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Diallel analysis for combining ability for yield and fiber quality traits in upland cotton (*G. hirsutum* L.)

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Abstract

Cotton (*Gossypium hirsutum* L.) is an important fiber crop, grown in tropical and sub-tropical regions of the world. During 2022-23, cotton contributed approximately 0.3% to GDP and 1.4% to the value addition in agriculture of Pakistan. Seed cotton yield in Pakistan is lower as compared to other countries, emerging challenges of climate change, declining land and water resources require exploration of new breeding approaches like heterosis breeding for sustainable cotton production. For this purpose, a research was conducted in experimental area of Department of Plant Breeding and Genetics, University of Agriculture, Faisalabad. Three parent genotypes, *i.e.* CIM-663, FH-305 and BS-49 during winter season in glasshouse collected from seedbank of department and crosses made with full diallel mating design. Evaluation of six F₁ genotypes and three parent varieties were proceed in field by following randomized complete design with two replications during Kharif season 2023. The data for various quantitative traits like plant height, sympodial branches, boll weight, number of bolls per plant, number of nodes per plant, first fruiting node, seeds per boll, seed index, seed cotton yield, lint mass per plant, ginning out turn, fiber length, fiber strength, and fiber fineness were recorded. Recorded data subjected to analysis of variance and analyzed by using Griffing's approach for estimation of GCA and SCA. Among the parents FH-305 and BS-49 exhibited superior GCA for most of the traits. Among the crosses FH-305 × BS-49 showed high specific combining ability. Furthermore, SCA variance found to be better than GCA variance and RCA variance for most of the genotypes. In this study, most of the traits found under the control of dominance gene action. These best performing parents can be further utilized in future breeding programs for varietal improvement purpose.

Keywords: *Gossypium hirsutum*, Heterosis breeding, Diallel analysis, Combining ability, Climate Change

