

Heterosis 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 8 CMS lines and 10 pollinators 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, fodder yield per plant, ear heads weight per plant, ear head length and number of effective tillers per plant, while moderate heterosis was found for 1000 seed weight and harvest index. Ear head girth exhibited the least heterosis. Maximum positive heterosis for grain yield per plant over better parent and standard check (GHB-558) was observed to be 262.15 and 41.05 per cent, respectively. The cause of heterosis in grain yield might be due to its component traits, mainly, ear head weight, number of effective tillers per plant, harvest index and 1000 seed weight. ICMA-98333 X IPC-1518, JMSA-2005 X IPC-1501, ICMA-00777 X IPC-1518, ICMA-98777 X J-2290, ICMA-98333 X J-2290 and JMSA-20021 X J-2290 were the best heterotic hybrids for grain yield and its two or more components.

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

INTRODUCTION

Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is a highly cross-pollinated crop with the advantages of huge genetic variability, protogyny and availability of efficient cytoplasmic genetic male sterility system. These characteristics offer great possibilities of crop improvement through hybridization. Although commercial exploitation of hybrid vigour in pearl millet has resulted in a substantial improvement in the productivity but there is still a need to surpass the plateau achieved in the grain yield. The magnitude of heterosis provides a basis for genetical diversity and a guide for the choice of desirable parents for developing superior F_1 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

Eight cytoplasmic-genetic male sterile lines (JMSA-2005, Pb-214 A, JMSA-20021, Pb-409A, ICMA-98333, ICMA-00777, ICMA-98777, ICMA-99111) and 10 diverse restorer lines (J-2340, J-2290, J-2439, J-2454, IPC-655, IPCA₄R-873, IPC-1518, IPCA₅R-873, IPC-1501, H-77/833-2) were crossed following line x tester mating design during summer-2002. A set of 100 genotypes comprising of 80 F_1 s alongwith fertile counter parts of eight male sterile lines, 10 pollinators and two

checks (GHB-558, MH-169) were sown on 19th June during Kharif-2002 in a randomized block design replicated thrice at Main 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 various characters viz., ear head girth (cm), ear head length (cm), number of effective tillers per plant, ear heads weight per plant (g), 1000 seed weight (g), harvest index (%), dry fodder yield per plant (g) and grain yield per plant (g). The heterosis as percentage deviation from the better parent (heterobeltiosis) and the standard check, GHB-558 (standard heterosis) for each character was computed.

RESULTS AND DISCUSSION

Three best per se performing parents and three top ranking heterotic crosses alongwith range of heterosis and number of crosses showing significant desirable heterosis over better parents and standard check (GHB-558) are presented in Table 1. The results indicated that the degree and direction of heterosis varied enormously for all the characters studied. Overall, the magnitudes of heterotic effects were high for grain yield per plant,

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