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**HETEROSIS AND COMBINING ABILITY ANALYSIS FOR SEED
YIELD AND ITS COMPONENTS IN SESAME (*Sesamum indicum* L.)**

ABSTRACT

Key Words: Combining ability, Gene action, Heterobeltiosis, Sesame, Standard heterosis

The present investigation on “Heterosis and combining ability analysis for seed yield and its components in sesame (*Sesamum indicum* L.)” was carried out at Sagadividi Farm, Department of Seed Science and Technology, College of Agriculture, Junagadh Agricultural University, Junagadh during Summer 2016. The experimental material comprising by 8 lines, 5 testers, their resulting 40 hybrids and standard check Guj.Til-2 were grown in order to estimate heterosis, combining ability and nature of gene action involved in the inheritance of seed yield per plant (g) and its components viz., days to 50 per cent flowering, days to maturity, plant height (cm), height to first capsule (cm), number of branches per plant, number of internodes per plant, length of capsule (cm), width of capsule (cm), number of capsules per plant, number of capsules per leaf axil, number of seeds per capsule, 1000-seed weight (g) and oil content (%). The experiment was conducted in Randomized Block Design with three replications. Observations were recorded on five competitive randomly selected plants per replication per treatment for all the characters except days to 50 per cent flowering and days to maturity, which were recorded on plot basis and the mean values were subjected to analysis of variance, estimation of heterosis and combining ability analysis.

The analysis of variance for experimental design revealed highly significant differences among genotypes and hybrids for all the characters indicating the presence of sufficient amount of genetic variability for all the fourteen traits studied. While, differences among parents were also found highly significant for all traits. Mean squares due to parents vs hybrids were also found highly significant for all the characters except for length of capsule, width of capsule, 1000-seed weight and oil content.

High magnitude of heterosis was observed for days to 50 per cent flowering, number of branches per plant, number of internodes per plant, number of capsules per plant, number of seeds per capsule, 1000-seed weight and seed yield per

plant. Whereas, the magnitude of heterosis was moderate for plant height, height to first capsule, length of capsule, and low for days to maturity, width of capsule and oil content. The heterobeltiosis for seed yield per plant ranged from -46.82 per cent to 50.00 per cent, while the standard heterosis ranged from -25.96 per cent to 77.81 per cent. The cross RT 33 x Guj.Til-10 recorded the highest standard heterosis for seed yield per plant followed by DPI 1484 x Guj.Til-2, TC 66 x Guj.Til-2 and DPI 1484 x Guj.Til-1. These crosses also exhibited desirable heterosis for important yield attributes suggesting that the heterosis for seed yield was associated with heterosis for component characters.

Analysis of variance for combining ability revealed that the mean squares due to lines, testers and lines x testers were significant for all the characters except for mean squares due to testers for number of seeds per capsule and due to lines x testers interaction, except for plant height and oil content, which indicated the importance of both additive and non-additive genetic variances in the expression of these characters.

Higher magnitude of σ^2_{gca} as compared to σ^2_{sca} for characters *i.e.* plant height, number of internodes per plant and oil content indicated the involvement of additive gene action. Higher magnitude of σ^2_{sca} than σ^2_{gca} observed for all the remaining eleven characters including seed yield per plant, indicated that the predominance of non-additive gene effects in the inheritance of these characters.

The lines IC 96128, TC 66 and DPI 1484 and the testers Guj.Til-4 and Guj.Til-3 displayed high gca effects and good *per se* performance for seed yield per plant and some desirable traits. These parents possessed high concentration of favourable genes for more number of traits and should be utilized in multiple crossing programmes.

The sca effect of the crosses indicated that eleven hybrids manifested significant and positive sca effects for seed yield per plant. Among these, the best three specific combiners were RT 33 x Guj.Til-10, LIMDI 9 x Guj.Til-1 and TC 66 x Guj.Til-2. These crosses also showed desirable sca effects for important yield traits. The crosses exhibiting high sca effects involved either average x good, good x poor, average x poor, poor x average, poor x poor or good x good general combiners for majority of characters indicating the presence of additive x dominance, dominance x dominance and additive x additive type of gene interactions. The use of recurrent selection or biparental mating followed by pedigree selection may proved to be effective in simultaneous exploitation of both the type of gene actions for improvement of seed yield and its attributes in sesame.