Mechanical Separation of Hybrid and Self-Pollinated Seed as a Means of Increasing Percentage Hybrids in Upland Cotton

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HYBRID vigor has been utilized extensively in many crops, but a method is not currently available for large-scale production of cottonseed consisting of a high percentage of F1 hybrids. Cotton has a perfect flower which makes production of large quantities of F1 hybrid cottonseed difficult. Also, cotton pollen is not wind-borne and must be carried from flower to flower by insects. Simpson (9) reported that the percentage of natural crossing at various locations in the Cotton Belt ranged from 7 to 49% for 1948-52. Loden and Richmond (4) reviewed reports of hybrid vigor in cotton and indicated that many agronomically desirable characters of cotton, including yield of seedcotton, exhibit heterosis.

Cotton geneticists have tried to develop a workable method of utilizing male-sterility to produce hybrid cotton, but no successful method has been reported in the literature. Kohel and Richmond (3) reported that lint yield reduction on male-sterile plants in a natural-crossing block would make the production of F1 hybrid seed very costly even in areas where natural-crossing is high.

Since a workable method of producing large quantities of F1 hybrids is not available, methods of producing partial hybrids are being investigated. Ware (10) reported that seeds produced on F1 cotton plants were larger than seeds produced on their parent plants. Pressley (7), and Ganesan (1) reported that F1 cottonseeds are often heavier than those of either parent. The most striking differences were reported by Ganesan, who found that the F1 seeds from crosses of strains of Gossypium arboreum L. were 21 to 41% heavier than those of the self-pollinated parents.

These findings are in accordance with those reported by corn researchers. Whaley (11) reviewed the literature pertaining to hybrid vigor in seed and indicated increased F1 seed weight is common in corn. Whaley (12) indicated that F1 corn kernels from selected crosses exceeded the weight of their larger parent, but that most crosses produced kernels that were intermediate between those of their parents.

If heavier cottonseeds are also larger, it might be possible to remove hybrid seeds from mixed populations with sieves. Hand crosses made in 1958 and 1959 indicate that some parental combinations produced F1 seeds that were larger than self-pollinated seeds from the respective female parent. Additional studies were initiated in 1960 and 1961 to determine whether these results could be duplicated under natural-crossing conditions.