Texas big boll cotton on his own farm, secure an early good staple cotton that will more successfully escape the boll weevils.

For the use of growers, a brief account without detail of the two years' breeding work is made herewith.

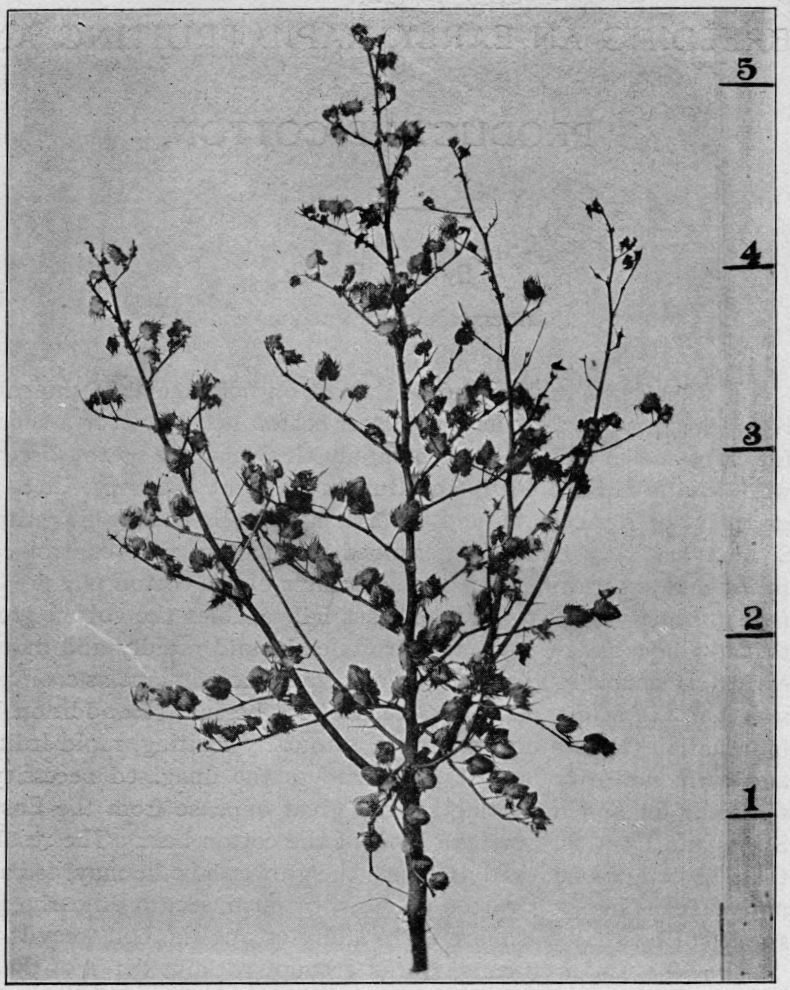
In order to present clearly these results, and some results of this year's work it is necessary to state briefly the structure of the cotton plant.

The cotton plant is made up of a main stem, primary and fruit branches, which are divided into joints; at the joints on the fruit branches the fruit or bolls are formed.

In the breeding work, it is found that:

The early cottons have short joints and the first fruit limbs are near the ground;

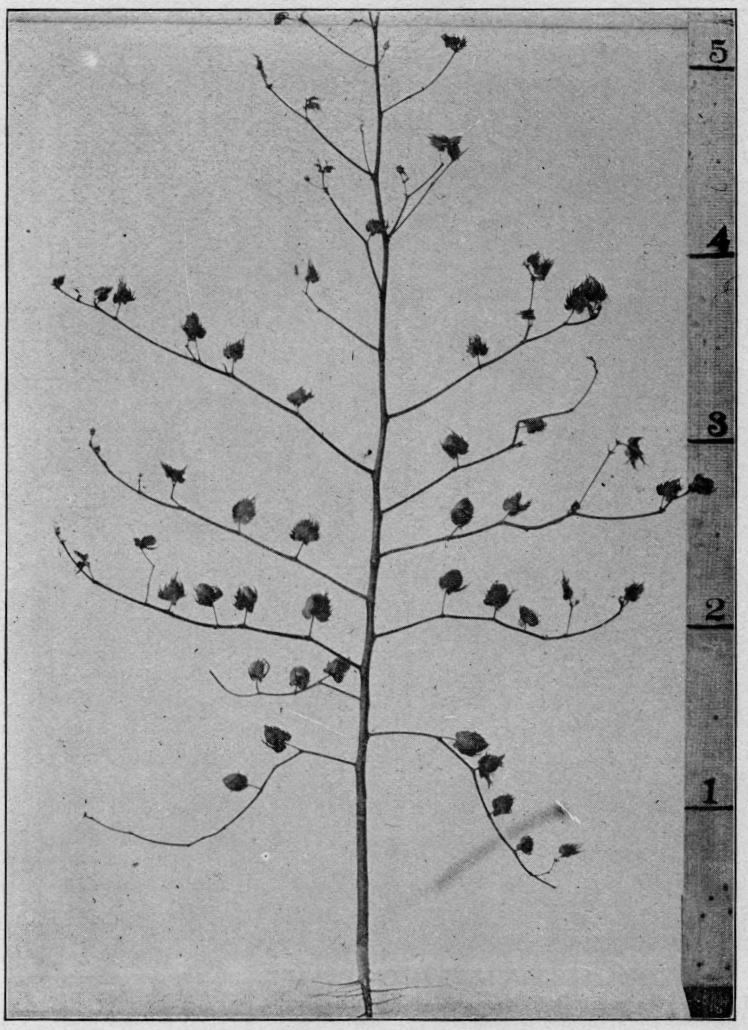
The late cottons have long joints and the first fruit limbs are at a considerable distance above the ground.



AN EARLY COTTON PLANT.

Short jointed and low fruit limbs.
Plants of this structure fruit early, rapidly and are well adapted to boll weevil conditions.

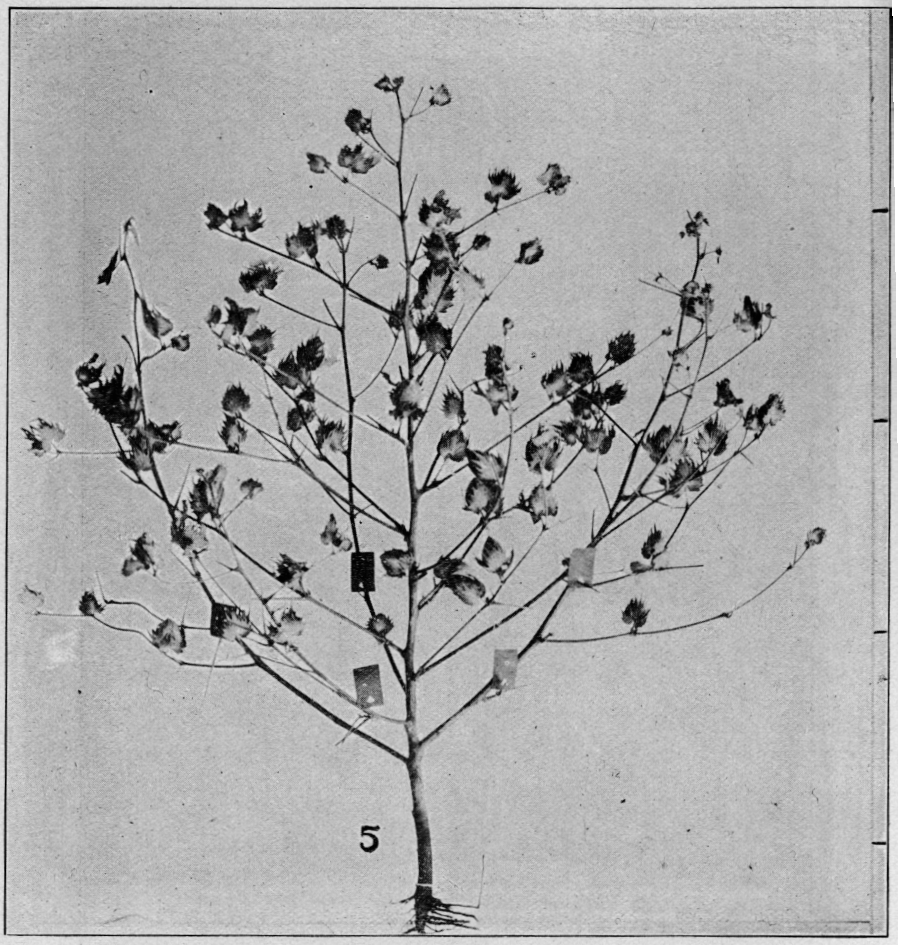
Early fruiting is therefore dependent upon low fruit limbs; the first fruit limb should not be higher than the fifth or sixth joint above the seed leaf joint. Rapid fruiting is dependent upon short joints on the main stem and fruit limbs, and if the boll is large the greater will be the yield. Large bolls can grow and do grow as rapidly on a low-fruiting, short-jointed cotton or an early cotton as on a late or long-jointed cotton. Besides the factors of short joint and low fruit limb, the fruit limbs, especially the first limbs, should be long—continuous in growth, for a maximum yield in a short period of time. They



A LATE COTTON PLANT.

Long joints and first fruit limbs are high up from ground.
Plants of this type or structure fruit late and fruit slowly, and are not adapted to boll weevil conditions.

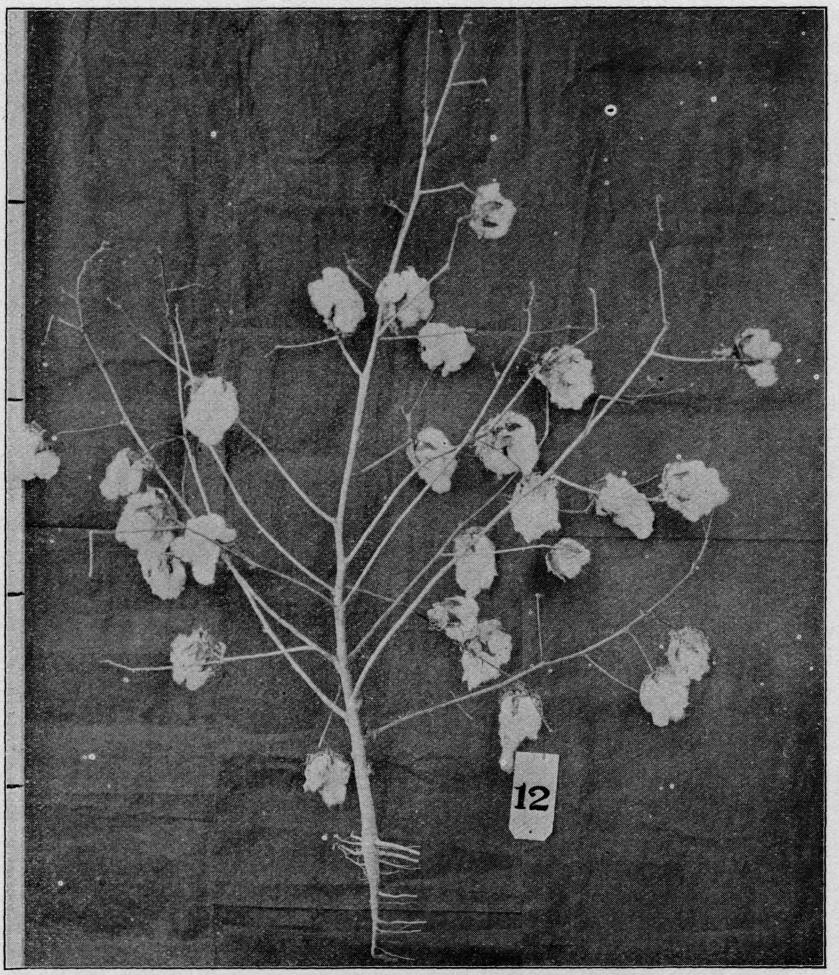
should not stop after growing two or three bolls but should continue to grow bolls. A cotton plant that begins the growth of fruit limbs near the ground, at the fourth or fifth joint above the seed leaf joint necessarily begins to fruit earlier after germinating and therefore has a longer time in which to fruit and if the joints are short the fruit is rapidly made. Then with fruit limbs continuous in growth a maximum yield is made in a short time. In buying seed the farmer should



A LATE COTTON PLANT.

Long joints and first fruit limbs are high up from ground.
The plant has a compact appearance but that is due to the many primary limbs. Plants of this type or structure are late, fruit slowly and are not adapted to boll weevil conditions.

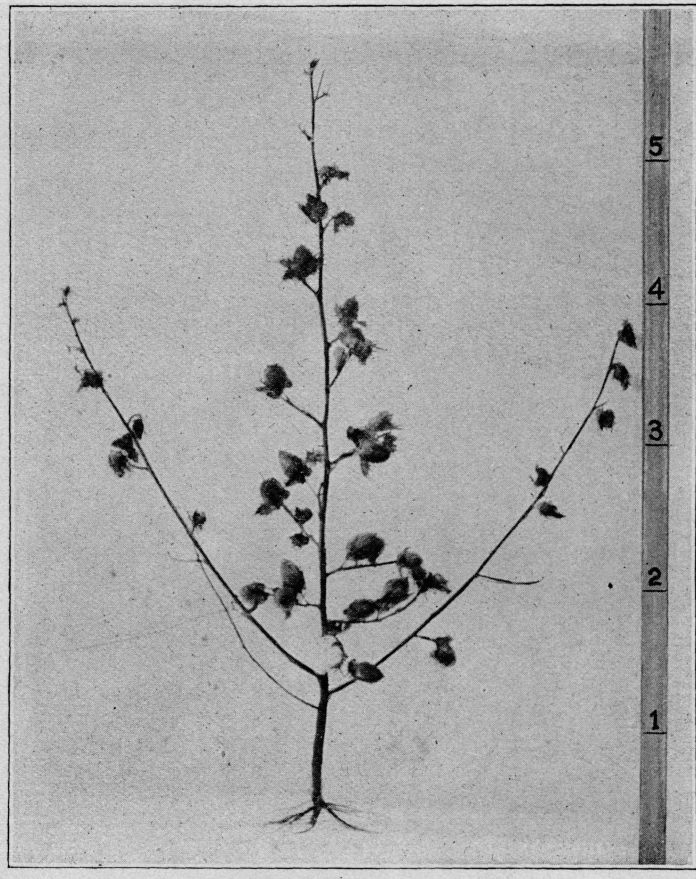
demand of the dealer or seed breeder that the cotton be of this character, and when seed are thus bought the purchaser can know definitely that he is getting an early, rapid fruiting and productive cotton. Heretofore growers have bought seed without demanding anything as to these features. They have bought what the seed breeder or dealer had to sell. The farmer and seed breeder or dealer have not had a scale of points by which the demands of one could be understood and furnished by the other. Had such information been known to Texas farmers they would have been saved the useless expense incurred in the past few years in importing from Eastern and Northern



A LATE COTTON PLANT.

Long joints and first fruit limbs are high up from ground and few in number.
The plant has a compact appearance but that is due to the many primary or wood limbs. This type or structure of plant is late and fruits slowly, and is not adapted to boll weevil conditions.

cotton growing States cotton seed in a majority of cases poorer than their own. The grower may get cotton from the North that fruits low and is short-jointed, and hence early, but he would be about as liable to get a late cotton, since high-fruiting and long-jointed cottons are found in the North the same as in Texas, and since also the factors that control earliness are not the result of locality but of the plant itself—inherently fixed. The cotton plant cannot be grown profitably far enough North for natural selection to develop an early cotton, or for the late plants to be eliminated by failure to make fruit. In any



A TYPE OF COTTON PLANT.

Plants of this structure have short joints on main stem and fruit branches, but the fruit limbs are too short and stop growing after making two or three bolls. Therefore such plants are not desirable as they make only a few bolls early or at the base of the plant.

lot of ordinary seed there are a few plants that fruit low and have short joints, and these will bloom from a week to two weeks before most of the plants of the same lot; but such early plants are few in number. Some of the common Texas cottons by actual count at College this year showed the number of such plants to be about five to ten in a hundred.

The seed we have selected and are growing for greater earliness and rapidity of fruiting show a marked gain in these qualities. The fruit also matures early, is of large boll and storm-proof.

Cotton growers will observe that the joints of any cotton, whether

short or long, are to some extent longer when abundant water is present; but when a plant has short joints it has an inherent nature to grow short joints, and these still retain their relative shortness in the presence of abundance of water.

The popular way of judging the comparative earliness of cotton is by comparing the weighings of the first and second pickings of the cottons, and the one yielding the most is said to be the earliest. I find from our investigations last season and this season that early opening is not necessarily an indication or proof of early fruiting and that it is of no advantage in escaping weevils, since weevils do not attack bolls of any size unless it be the latest young bolls, until squares are destroyed. The yield of the first two pickings, then, indicates either that fruit matures from bloom to open bolls in a shorter time, or that the bolls from small size or nature of covering favors rapid drying out and quicker opening after maturity. This early opening is important only in States where early frosts occur. In boll weevil sections, however, the total yield of the crop is the measure of early fruiting and not the yield of the first pickings. King cotton opens early and escapes early frosts, but it does not begin fruiting any earlier or yield any more, and frequently yields less in boll weevil sections than the low-fruiting, short-jointed stalks that may be found in all Texas native big boll cottons.

The selection of planting seed insures in part the success of the next crop, and hence is a most necessary and important but inexpensive operation. Seed should be selected from plants on soil which makes not less than ½ bale per acre, and if it makes ¾ of a bale or more per acre the plant development is still better for indicating the features that characterize the desired type. Seed should not be taken from stalks that have shed much fruit.

These investigations show that the large boll, thick hull cottons are storm proof, since the burrs do not curl backward and leave the locks unsupported. On the other hand, the small boll, thin hull cotton curl completely backward in opening and the cotton falls out either by its own weight or as the result of winds or rains.

Age is of less importance than the rate of growth in determining the period of time after planting till the plant will begin fruiting. The quality of rapid growth, aside from that resulting from good culture and fertilization, should be secured when selecting seed, and it may be done by selecting seed from the largest plants of the proper type.

To breed a cotton that will have a greater per cent of lint than 30 to 33, which is now the general yield, is greatly desired and would largely increase the profits of the grower at no cost whatever. Compare a cotton that yields 33⅓ per cent of lint or a 500-pound bale

from 1500 pounds of seed cotton, with a cotton, say, that yields 40 per cent of lint, or a 500-pound bale from 1250 pounds of seed cotton, or a 600-pound bale from 1500 pounds of seed cotton. The difference shows an increase of 100 pounds of lint and at 10 cents gives a profit of $10.00.

It is easily possible to raise the general yield of lint. Our work this year showed a variation in yield of lint by different individual plants of the same variety from 25 to 38 per cent in one variety, and from 29 to 40 per cent in another variety. Plants are now being grown that yield around 40, and there is little doubt that in a few years a cotton can be developed that will give regularly 40 per cent of lint. This would be a gain of 10 per cent in yield of lint over the 30 per cent cotton now in general cultivation, and would show a gain of 166 pounds of lint from 1666 pounds of 30 per cent seed cotton. At 10 cents per pound the value of gain would be $16, which is certainly a profit worth considering in cotton breeding. High per cent of lint is a quality which cotton growers greatly desire.

Aside from the very urgent demand, caused by boll weevil, for cotton breeding and selection, the work of developing an earlier and more productive cotton than the cottons now grown, by increasing the number of bolls, size of boll and quantity or per cent of lint, undoubtedly offers the least expensive and the most profitable way for the South to meet the world's increasing demand for cotton or to decrease the cost of the crop now grown.

MAXIMUM EARLY FRUITING AND PRODUCTIVENESS.

The results of this cotton breeding show that the cotton plant must have the following qualities:

FOR EARLY FRUITING.

The first fruit limbs must be low—not higher than the fifth joint above the seed leaf joint.

Primary or wood limbs must be low—the first not above the fifth joint, and not exceeding four in number is desirable.

FOR RAPID FRUITING.

The joints on the main stem, fruit limbs and primary limbs must be short; not to exceed two or three inches is desirable.

Fruit limbs should grow in succession at each joint of the main stem and primary limbs and should be continuous in growth for continuous fruiting.

FOR PRODUCTIVENESS.

The bolls should not be less than 1½ inches in diameter.

The per cent of lint to seed cotton should not be less than 33⅓.

The rate of growth is very important and, therefore, the larger the plant of the type, the greater is its inherent rate of growth, its earliness, rapidity of fruiting and yield.

Early opening of bolls, or maturity, is not important in escaping weevils. In States further north, it is important in escaping early fall frosts. It is not invariably a measure of the early setting of fruit.

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AND THE

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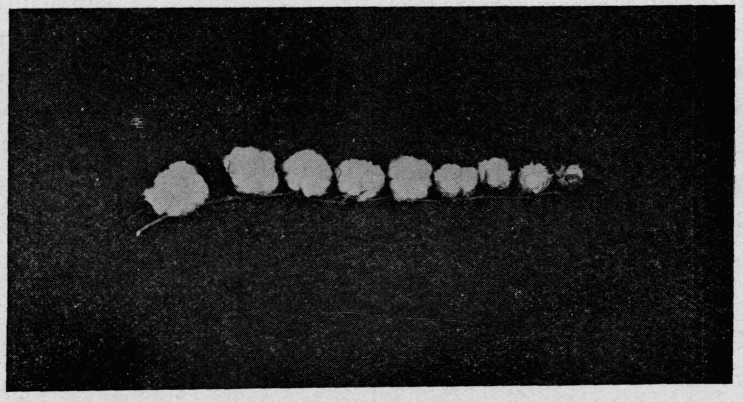

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