

## Heterosis studies for grain yield and its components in Pearl millet

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### ABSTRACT

The present study was carried out to estimate the nature and magnitude of heterosis for grain yield and its attributing traits through line x tester fashion involving four CMS lines and 12 restorers in pearl millet. The magnitude of heterosis varied from cross to cross for all the characters studied. The high level of heterosis was observed for grain yield per plant and ear head length, while moderate heterosis was found for length of protogyny, plant height and harvest index. The number of effective tillers per plant and ear head girth exhibited the least heterosis. Maximum positive heterosis for grain yield per plant over better parent and standard check (GHB-719) was observed to be 105.71 and 11.30 per cent, respectively. The cause of heterosis in grain yield might be due to its component traits, mainly, ear head length, plant height and harvest index. Three most promising hybrids viz., JMSA-20072 x J-2290, JMSA-20073 x H-77/833-2 and ICMA-98444 x J-2498 having high heterosis, *per se* performance, coupled with high SCA effects and involved both or at least one good combiner parents for grain yield.

**Key words :** Heterosis, *Pennisetum glaucum*, Line x Tester, Grain yield

### INTRODUCTION

The exploitation of heterosis in pearl millet was considered easy with its protogynous flowering and high out-crossing rates (Chavan *et al.*, 1955). The availability and knowledge of cytoplasmic-nuclear male sterility (CMS), the development of CMS lines, and their maintainers and restorers, made it possible to produce the seed of commercial single-cross F<sub>1</sub> grain hybrids in India (Athwal, 1966). The magnitude of heterosis provides a basis for genetical diversity and a guide for the choice of desirable parents for developing superior F<sub>1</sub> hybrids to exploit hybrid vigour and for building gene pools to be employed in breeding programme. Keeping this in view, the present investigation was carried out to know magnitude of heterosis for grain yield and its components in pearl millet.

### MATERIALS AND METHODS

Four cytoplasmic-genetic male sterile lines (ICMA-95444, ICMA-98444, JMSA-20072, JMSA-20073) and 12 diverse restorer lines (J-2290, J-2340, J-2405, J-2433, J-2454, J-2467, J-2474, J-2479, J-2483, J-2495, J-2498, H-77/833-2) were crossed following line x tester mating design during summer-2009. A set of 65 genotypes comprising of 48 F<sub>1</sub>s along with fertile counter parts of four male sterile lines, 12 pollinators and one standard check (GHB-719) were sown on 13<sup>th</sup> July during *Kharif*-2009 in a randomized block design replicated thrice at Pearl millet Research Station, Junagadh Agricultural University, Jamnagar (Gujarat), India. Each genotype was grown in a single row of 5.0 m length each with inter and

intra row spacing of 60 x 15 cm. The recommended cultural practices and plant protection measures whenever necessary were adopted for raising the good crop. Observations were recorded on ten randomly selected competitive plants for each entry, in each replication for seven characters (Table 1). Length of protogyny was calculated by deducting days to stigmatic stage from days to anthesis. The recorded data were subjected to analysis of variance technique for each of the characters reported by Panse and Sukhatme (1978). The heterosis as percentage deviation from the better parent (heterobeltiosis) and the standard check, GHB-719 (standard heterosis) for each character were worked out as per the standard procedure given by Fonseca and Patterson (1968) and Meredith and Bridge (1972), respectively.

### RESULTS AND DISCUSSION

The analysis of variance revealed significant differences among the genotypes for all the characters (Table 1), indicating the existence of considerable amount of genetic variability in the experimental materials. Genotypic variances were further partitioned into variance due to parents, hybrids and parents Vs hybrids. Significant differences due to parents and hybrids for all the characters except length of protogyny for hybrids. Mean squares due to parents Vs hybrids were significant for all the characters except for length of protogyny and number of effective tillers per plant. The results of heterosis indicated that the degree and direction of heterosis varied enormously for all the characters studied. Overall, the

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