SUMMARY

Partial diallel crosses among 15 genotypes of barley, consisting of hulled and hull-less types in six- and two-rowed groups, were made using Kempthorne and Curnow (1961) model with s = 8. An experiment, with 135 genetic population, was laid out and observations on 16 quantitative characters were recorded. The estimates on variance, combining ability variance, general combining ability of parents, heterosis and inbreeding depression, heritability and genetic advance, were worked out. The results obtained are summarised below:

(1) Performance of progenies and parents showed that the differences for all the traits were significant.

(2) Significant difference was observed between parental lines and their crosses for all the characters excepting heading days, grain development period, area of flag leaf and protein content, whereas significant difference was observed between $F_1$ hybrids and $F_2$ populations for all the characters except area of flag leaf.

(3) The parents showed very high coefficient of variation for kernel colour and extrusion of peduncle, whereas they exhibited very low variation for protein content and heading days.

(4) The variances for general combining ability were highly significant for all the characters both in $F_1$ and $F_2$ populations.
(5) Specific combining ability variances were highly significant for all the characters except grain development period, awn length and ears per plant in F1 and awn length, ears per plant, number of grains per plant and grain yield in F2.

(6) General combining ability variances were larger than specific combining ability variances both in F1 and F2.

(7) Goa : Sea ratio was high for all the traits which revealed preponderance of additive genetic components for the expression of these characters.

(8) Mean performance of the parents was found to be good index of the general combining ability. None of the parent was found superior in performance for all the traits.

(9) Out of the fifteen parents, eight for kernel colour; seven for grains per spike; five for ear length, area of flag leaf and protein content; four for plant height, 1000 grain weight and grain yield of main spike; three for extrusion of peduncle, heading days, grain development period, number of grains per plant and grain yield per plant; two for peduncle length and awn length; and one for number of ears per plant were found good general combiners both in F1 and F2 generations.

(10) Parents Ratna for 11 characters, K 1596 for eight characters, Conquest for six characters, Numar and REB 614 for five characters, Mex.22, EB 2342 and Clipper for four
characters, IB 65, EB 921 and AQ 769 for three characters, Majwah and DG 2 for two characters and Glacier and EB 1626 for one character were found to be good combiners in both the generations.

(11) Ratna, K 1596 and Numar were found to be the most promising combiners for grain yield and its contributory characters and REB 614, EB 2342, EB 921 and AQ 769 for protein content. Good combiners for yield were poor combiners for protein content or vice versa.

(12) Out of 60 F₁ hybrids, 20 exhibited more than 25% heterosis for grain yield over the superior parent. These hybrids also showed substantial increase for developmental and yield contributing traits. The hybrid Ratna x Majwah exhibited maximum heterosis (71.5%) over the best variety included in the experiment.

(13) Characters exhibiting heterosis in F₁ also showed depression in F₂. Excepting EB 2342 x DG 2 with 67.82% increase, all the hybrids showing increase in yield in F₁ showed decline in yield in F₂.

(14) Heterosis for protein content over best variety was negligible.

(15) Heritability in narrow sense was found to be high for kernel colour (82.56 - 92.24%), grains in main spike (71.13-78.56%) and grain yield of main spike (69.56-75.00%). It was low for plant height (26.46-33.54%), grain yield per plant (24.70-62.75%) and protein content (16.67-44.82%).
For other characters it was medium. Among the yield components number of grains on the main spike and number of ears per plant were found to be the most and least heritable traits respectively.

(16) Genetic advance was highest for kernel colour (83.33–88.36%) followed by number of grains in main spike, flag leaf area, number of grains per plant, grain yield of main spike, protein content, 1000 grain weight and grain yield per plant.

(17) Reliable results are possible from the analysis of $F_2$ generation for fixable components, particularly in a situation where pollination and seed setting presented a good deal of difficulty and number of seeds available per pollination is limited.