Growing Cotton by Transplantation

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Crop seeds are generally sown directly. It is possible, however, first to raise seedlings in a nursery or seedbed, and then transplant them in the field. This practice, known since early days, is usually applied with vegetables (tomatoes, peppers, etc.). In the case of farm crops, tobacco is traditionally grown by transplanting, and in many countries this practice is applied successfully also to rice. Transplanting maize, potatoes, mangolds, and sugar beets gave striking results in Bavaria (12). In Canada, yield increases of 36 and 52% have been obtained with transplanted sugar beets (1). Transplanting is mostly indicated where crop seeds are small or delicate, the growing season is relatively short, or for obtaining higher yield and earlier crops.

Attempts to apply the above method to cotton seem to have started in Turkestan as early as 1912; but they were mostly unsuccessful, since 70% or more of the seedlings perished during the process. Tests were resumed after 1924, and the results proved so encouraging that in the 1930s cotton was reported to be grown by the new method on thousands of hectares.

According to a number of Russian workers, the benefits of transplanted cotton are many. Plants flower and mature their crop much earlier than cotton sown directly, and this is of exceptional importance in the case of late varieties, such as the Egyptians (5, 6, 11). With regard to the technique used, 4 to 5 seeds were sown in small paper pots; the pots were placed in seed-beds, heated by a 30-cm. layer of decomposing farm manure. The method was described in detail in a number of earlier Russian publications (2, 4, 13, 14).

In recent years, there is hardly any reference to growing cotton by transplantation. In the Soviet Union, developments after the war are unknown (the method does not seem to be now applied commercially). But according to personal information, transplanting is practiced on a considerable scale in China, and in North Korea, where the growing period is rather short.

In the Belgian Congo, tests in 1948 showed that transplanting results in reduced yields (7). In Peru, the practice was new in 1959, but its many advantages over direct sowing were recognized (9). Then, as mentioned in a short note by Kulkarni et al. (8), transplanting of long staple cotton in India met with success (survival about 95%). The new method is applied commercially on a few hundred hectares in Yugoslavia and Bulgaria, where a simple moulding contraption is used for making soil cubes.

The present paper deals with experimental work, carried out in Greece, for studying growing cotton by transplanting as compared to direct seeding.

MATERIAL AND METHODS

The first tests on transplanting started in Greece at the Cotton Research Institute as early as 1934; they lasted until 1940. Transplanted seedlings had bare roots, as is the case with tobacco. The results were not encouraging because of a low rate of survival and a relatively long period needed for recovery after transplanting. On the average, only about half of the transplanted seedlings survived and yields were not improved. Further experience led to the development of better techniques, which were applied in a set of experiments carried out in 1958–61 and dealt with in this paper.

In these tests three seeds were sown in small soil cubes or in soil in paper pots. Cubes or pots were about 10 cm. long and 5 cm. in diameter; the soil was a suitable mixture of loam, farmyard manure, and peat. Damage to seedlings by soil diseases or insects was avoided by disinfecting with a combination of zinblende and aldrin (30 and 3 g. of active material per cubic meter of soil, respectively). Captan (10) gave good results at 10 g. per cubic meter. Cubes or pots were placed in a cold temporary seed-bed, protected only by a cover of plastic, burlap sheet, or other suitable material. Seed-beds were sown at the beginning of March. Transplanting was done at the end of April or the beginning of May. At that time the seedlings had acquired 4 to 6 permanent leaves and reached 15 to 20 cm. in height. If seed-beds are properly taken care of, soil cubes or pots with well-developed seedlings need not be less than 80% of those sown. Cubes or pots, after being placed in their permanent position in the field, need watering unless the soil is well provided with moisture or rains follow. After transplanting, the field is treated as if cotton were sown directly.

The foregoing technique has been indicated by the results of numerous field trials, carried out for this purpose. Modifications will, no doubt, be needed if working under different conditions.

EXPERIMENTAL RESULTS

During the 4-year (1958–61) period, 11 transplanting experiments have been carried out at Sindos. To save space they are not described in detail, but their results with regard to yield and earliness are summarized in Table 1.

In the exploratory test of 1958, the effect of transplanting was studied with 3 cotton varieties: 2 Upland (16X and IOE) produced at the Institute and 1 Egyptian (selected from Menouf). A large number of characteristics were considered. They included: seedling survival after transplanting, number of flowers (opening flowers were counted every day), mean date of flowering, number of bolls picked (17 pickings from August 11 to October 10), mean date of picking (according to boll number, not their weight), boiling period (determined for every boll separately), weight of individual bolls, yield of seed cotton, earliness in maturity (according to the method described by Christidis and Harrison (3)), lint percentage, lint length, fibre strength (Pressley), and fineness (Micronaire).

The results are summarized in Table 2. To reduce the amount of figures, the data are given in differences, "transplanting minus direct seeding", instead of separately for each of the two methods. LSD quoted is always based on

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