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Diallel analysis for yield and yield components in pearl millet

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Combining ability was studied in 8x8 diallel set, excluding reciprocals, for grain yield and its 12 attributes in pearl millet. Both GCA and SCA variances were highly significant for all characters. The predictability ratio of GCA and SCA revealed preponderance of additive genetic variance for plant height, ear head length, ear head girth and 1000 grain weight, whereas, non-additive genetic variance for days to 50 per cent flowering, days to maturity, number of effective tillers per plant, fodder yield per plant, harvest index and grain yield per plant, while, both were equally important for number of nodes, ear head weight and threshing index. The parents like J-2420, J-2441, J-2440 and J-2340 were identified as good general combiners for grain yield per plant and some other components. Majority of their crosses had also displayed significant and desirable SCA effects, coupled with high *per se* performance for grain yield per plant. The hybrids viz., J-2420 x J-2480, J-2340 x J-2440 and J-2440 x J-2420 were the most promising having good SCA, alongwith with high *per se* performance and heterobeltiosis for grain yield. Analyses of crosses revealed majority of the superior crosses were involved high x low; and few cases high x high or low x low general combiners.

Key words : Combining ability, Pearl millet, Diallel cross, Grain yield.

INTRODUCTION

Efforts to develop pearl millet inbreds have greatly increased since the discovery of cytoplasmic-nuclear male sterility (Burton, 1958) and the development of single cross forage and grain hybrids. With the production and extensive testing of single crosses with Tift $23A_1$, Indian breeders were able to announce the release of 'HB-1' first pearl millet hybrid in 1965 (Athwal, 1965). Restorer lines are used as pollinators to produce commercial hybrids. They should have good general combining ability (GCA), but also high specific combining ability (SCA), completely restorer male fertility in grain hybrid, confer stable fertility restoration, have similar or less days to flowering as A-line, produce large amounts of pollen, and confer desirable agronomic traits to the hybrid (Andrews, 1987). Combining ability studies regarded useful to select best combining parents, which upon crossing would produce more desirable segregates. Such studies also elucidate the nature and magnitude of gene actions involved in the inheritance of grain yield and its components, which will decide the breeding programme to be followed in segregating generations. Good combining ability of improved inbreds is essential because inbreds are usually used to produce hybrids and synthetics. Both GCA and SCA are important, depending on the use of the inbred and traits of interest (Kumar *et al.*, 1982; Gartan *et al.*, 1988). Accordingly, the present study was undertaken to have an idea on the nature of gene action involved in the inheritance of quantitative traits and to identify appropriate parents and crosses for development of new restorer lines in pearl millet.

MATERIALS AND METHODS

Eight genetically diverse inbreds of pearl millet viz., J-2340, J-2405, J-2440, J-2441, J-2444, J-2454, J-2420 and J-2480 were crossed in all possible combinations excluding reciprocals at the Main Millet Research Station, Junagadh Agricultural University, Jamnagar (Gujarat) during summer 2005 to generate a diallel set. Eight parents' alongwith their 28 F_1s were evaluated for grain yield and 12 yield components in a Randomized Block Design with three replications at Instructional Farm, College of Agriculture, Junagadh Agricultural University, Junagadh (Gujarat), India, during *Kharif*-2005. Each entry was sown in single row of 4.0 m length having 60 x 15 cm crop geometry. All the recommended cultural practices were adopted to raise good crop of pearl millet. Observations were recorded on five randomly selected competitive plants for each entry, in each replication for 13 characters (Table 1). Days to 50 per cent flowering and days to maturity were noted on the basis of whole

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