Hybrid Vigor from Natural Crossing for Improving Cotton Production

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Crop production in the United States has been increased materially within recent years by the use of hybrid seed. The most outstanding example of accomplishment in this field has been in the production of hybrid corn. Although breeding methods that utilize hybrid vigor have been applied with notable success in the production of other crops, no serious effort has been made to produce hybrid cottonseed for commercial planting. This is not due to poor response of cotton to hybridization. The superior performance of hybrids between compatible cotton varieties is well supported by experimental evidence.

The possibility of utilizing hybrid vigor for increasing the productivity of cotton has been mentioned by numerous authors. As early as 1909, Cook (2) suggested the use of interspecies first-generation hybrids for commercial cotton production. Brown (1), in his text on cotton, comments on the superior performance of first-generation hybrids, but states that, "no great amount of importance can be attached to them because they are not likely to reproduce their valued qualities". Recently, Kime and Tilley (5) have published the results of comprehensive tests on hybrid vigor in upland cotton and have adequately reviewed the pertinent literature on this subject.

The cotton plant produces a perfect flower which readily pollinates itself, but the large, showy flowers attract numerous pollen-carrying insects. In certain sections of the Cotton Belt, consequently, there is a high rate of random cross-fertilization. At Knoxville, Tenn., experiments have indicated that natural crossing among plants may normally reach 50%. On the basis of this high rate of natural crossing, considerable hybrid vigor might be expected in the progeny of plants grown adjacent to others of different genetic complexes. The study reported here was undertaken to furnish information on the effect of such natural crossing on the yield and quality of cotton.

MATERIALS AND METHODS

Seed of seven varieties of cotton was obtained from two sources, viz., (a) from isolated fields, as is customary in commercial cottonseed production; and (b) from open-pollinated plants in the 1946 variety test at Knoxville, Tenn. That test included 25 upland varieties in replicated, randomized plots. The open-pollinated seed from this test, then, had been exposed to natural crossing, largely at random, with a varied assortment of genetic types. For convenience, this seed is designated as "crossed" and, by contrast, the ordinary varietal seed is designated as "inbred". Actually, of course, the inbreeding of the latter is only within the parent variety.

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2Agronomist, U. S. Dept. of Agriculture.

3Figures in parenthesis refer to "Literature Cited", p. 979.