

Study on genetic diversity and its relation to heterosis in F_1 hybrids of germplasm lines of brinjal (*Solanum melongena* L.)

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Diversity is an important criterion in the selection of elite germplasm lines to develop highly heterotic F_1 hybrids. The heterosis and diversity study was conducted on 28 F_1 hybrids of brinjal derived from germplasm lines viz., IC-112995, IC-111305, IC-90952, IC-99704, IC-99663, IC-136210, IC-126784 and a local cultivar Manjri Gota at botany garden, UAS Dharwad during summer 2006. Fruit weight (g), number of fruits per plant and fruit yield (g) exhibited considerably high magnitude of heterosis. High heterosis for fruit yield was attributed to increased fruit weight and number of fruits per plant. Thirty six entries comprising 28 F_1 hybrids and 8 parents were grouped in six clusters. Based on parental divergence, all 28 hybrids were grouped in 4 divergence classes. The combination of heterosis and diversity analysis indicated the high frequency of hybrids classified under DC2 and DC3 suggesting moderate genetic diversity is most desirable to produce highly heterotic hybrids.

Key words : Heterosis, Diversity, Brinjal

INTRODUCTION

Genetic divergence is the one of the criteria of selection of parents to produce potential hybrids and for isolation of transgressive segregants from hybrids in further filial generations. This study is important in the view that germplasm lines have their wide varied origin and are highly variable with respect to plant and fruit morphological aspects. As fruit production is gaining importance at domestic and international level, mining in to new germplasm lines and their systematic study is prerequisite to develop new hybrid varieties which can withhold the challenges of both quantity and quality aspects on commercial lines. Though genetically diverse parents yield maximum heterosis, the magnitude of divergence critically matters the F_1 heterosis (Busbice and Rawlings, 1974). More diverse the parents within reasonable range better are the chances of improvement in yield and other yield parameters. In view of this an investigation was carried out to understand the relationship between heterosis and parental divergence in germplasm lines (collected from NBPGR New Delhi).

MATERIALS AND METHODS

The experimental material comprised of eight parents and their all-possible hybrids combinations without reciprocals. Parents and hybrids were planted in randomized block design with two replications in the botany garden of University of Agricultural Sciences, Dharwad during summer season of 2006. Each entry with

spacing of 30x10 cm was represented by two rows with ten plants in each. Observations were recorded on five randomly tagged plants in each entry on number of branches per plant, days to flowering, number of flowers per inflorescence, number of fruits per cluster, fruit weight (g), number of fruits per plant and yield per plant (g).

Genetic divergence was studied following Mahalonobis's D^2 (1936) distance technique. Tocher's method (Rao, 1952) was used for grouping the genotypes. Arunachalam's method (1984) was used to classify the parental divergence in to four divergence classes (DC_1 , DC_2 , DC_3 , DC_4). The procedure used was as follows. The mean (m) and standard deviation (sd) of parental distance were computed. The minimum (x) and maximum (y) values of parental divergence of 28 combinations were derived. Using mean (m), standard deviation (sd), minimum (x) and maximum (y) values, parental divergence was classified into four divergence classes. The mean D^2 of 28 hybrid combinations was 383.32, sd was 342.12, x and y were 26.98 and 1249.36, respectively. Thus four intervals for four divergence classes are then $DC_1 = 725.44$ to 1249.36, $DC_2 = 383.32$ to 725.43, $DC_3 = 41.20$ to 383.31 and $DC_4 = 26.98$ to 41.19. Standardized potence (%) i.e. heterosis over mid parent value of hybrids for yield per plant associated with each divergence class were obtained and for each heterotic hybrid the divergence class to which corresponding D^2 values of their parents was established.

RESULTS AND DISCUSSION

Heterosis estimates over local check Malapur and