

**DEVELOPMENT OF BREEDING POPULATIONS IN COTTON THROUGH RANDOM MATING****Osman A. Gutierrez, Johnie N. Jenkins and Jack C. McCarty****USDA-ARS****Mississippi State, MS****Daryl T. Bowman****North Carolina State University****Raleigh, NC****Clarence E. Watson Jr.****Mississippi State University****Mississippi State, MS****Abstract**

Collection, evaluation, development, and maintenance of crop germplasm are for public crop improvement programs. The hybridization of superior cultivars followed by selection in a breeding program has been the main approach utilized to obtain genetic improvement of cotton (*Gossypium hirsutum* L.). Grower demands for higher yield and better fiber quality and a strictly mechanized farming system as well as many other factors have narrowed the germplasm base in modern cotton cultivars. Genetic diversity provides protection against disease or insect epidemics and is the basis for genetic gain. Linkages between desirable and undesirable loci can contribute to slow genetic progress from selection. Random mating has been successfully used in self and cross pollinated crops to break negative association between traits. The objectives of this study were: 1) to develop improved populations via breakage of linkages and accumulation favorable linkages and 2) to assess effect of three cycles of random mating on recombination and correlations among agronomic traits. Fifty five half-sib families Cycles C<sub>0</sub>, C<sub>1</sub>, and C<sub>2</sub> developed by bulked-pollen methodology and fifty five F<sub>2</sub>-bulk populations were grown at the Plant Science Research Center, Mississippi State, MS in the summer of 2004 at two locations in a randomized complete block design with four replicates. Correlations between parents and their F<sub>2</sub> bulk-population averages for boll size, lint percent, seed cotton yield and lint yield were highly significant. Correlations between parents and C<sub>0</sub>S<sub>1</sub> and C<sub>1</sub>S<sub>1</sub> averages were highly significant only for lint percent. Results indicated that recombination for alleles conditioning lint percent may have not been obtained; however, recombination for alleles conditioning the other traits was obtained. Random mating is a good tool that can be used in the development of improved breeding populations in cotton.