A METHOD OF PROPAGATING VARIETIES OF COTTON FROM VERY SMALL AMOUNTS OF SEED.

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INTRODUCTION.

In raising plants from the seed of a single selected boll of cotton, or from the seed of a boll which is the result of a deliberate cross or self-pollination, it will be realized that the ordinary method of field sowing which requires the planting of four or five seeds per seed-hole involves an unjustified waste of precious seed, especially in view of the fact that in the final thinning of the crop all but one of the plants in each hill have to be removed. The alternative method of planting only one or two seeds to the hill gives invariably a poor stand. An improvement can be effected in the germination by covering the sown seed with sand instead of with ordinary soil. But even the use of sand does not always ensure a good stand of the resulting crop. This is especially the case when a spell of cold weather immediately succeeds the sowing of the crop. This difficulty of getting a good germination is more marked in heavier soils than in light soils. Unfortunately, the soil of majority of the breeding plots of cotton at the Agricultural Experimental Station, Baghdad, happens to be of a heavy nature. It is a heavy silt soil, rich in lime and difficult to work. In the course of breeding cottons during the past three years in the locality the writer has often had to be contented with only a few plants, when his requirements both for genetic study and the propagation of new strains demanded the raising of as large a number of plants as possible from the strictly limited quantity of seed at his disposal.

During the sowing season of 1923 an experiment was carried out to determine the possibility of transplanting cotton seedlings with a view to raise the largest possible number of plants in the breeding or propagation of a new type from a limited quantity of seed.

It is generally considered that cotton plants cannot be transplanted successfully under commercial conditions. But for purely "experimental" purposes, and under very special conditions of culture, the successful transplantation of cotton seedlings is not a difficult matter.

METHOD OF THE EXPERIMENT.

The method adopted in the experiment may be summarized as follows: A layer of sand about 2 inches in thickness, and resting on a piece of tin measuring 12 by 8 inches imbedded at surface level in a plot of land, was used as a seed bed. In this particular experiment there were four such beds lying side by side on the ground. A shallow groove was prepared in the soil round each bed. In order to keep the sown seed sufficiently moist for germination, water was let in this groove when required.

On April 24, 350 seeds of the variety of cotton called *Webber* 49-3 were sown at 1-inch intervals in these four beds of pure sand. Before sowing the seeds had been kept overnight in water.

After the completion of germination these layers of sand along with the basel plates of tin were removed *en bloc* into sieves made of close-meshed wire gauze, the margins of which had been sent upwards. These sieves were then held over a slowly running stream of water, in such a way that the water of the stream could effectively wash away the sand, but could not carry any germinated seedlings with it. After all the seedlings had been washed, they were carefully transferred to a basin of water, which

was covered with a piece of black cloth to prevent the sunlight from falling directly on the roots of the young plants.

Two days previous to the washing of the germinated seedlings a small plot of land had been ridged; and, in conformity with our field practice for commercial cotton cultivation, the land was given a presowing irrigation to determine the water line on the ridges in the plot. The washed seedlings were now planted on these ridges in holes of requisite depth made along the previously determined water line. The planting was done by inserting in an upright position the whole of the radicle and half the length of the hypocotyl of each seedling into the seed-hole, which was subsequently filled with sand, care being taken to leave uncovered the cotyledons and that part of the hypocotyl immediately below them. The rate of planting was originally two seedlings to the hill, but as the root tips of some of the young plants were broken through careless handling, the rate of planting was increased to three seedlings per hill. In this way a total of 113 hills was transplanted.

A light watering was given immediately after sowing, and another watering a week later. No other irrigation was given until the plants actually required it a month later.

RESULTS OBTAINED.

The data collected in the experiment are given in the subjoined table.

1	2	3	4	5	6	7	8
Date of sowing	Number of seeds Sown in Sand	Number of seeds Germinated	Percentage of Germination	Number Days taken to complete Germination	Date of Transplanting the Seedlings	Number of Seedlings Transplanted	Rate of Planting
April 24, 1923	350	340	97·1	Six	May 1, 1923	339	Three Seedlings per hill

9	10	11	12	13	14	15	16
Total Number of Hills Sown	Number of Hills with Successful seedlings			Successful Hills as a Percentage of Hills Sown	Total Number of Plants Survived	Survived Plants as a Percentage of the Total Number of Seedlings sown	Remarks
	Two Seedlings per Hill	Three Seedlings per Hill	Total				
113	67	44	111	98·2	266	78·4	Figures given in columns 10 and 11 are those recorded on June 5, 1923

This table is largely self-explanatory. We may, however, refer to the fact that the number of seedlings surviving on June 6 when expressed as a percentage of the total number of seedlings originally sown (see column 15 in the table) is not very high. The low percentage of seedlings that survived may be explained by the fact that the root tips of some of the seedlings had been injured during the operation of planting them on the ridges. Given the careful handling which is necessary at the time of washing the seedlings, and also subsequently at the time of planting them on the ridges, it should be possible to obtain results much better than those obtained in the experiment described above.

SUMMARY.

The comparatively small number of seeds produced per boll of cotton is a decided disadvantage so far as breeding from single bolls is concerned.

The ordinary method of sowing cotton is not suitable for growing plants from the seed of a single selected, selfed, or cross-pollinated boll, because it is wasteful. The cotton breeder cannot afford to sow four or five seeds to the hill and then remove a majority of the plants in the event of a good germination being secured.

When only very small amounts of seed are available, a satisfactory stand of cotton seedlings can be obtained by raising a crop in pure sand, washing the germinated seedlings in running water, and finally planting them on ridges in the way described in the foregoing pages.

To obtain really good results great care should be exercised both when washing the seedlings and subsequently when transplanting them into their permanent position. Injury to root tips should be avoided at all costs.—The Empire Cotton Growing Review, Vol. II. No. 1.