Good Varieties of Cotton for Missouri

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The use of a superior variety, adapted to local soil conditions is one of the basic factors in successful cotton farming. The advantages gained through higher yields and better quality of staple may easily represent the difference between a profitable crop and one grown at a loss.

Cotton variety tests are conducted at the Sikeston Experiment Field on a moderately productive phase of Lintonia silt loam, and in cooperation with farmers on other soil types for the purpose of determining the best varieties for Missouri. Those which have regularly produced high yields and fulfilled in the largest measure all other requirements of a good variety are described in the following paragraphs. Their relative adaptation to the various soil fertility levels is indicated, and a brief statement of their origin is given that might be of interest and value to the reader.
Deltapine (D. P. L. 11A)

The variety Deltapine, better known to many Missouri growers simply as D. & P. L. 11 or D. & P. L. 11A originated as a plant selection from a cross between an unnamed non-commercial hybrid and D. & P. L. 10. Strain 11A is a selection from Strain 11 for greater uniformity and better lint. These two strains were registered under the name "Deltapine" by the 1936 committee of varietal standardization and registration.*

Strain 11A has proved to be superior to the parent variety with respect to several important characters. It has ranked among the highest yielding varieties in nearly all of our variety tests. The medium-large open type plant growth is a desirable feature from the standpoint of its usefulness under a wide range of soil conditions. It is vigorous enough to produce a comparatively good growth on rather poor land, but seldom grows too rank except on very fertile land heavily charged with nitrogen and organic matter.

One of the unusual and particularly attractive features of Deltapine is the combination of good staple length and high lint percentage. Growers have reported gin turnouts ranging as high as 40 per cent. The average turnout in our tests for the three-year period 1937 to 1939 was 37.2 per cent. The staple is good quality and ranges from $1\frac{1}{2}$ to $1\frac{3}{2}$ inches in length, depending mainly, it seems, on the fertility of the land and the supply of soil moisture during the time of boll development. The bolls are medium size (averaging about 75 or 80 to the pound of seed cotton) hold the open cotton reasonably well over a long period and during adverse weather, and are easily picked.

Two new strains of Deltapine, D. & P. L. 12 and D. & P. L. 44-51, tested the first time in Missouri in 1939, outyielded 11A by a substantial margin. One of them may eventually replace it in Missouri, but further testing to measure their performance under a broader range of soil and seasonal conditions is necessary before they can be recommended.

Stoneville 2-B

This strain of Stoneville is a descendant of Stoneville 2 which in turn was developed from Lone Star 65. It is closely related to Stoneville 5, a strain that has been widely grown in the State.

Stoneville 2-B produces a medium-sized spreading type of plant with a comparatively light foliage. The bolls are medium large, averaging about 70 per pound of seed cotton, open well, and are

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easily picked. The staple is good quality and ranges from 1\(\frac{3}{16}\) to 1\(\frac{3}{8}\) inches in length depending on environmental conditions, and is a full \(\frac{1}{32}\) of an inch longer than other Stoneville strains grown in Missouri. The lint percentage ranges from about 32 to 35 per cent with an average of 33.4 per cent in our tests. It matures early and the bolls are open for picking at approximately the same time as Deltapine.

During the three-year period 1937 to 1939, Stoneville 2-B appeared in a total of nine tests in Missouri. With but few exceptions it ranked among the best varieties in acre yield and money value per acre in each of these tests and its average performance was unsurpassed. The full range of adaptation of this variety to the various soil types and fertility levels cannot be stated, but certainly it is very broad. It was pointed out under the preceding heading that Deltapine is also widely adapted. And for nearly all soils that fall within the intermediate groups of fertility levels there seems to be but little to choose between these two varieties, except on the basis of relatively unimportant differences in boll size, lint percentage, staple length, picking qualities, etc. Because of a more vigorous plant growth, Deltapine should probably be given preference over Stoneville 2-B for growing on poor land, but for the very same reason it would naturally follow that Stoneville 2-B should be given preference over Deltapine for rich land where cotton grows too rank.

**Ambassador (Stoneville 4-B)**

The variety name, "Ambassador," is not so familiar to Missouri farmers as the variety to which it applies. Stoneville 4A was assigned this name in 1936 by the committee of varietal standardization and registration. The three strains, No. 4, 4-A and 4-B, and the parent strain No. 1 are so closely related by breeding and show such marked similarity in morphological characters that they might all be classified under this name. Stoneville No. 1 was first grown commercially in this State about 1930 and was later replaced by strain No. 4 which in turn was replaced by 4-A and 4-B. These two strains now represent the Ambassador variety in Missouri, but 4-B is rapidly replacing 4-A.

The most distinctive features of Ambassador are its dwarfy spreading type of plant growth, early prolific fruiting habits, extremely early maturing, and big bolls. The lint is good quality, ranges from 1 to 1\(\frac{1}{16}\) inches in length, and yields an average gin turnout of about 33 per cent.
Ambassador is best adapted to rich soil though it produces good yields on land no better than average in fertility. However, it has not quite measured up to the high average acre production set by Stoneville 2-B and Deltapine 11A even on rich soil. But the advantages in growing this dwarfy, spreading, early, big boll variety on rich soils, particularly on those carrying a heavy charge of nitrogen and organic matter where cotton normally grows too rank and opens late, might easily offset any yield advantages that have been found in other varieties.

**Deterioration of Cotton Varieties**

Experienced growers recognize the fact that superior varieties deteriorate in yield, uniformity of lint, and other essential features of a good variety, but the rapidity with which this "running-out" process occurs and all the reasons for it are not always fully appreciated. Growing a number of varieties in the same community and ginning the crops at custom gins are the principal causes. These practices result, in the seed of a variety becoming mixed not only with the seed of other varieties but with badly degenerated stocks of "gin-run" seed.

The amount of mixing that takes place in the gin is surprisingly large, where different varieties follow each other in single bale lots through the modern machinery. Experiments by Ballard and Doyle* show that more than 25 per cent of mixing may occur. These experiments also show that even if the varieties are ginned in lots of several bales mixing will occur, but in successively smaller amounts up to the ginning of the fourth bale, and even later bales if the seed is allowed to pass through screw conveyors.

Although gin mixing is the principal cause of deterioration of cotton varieties it is by no means the only cause. Cotton varieties are cross-fertilized readily by pollen transferred by natural agencies from the flowers of one variety to those of another. Because of the sticky nature of cotton pollen it is not blown about by the wind in the same manner as corn pollen but is carried from one flower to another by bees and other insects. Crossing takes place freely between varieties in the same field where gin mixed seed are planted, or where two varieties are grown near each other. Naturally the amount of crossing depends on the number and kinds of insects present, the distance between varieties, and possibly to a smaller degree, on other factors such as the relative time of blooming of the two kinds. Where two varieties are

grown in close proximity in adjacent fields or sections of the same field, anywhere from five to ten per cent of crossing is likely to take place in the first few rows of each. With an increasing distance between the two kinds the percentage diminishes. Some crossing may take place between varieties separated by a distance of 200 yards or more but the percentage is very small.

After a superior variety has been subjected to gin mixing and crossing of the plants with other kinds for a few years, it becomes so badly mongrelized that it shows little resemblance to its former type. The yield is lower. The staple is inferior in quality. As a result of crossing, many hybrid plants are present some of which are decidedly inferior to the parent varieties. They present a wide range in height, time of maturity, productivity, general growth habits, leafiness, boll size and shape. "Slick-seeded" plants often appear and they are the unmistakable and frequently the first indication to the farmer that his variety is running out.

Even if all gin mixing and cross pollination is prevented a variety will eventually deteriorate as the result of the appearance of worthless off-type plants from time to time. However the rate at which a variety deteriorates through this natural tendency to "go to pieces" is comparatively very slow. By rogueing out these faulty plants as soon as they appear a variety can be maintained at a high state of productivity and uniformity almost indefinitely. But this cannot be done efficiently except by some one who is trained for work of this nature.

**Keeping a Cotton Variety Pure**

In view of the seriousness of gin mixing and cross pollination as a cause of the deterioration of cotton varieties, it becomes readily apparent that measures should be employed to correct the faulty practices in cotton growing and handling that permit these degrading influences to exist. Simply by growing a pure variety in an isolated field, cross pollination can be prevented. Or where for any reason isolation is not possible, that part of the crop most favorably located for crossing to take place can be discarded as a source of planting seed. The control of gin mixing, however, is not so simple and requires considerable effort on the part of the grower and the cooperation of the ginner.

In handling the crop from a pure seed increase field a number of special precautions must be taken to prevent mixing of the seed by the gin and by other mechanical means if more than one variety is
produced on the same farm, and also to insure that the seed will germinate properly. The chief precautions are as follows:

(1) All picking sacks, wagons, cotton houses, or other containers used in harvesting and storing the crop should be thoroughly cleaned before picking begins.

(2) The crop should be picked over as often as necessary to insure that the seed will not be unduly exposed to the danger of loss by storms or lowering of germination by weathering.

(3) Before the crop is ginned, all gin parts where mixing may occur, including the suction pipe, overhead cleaner, gin stands, distributor belt, and seed conveyor should be thoroughly cleaned. A screw conveyor is very difficult to clean, and unless a gin is equipped with the belt type it is best to allow the seed to fall on the floor in front of the stands after it has been swept clean of stray seed, dirt, and trash.

(4) The seed should then, as a rule, be sacked in even weighted bags and properly labeled. Seven or eight ounce burlap bags that will hold 100 pounds of cotton seed is a convenient size, and the open weave permits the seed to dry. They should be stored in dry, well ventilated buildings by stacking in such a manner as to permit the air to circulate freely between them. Additional precautions may be required in handling the seed from that part of the crop harvested early in the picking season or shortly after rains, in order to prevent heating and loss of germination while in storage.

Considerable time is required to clean a gin and gin operators are justly reluctant to stop their machinery on busy days long enough for a thorough job of cleaning to be done. For this reason it is best for the ginner and farmer as well, to postpone the ginning of the good variety until such time as the gin would otherwise be idle. Slack periods occur after rains or toward the end of the picking season that can be utilized to an excellent advantage for saving pure seed. In the meantime, of course, storage must be provided for the seed cotton, preferably in a separate cotton seed house or a special bin in such a house constructed in a manner that no mixing with other seed cotton stored in the adjacent bins can take place.

But notwithstanding all these well known safeguards for maintaining pure seed of superior varieties, it cannot, or at least has not, been done effectively in many cases where the seed is subjected to even the small amount of mixing and crossing year after year which invariably occurs under the prevailing system of growing a number of varieties in the same community, and ginning them on the same gin. Obviously then the best procedure for farmers who are
interested in keeping seed pure is to unite in growing only one va­
riety, and ginning on a cooperating gin that handles this variety
exclusively. This one variety plan is by no means new, but has long
been advocated by Cook and his co-workers in the United States De-
partment of Agriculture, and by state experiment stations.

Clearly the outstanding advantage of the one variety plan is to
be found in the fact that it provides year after year an easy means
of higher production and better quality of lint, through the use of
good seed that automatically becomes available to the farmer at the
lowest possible cost. But there are other advantages. Communities
that build a reputation for the production of high quality seed can
often dispose of a good portion of their surplus to unorganized growers
at a premium over oil mill prices. Also there is a price advantage
to be derived from the sale of large commercial quantities of good
uniform fiber that is not possible in mixed variety communities.

The type of organization required for the successful operation of
a one variety production program will vary from one community to
another. There are, however, certain fundamental points on which
there should be definite understanding and agreement in all cases:

(1) A variety must be chosen that is acceptable to all the growers.
In view of the present information there seems to be no question but
that the choice might well be limited to Stoneville 2-B, Ambassador
(Stoneville 4-B) and Deltapine 11A. Information given earlier in
this circular on the relative adaptation of these varieties to various
soil fertility levels, and on relative earliness, boll size, plant type,
staple length, etc., affords a sound basis for the final selection of one
of them for growing on a community basis.

(2) Pure seed stocks must be made available to the growers. The
cost of a sufficient quantity of pure seed direct from the breeder
for planting the entire acreage of all cooperative growers the first
year might be prohibitive. It would then be necessary for each mem-
ber to produce enough seed of the chosen variety in an isolated field
to provide seed for his entire acreage the next year. Or a much better
plan would be for a few growers (preferably one or two) to accept
the responsibility of producing the required amount of pure seed
to be sold to the others at an equitable price agreed on in advance.
Thereafter each grower could save seed from his own crop until
such time as it seemed necessary to bring in another stock of seed,
either of the same variety or a different one. It would again be ad-
visable for a few of the growers to take over the responsibility of pro-
ducing enough seed to supply the whole community the next year.
(3) Arrangements must be made for ginning the crops on a gin that excludes all other varieties. A guarantee by the growers to deliver the output from an acreage calculated to furnish enough cotton for a capacity run during the peak of the ginning season, and a return guarantee by the ginner to exclude all other varieties, would appear to be an attractive arrangement for both parties. By separate ginning to prevent mechanical mixing of seed, and careful isolation to prevent crossing, a variety can be kept pure and productive for many years.

Other Factors in Producing Good Cotton Crops

The importance of growing a superior adapted variety has been emphasized, and practical means of keeping the seed pure are given. Perhaps there is no other production factor of equal importance that lends itself so readily for adoption on every cotton farm as that of using good seed of a good variety. Yet there are several additional factors involved in the production of profitable crops, and the neglect of one will lessen the effectiveness of the other. Among these are:

1. Keeping the soil productive by growing legumes and returning at least a part of these crops to the land in the form of animal or green manure.

2. Putting the land in good condition for the crop by thorough seedbed preparation.

3. Planting as soon as temperature conditions are favorable for prompt germination. Usually this is about the first of May, though in some seasons excellent results are obtained from earlier plantings.

4. Planting 1 to 1 1/2 bushels of seed high in germination to insure enough plants for thinning to a uniform stand of one to three plants in the hill with the hills 10 to 14 inches apart.

5. Careful and thorough cultivation, especially during the early growth stages of the crop, that will conserve the stand and control weeds and grass. Cultivating deeper or more often than necessary for complete control of weeds may, particularly in the case of deep, late cultivation, cause a reduction in yield.

6. Picking the cotton with reasonable promptness after the bolls are open. This can regularly be accomplished only by making certain well in advance that the required labor force will be available when it is needed. Growers who depend mainly on transient pickers may suffer unnecessary losses both in quality and quantity of their crops.