The present investigation was undertaken in bottlegourd (Lagenaria siceraria Mol.) in a half-diallel cross using eight parental lines, namely PBOG 13 (round fruited), PBOG 22, PBOG 54, PBOG 61, PBOG 76, PBOG 117, PBOG 119 and Pusa Naveen (all long fruited). The 36 genotypes (8 parents and 28 F1's) were evaluated during kharif 2003 and summer 2004 for 18 yield and yield related traits. Further, sodium dodecyl sulphate polyacrylamide gel electrophoresis (SDS-PAGE) was performed on eight parental lines to detect protein profile variation in the parental lines.

Significant differences were noted among the genotypes for all the traits except pedicel diameter during summer season. Variances due to gca and sca were significant for all characters except number of seeds per fruit and 100 seed weight indicating the predominance of additive gene action. On the basis of the average gca effect over both the seasons, Pusa Naveen was found to be good general combiner for a set of economic traits eg. days to first male flower (-3.70), days to first female flower (-4.80), node number to first male flower (-1.23), node number to first female flower (-1.24), days to first fruit harvest (-3.34) and pedicel length (-1.81). The other good general combiners were PBOG 76 for main vine length (1.03), number of nodes on main vine (10.70), fruit weight (0.03), fruit length (4.95), pedicel diameter (0.04), number of fruits per plant (1.72) and fruit yield (50.15), PBOG 61 for internodal length (-0.99), PBOG 13 for number of primary branches per vine (3.47) and fruit diameter (1.65). The components of variation indicated that dominance component, H1 and H2 were significant for all the characters except days to first male flower while additive genetic variance (D) was significant for all the characters except number of primary branches per vine, fruit weight, pedicel diameter and 100 seed weight suggesting the involvement of both additive and non additive gene action.

Vr, Wr graphical analysis indicated involvement of dominant genes for earliness and recessive genes for fruit diameter i.e. the round shape was conditioned by recessive genes. Pusa Naveen and PBOG 13 were indicated as potential donors for earliness and greater fruit diameter respectively. The crosses PBOG 13 x PBOG 61 (495 q/ha) and PBOG 13 x PBOG 76 (468 q/ha) and PBOG 61 x PBOG 76 (443 q/ha) were found to be the best heterotic combinations along with good sca effects for important economic traits and are worth exploiting on commercial scale. A total of 21 bands grouped in four zones were detected in the eight parental lines of bottlegourd. The round fruited cultivar, PBOG 13 had distinguishable protein profile as it lacked A1 and C2 which were present in all the long fruited genotypes. PBOG 117 which however was distinguishable from PBOG 13 (round fruited) and PBOG 22, PBOG 54, PBOG 61, PBOG 76, PBOG 119 and Pusa Naveen (long fruited) due to absence of A2, A3, A4, B3, B4, B5, C1, C2, C3, C4, D1 and D2 bands.