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Heterosis and combining ability studies in maize (*Zea mays* L.)

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In investigation, the experimental material comprised of seven diverse parents and their 21 hybrids developed through diallel mating scheme without reciprocals with two standard check hybrids HQPM -1 and Ganga safed -2 was grown in a RBD with three replications during *Kharif* 2012. Analysis of variance indicated the significant differences among the parents and hybrid for all the traits except ear girth which revealed existence of variability in the genotypes and hybrid.

The highest significant positive standard heterosis over better standard check HQPM-1 for kernel yield per plant was exhibited by HKI-193-1 × I-07-30-1-3 (40.35%). On the basis of desirable *per se* performance, significant positive heterotic effects and significant positive SCA effects for kernel yield per plant, the best four hybrids were HKI-193-1 × I-07-30-1-3, HKI-193-1 × I-07-28-2-1, HKI-193-1 × I-07-14-1-1 and I-07-28-2-1× I-07-14-1-1. These hybrids also exhibited high *per se* performance, high heterosis and high SCA effects for yield attributing traits *viz.*, plant height, ear height, ear length, number of kernels per row and protein content. The SCA variance component was observed to be higher than the corresponding GCA variance component for all the traits except number of kernels per row indicating the preponderance of non-additive gene action for the inheritance of all the above traits. The parent HKI-193-1 was identified as good GCA for kernel yield per plant, ear height, ear length, number of kernels per row and shelling percentage. The parent HKI-1040-11-2 was good GCA for days to 50% tasselling, days to 50% silking, days to maturity, plant height, ear height and 100-kernel weight. Whereas parent I-07-30-1-3 appeared to be good general combiner for number of kernels row per ear, number of kernel per rows and 100-kernel weight and also average combiner for kernel yield per plant, shelling percentage and protein content. The highest significant sca effect in desired direction for various characters was exhibited by different hybrids viz., HKI-1040-11-2 × I-07-66-1-1 for days to 50% tasselling and silking, kernel yield per plant and shelling percentage; HKI-193-1 × I-07-14-1-1 for plant height, ear height and ear length; I-07-30-1-3 × I-07-28-2-1 for 100-kernel weight and HKI-193-1 × I-07-28-2-1 for protein content. On the basis of *per se* performance, heterotic response, combining ability estimates, nature of gene action for kernel yield per plant and its component characters test hybrid HKI-193-1 × I-07-30-1-3 was found promising and may be exploited commercially after critical evaluation for its superiority and stability across the locations and over years.

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Abnormalities and abortion in reproductive organs of hot pepper induced by low night temperature

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Low night temperature (LNT) adversely affects productivity of pepper (*Capsicum annuum* L.) grown in unheated greenhouses. Flower abnormalities and abortion were investigated in the local hot pepper vs. Beldi and Baklouti grown in a growth chamber at a day/night temperature regime of low (25/10°C) or optimum night temperature (25/20°C as a control). The LNT induced abnormalities in pepper flowers but sensitivity was cultivar dependent; increased ovary diameter in 'Baklouti' (40% more than that in 'Beldi') was associated with a decrease in style length. Numbers of ovules decreased more than 60% under LNT (more so in 'Baklouti'). In addition, longitudinal lengths and transverse diameters of ovaries measured by transverse section were affected by cultivar and temperature regime. LNT affected pepper floral structures early: Buds and flower bud stages were more sensitive than flowers at the anthesis stage. The abortion percentage of these structures was less pronounced in 'Beldi' (41.5%) than in 'Baklouti' (49.6%) after 5 days of the treatment.

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