

## How Every Farmer Can Breed Up His Cotton.

The Five Objects to be Aimed at, With Instructions for Selecting Seed, and Descriptions of the Most Desirable Type of Stalks and Bolls.

While the plan of breeding cotton that follows is especially suited to boll weevil conditions, it is eminently practical for growers who do not have the weevil to contend with.

The five objects in selecting seed should be (1) to make picking easier, (2) to reduce the size of the leaves or of the stalks if they should be too large, (3) to improve the staple, (4) to increase the yield, and (5) to produce a crop before weevils become numerous enough to prevent it.

**The Kind of Bolls to Grow.**—Select bolls with five locks, rather than four; but owing to seasonal influences some of the offspring of five-lock cotton will have four-lock bolls. Such seasonal variations, however, will not affect the general increase by seed selection of five-lock bolls. A very sharp-pointed boll is objectionable at picking time, while a very round boll will contain less cotton than one that is of the same diameter and longer. Large boll cottons rarely begin to open as early as some of the small boll cottons, but they begin setting fruit at about the same time. The time they begin to set fruit, and not the time they begin to open, is what enables them to make an early crop and to get ahead of the boll weevil. This is contrary to a somewhat prevalent idea and therefore should be noted well. For many reasons a large boll is to be preferred to a small one, and both growers and pickers prefer it. Too much emphasis can hardly be put on the fact that the yield and not the date of the first open boll is what makes cotton profitable in boll weevil sections. Even the cotton that has the largest yield at the first picking may not be best. A type is desired that fruits early and rapidly, and large boll cottons have been bred to escape the weevil as successfully as any small boll cotton that opens all its bolls ten or fourteen days earlier.

**Leaves, Bolls, and Yield.**—It is unsafe to trust to the eye to decide as to the yielding quality. Use the scales. A small boll, small leaf cotton may seem to have more staple on the stalk than a large boll, medium leaf type. Larger leaves hide the bolls and make them seem smaller in number. A stalk with large bolls may yield more pounds than a stalk with a larger number of small bolls. A leaf of medium size (about six inches wide at right angles to the mid-rib) is as large as a leaf should be for upland soil. Larger leaves mean too much weed. In large plants they prevent the sun from reaching and opening the lowest bolls. On deep, fertile bottom soil, where less growth and more sunlight at the base of the plant are desirable, the aim should be for a leaf that is four or five inches wide. When leaves are too large they prevent the drying of the lower bolls; and on a large plant may cause the bolls to rot.

Growers sometimes speak of land being fine for cotton, because the stalks are six or eight feet high; but that sort of a growth means weed, rather than staple. For bottom land particularly, and less often on upland, it may be advisable to select seed for producing a smaller plant. For this purpose, save seed from very small and fruitful plants. Most upland growers, of course, are not so much interested in breeding the weed down to a smaller type as they are in producing weed enough by more soil fertility to give a good yield of lint.

**Getting Ahead of the Weevil.**—About the time cotton begins to set squares the weevils that have lived through the winter begin to move about. It at once becomes a race between the cotton in setting squares and the weevils in increasing fast enough to destroy the squares. In order for the grower to make profit, his cotton plants must make fruit faster than the weevils can destroy it. As they increase very rapidly after the first generation, because there are more of them to further the increase, an early crop is of very high importance. The manner of preparing the seed-bed, planting, and cultivation are important; but in the present article we shall confine our attention to breeding up cotton by the selection of seed. Weevils feed on squares, but they do not injure

bolls of any size until the squares are nearly all destroyed. The total destruction of squares may occur late in the season, when the weevils are very numerous. But at this time weevils begin to feed on the youngest bolls, while the older bolls, whether open or not, may be safe from them.

**The Big Boll May Also be Early.**—Texans used to think that large boll cotton could not be grown early enough to escape the weevil and that good staple cotton could not be early. They imported seed that was not storm proof, that had inferior staple qualities, and that was not suited to Texas conditions. The investigations of specialists and the experience of Texas farmers showed that early cottons of superior quality can be obtained from seed selection. It will be best for growers in other sections to do as the Texans did, to select seed from cottons that are now giving good results in their own territories and under the very conditions that their cotton will be grown in the future. They would have themselves the expense of importing seed and would have types suited to their requirements.

**The Kind of Plant to Select.**—Recalling again that the important thing is the time that a plant begins to set fruit, rather than the time of the first open bolls, we shall proceed with a description of the plant. The cotton plant is made up of the main stem, and of wood or primary limbs and of fruit limbs, besides the leaves and the fruit. The main stem and the wood branches and the fruit branches are divided into joints. At each joint a leaf is formed, and on each joint of the fruit limbs fruit is set. Some plants will have low fruit limbs, the first fruit limbs being at the joint nearest the seed leaf joint. This is the kind that sets fruit early. It is equally true that the plants that set much fruit in a short time have short joints in the main stem and the fruit limbs. Then, select for seed plants such as have low fruit limbs and short joints, because they will grow as fast in the early part of the growing season as long jointed plants and in the same time will set many more squares. This type of plant will grow as fast as the long jointed ones till considerable seed begin to form in the lower fruits. After that the longer jointed ones will outgrow them. But at this stage the short jointed ones are giving most of their strength to the production of seed, and it is about this time that weevils become so numerous as to destroy the squares on both types of plants. The short jointed ones mature their large crop of squares that have already set; while the long jointed ones have but few squares and will be prevented by the weevils from maturing much fruit, even though the plants may continue to grow.

**How to Select for Rapid Growth.**—The rapidity of growth is of great importance for the rapid setting of fruit; and as some plants of any type will grow faster than other plants of that type, it is important to select seed from the largest plants of the desired type. If the land makes too much weed that principle might need some modification, however. Rapid fruiting plants also show a continuous growth of the fruit limbs, and this is of vast importance for the maximum crop in a short time. The end bud of all fruit limbs should continue to grow and set squares till the entire plant stops growing. With such fruit limbs, the main stem may not become very tall but the continuous growing fruit limbs will make more fruit early on the lower part of the plant than a cluster fruit limb type would. Furthermore, the weevil prefers to feed on squares that are high on the plant; and this often permits late squares to make bolls on the lowest continuous growing fruit limbs even when the weevil is present. Re-read the description of these characters, if that is necessary to fix them in mind for use in distinguishing early and rapid fruiting plants; then you will be able to make the selection any time after the fruiting has begun well or the selection may be delayed till all the bolls are open.

**The Main Points in a Nutshell.**—Let us sum up some of the desirable things as follows: (1) The biggest leaves should not be wider than six inches across the midrib, and under some conditions they should not be so wide. (2) Fruit limbs should grow at the successive joints of the main stem and

of the wood limbs and the fruit limbs should have a continuous growth so as to keep up uninterrupted fruiting till the plant is mature. (3) The joints of the main stem, of the fruit limbs and of the primary limbs must be short—not over one to three inches on the lower part of the plant. (4) The first fruit limb must be low—not higher than the fifth or sixth joint above the seed leaf. (5) The wood or primary limbs must be low, preferably not more than four in number, the first limb not higher than the fifth or sixth joint above the seed leaf. (6) The boll should be reasonably large for the type of cotton with which the seed selection is made, the picking being done more readily and less trash being mixed in when the boll is large. The boll covering of a large boll is also more storm resisting, since it does not curve back so much in drying and leave the locks unsupported. (7) Select for as large a percentage of lint as possible. It will vary with the seasons while improvement may be going on. (8) Aim for fiber not less than one inch in length, but this length is enough for general purposes.

**Yield and Length of Staple.**—Most of the long staple varieties of upland cottons have been developed for length of staple, without much regard for increasing the percentage of lint or for early or rapid fruiting. This neglect can be remedied by selecting seed from plants which show conspicuously the desired points. Long staples are noted for rapid deterioration under ordinary conditions. When seed selection is not practiced, inferior seed are used—immature, diseased seed and those from bolls injured by insects or from plants resulting from insects crossing desirable and undesirable plants.

**The Work is Not Excessive or Expensive.**—Those inexperienced in selecting seed will imagine that it takes too much time and expense for a farmer to select seed; but R. L. Bennett, Special Agent of the Bureau of Plant Industry, states that to make a general seed selection and propagate enough seed for 100 acres of the general crop will not exceed \$5. We shall presume that a man who has enough energy to select seed for improving his crop will have the cotton from which he selects seed yield three-quarters of a bale per acre; and that he will get one-fifth of a pound from each plant. Hence, he will have to select and pick fifty or sixty plants to get one peck, 12 pounds, which is enough for planting one acre. A small farmer might select enough seed for his whole crop, or he could select only enough for a seed patch in which he would increase the selected seed by waiting one year to do it. A good stand can be got by the use of a peck of seed per acre if a planter is used that drops only one seed at a time at regular distances and puts the seed in the ground at the right depth—more shallow as the ground is wet and cold.

**Which Bolls to Reject and Which to Pick.**—After all, bolls are open and the choicest plants are selected, pick the largest bolls around the center of the stalk, perhaps about two-thirds of the total. Reject all bolls at the top and ends of the limb. The largest and best matured bolls grow around the center of the plant, and have seeds that are heavy, well developed and well matured. Such seeds sprout better and nourish the plant well till it begins to get plenty of nourishment from the soil. In selecting bolls, reject any that are small or defective. The selected seed must be ginned separately, and from first to last precautions must be taken to prevent foreign seed from being mixed with them. This must have particular attention at the gin.

**Wonderful Improvement is Possible.**—The cotton plant is peculiar in the remarkable improvement from the selection of seed only one year, the offspring being very much like the choice plants from which the seed was selected. By continuing the selection from year to year without interruption, a wonderful improvement is produced. Those who wish to give a large amount of time to cotton breeding may prefer to improve the crop by crossing, or by planting the seed from each selected plant in a row by itself and keep a record of the yield in pounds so that the breeding may be on the pedigree plan with ancestors of known characteristics; but the farmers will be rare indeed who should attempt that kind of breeding. It may be as well if they do not attempt too much at the start and then do poor work because they do not have the time or the patience to do really good work.

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