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RESEARCH PAPER

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Studies on combining ability for bio-energy traits in sweet sorghum [*Sorghum bicolor* (L.) Moench]

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An investigation was carried out to assess the nature of combining ability and gene action in respect of bio-energy traits in 72 new hybrids of sweet sorghum developed by crossing 4 male sterile lines and 18 testers in line × tester mating design and grown in Randomized Block Design with two replications during *Kharif* 2008 at 'K' Block of Zonal Agricultural Research Station, University of Agricultural Sciences, GKVK, Bengaluru. The variance among the lines (for juice yield and total sugars), testers (for juice yield) and line × tester interaction (for all the characters studied) in respect of their general combining ability were highly significant indicating predominance of non-additive gene action in genetic control of these traits. ICSA 84, ICSA 38 and ICSA 264 among the lines and NTJ 2, E 36-1 and GD 65008 among the testers, were identified as good general combiners indicating their ability in transmitting additive genes in the desirable direction to their progenies. Highly significant *sca* effects were observed for all the characters studied and good specific combiners for different characters involved parents with high × high, high × low, low × high and low × low general combinations.

Key words : *Sweet sorghum, Bio-energy traits, Combining ability*

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INTRODUCTION

In any plant breeding programme, combining ability provides necessary information on nature and magnitude of gene action involved which helps for selection of parents for breeding programme. The line × tester mating design helps in assessing the combining ability of parents there by selection of superior parents as well as cross combinations (Sprague and Tatum, 1942). Accordingly, the present study was carried out to assess the nature of combining ability and gene action in respect of bio-energy traits in 72 hybrids and their 22 parents of sweet sorghum [*Sorghum bicolor* (L.) Moench] supplied by Directorate of Sorghum Research and ICRISAT, Hyderabad.

RESEARCH METHODOLOGY

The experimental material used in the present investigation comprised of 72 new hybrids developed by using 4 male sterile lines with 18 testers through line × tester mating design and their 22 parents (4 B lines and 18 testers) which were grown in Randomized Block Design with two replications during *Kharif* 2008 at 'K' Block of Zonal Agricultural Research Station, University of Agricultural Sciences, GKVK, Bengaluru. Each entry was raised in single row of 3m length following recommended spacing of 45cm × 15cm. All the package of practices were followed to raise a good and healthy crop. Observations were recorded on five randomly selected tagged plants in each entry in respect of seven characters *viz*., cane weight, Brix per cent, juice yield, reducing sugars, total sugars, ethanol yield and grain yield. The mean values of these five plants were used for combining ability analysis as per the method suggested by the earlier workers (Kempthorne, 1957 and Arunachalam, 1974).

RESULTS AND ANALYSIS

The variance among the lines was significant for juice yield and total sugars, whereas the variance among the testers was significant for juice yield. However, the variance due to line × tester interaction was highly significant for all the characters indicating interaction of different lines with different testers. It is evident from the study that, SCA variances were higher in magnitude