

Status of combining ability in relation to other genetic parameters in egg plant

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SUMMARY

The line x tester analysis from 19 parents (15 female lines and 4 male testers) of egg plant (*Solanum melongea* L.) showed the status of general combining ability in relation to sca, heterosis and inbreeding depression for fruit yield and its related traits. This signified the importance of general combining ability in controlling the inheritance of traits studied. High x low and average x low gca effects were noticed for significant positive sca effects of crosses for the number of branches per plant, number of fruits per plant, fruit weight and yield per plant in both the generations, whereas these parental combinations also showed significant negative sca effects for days to flowering, days to marketable maturity and plant height. These results showed better contribution of gca effects in relation to high specific combinations of hybrids. The maximum positive significant heterotic crosses with breeding depression appeared in high x high, high x low and low x low gca parental combinations for number of fruits per plant and yield per plant, while these combinations were noticed significant negative heterotic effects alongwith inbreeding depression of maximum number of crosses for days to flowering, days to marketable maturity and plant spread which may be feasible use for development of earlier fruiting and dwarf plant genotypes in breeding programme. Overall, the maximum contributions of females x males interaction were recorded for all the characters except width of fruit, fruit weight and plant spread indicating the equal contribution of females and males in hybrids.

Key words : Combining ability, Heterosis, Inbreeding depression, Egg plant.

The development and use of hybrid on commercial scale utilizing the hybrid technology programme has proved to be one of the milestones in the history of egg plant improvement. For hybrid egg plant technology, the selection of parents through line x tester analysis, aims at further research and development efforts with respect to genotypes diversification and yield increment through higher exploitable heterosis levels. Combining ability test is one of the several biometrical basis of heterosis. With a few exceptions all the studied showed significant general combining ability (gca) and specific combining ability (sca) variances for yield and/or yield components indicating the importance of both additive and non-additive gene action. Relative proportion of gca and sca variances were found to vary in different studies. Reports on analysis of combining ability status of parents in relation to that of hybrids as well as frequency of crosses with performance of superior parents in relation to gca effects of parents are limited in literature. An attempt has been made here to analyze the results obtained through combining ability studies in relation to the performance of hybrids and to provide valid explanations for the same.

MATERIALS AND METHODS

The material comprised of 19 parents (15 lines as female and 4 testers as male), 60F₁s and F₂s. The parents used in the crosses were KS 219, KS 247, KS 253, KS

262, KS 228, KS 233, KS 250, KS 263, KS 235, KS 227, ACC 5114, ACC 8204, ACC 8206, ACC 8207 and ACC 2623 as lines and T 3, AB 1, KS 224 and DBR 8 as testers.

Sixty F₁s and their F₂s alongwith parents transplanted in a randomized block design with three replications at vegetable research stations, Kalaynpur, C.S. Azad University of Agriculture and Technology, Kanpur. The parents and F₁s were grown in single row, while F₂s in double rows of 10 plants each. Both plant and row spacing were maintained at 60cm apart. The observations were recorded on randomly selected five parents from parents and F₁s and 10 competitive plants in F₂s from each replications for days to flowering, days to marketable maturity, plant height (cm), number of branches per plant, number of fruits per plant, length of fruit (cm), width of fruit (cm), fruit weight (g), plant spread (m²) and yield per plant (kg). Periodical picking of fruits at marketable preference till the final stage of experiment was summed up plant-wise to give the data of the total yield per plant. The mean values recorded for hybrids and parents were subjected to line x tester analysis and the mean of squares alongwith variances of gca of the parents and sca of the hybrids were estimated using the formula suggested by Kempthorne (1957). The combining ability effects and their significance and proportion contribution of females, males and females x males interaction were worked out using

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