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Heterotic effects, heritability, genetic advance and correlation coefficients among yield and quality attributes in 11 parent diallel crosses in wheat

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SUMMARY

Magnitude of heterotic response over economic parent, estimation of heritability, genetic advance, gain and yield based on combining abilities for yield and quality traits in bread wheat in eleven parent diallel crosses has been reported herein and their implication on breeding methodologies has been discussed for the practical utility in the improvement of highly selected base material of wheat under normal sown situations at Kanpur. The efficacy of intermating coupled with selection has also been discussed in terms of breeding procedures.

Key words : Heterosis, Heritability, Genetic variability, Wheat.

Acceleration of wheat production through genetic manipulation must accompany improvement in morphological and nutritional quality traits and stability and adaptation of genetic architecture of quantitative traits (Kishore *et al*, 1992; Rathi *et al*, 2006) is recommended for planning efficient breeding after finding genetic components of variance for different traits using diallel cross technique (Balyan, 1984; Chaudhary *et al*, 1985) and their GCA, SCA and per se performance and GPR analyses. Information on combining ability is a prerequisite for development of superior parents with better GCA and crosses with high SCA effects. Knowledge on the nature of gene action governing quantitative traits is essential for achieving optimum equilibrium of yield and quality. Hence, in the present communication 55 F_1s obtained of 11 parent diallel crosses in respect to 13 attributes, namely, early growth vigour, days to anthesis, anthesis to maturity, synchrony of maturity, productive tillers/ plant, biomass, number of grains/ spike, grain weight/spike and grain yield/plant, were chosen for the estimation of the heterotic response over economic parent, genetic correlation between quality and yields, contributing trait determination of heritability and genetic advance and working out the role of quality traits like protein and tryptophan contents, seed hardness and phenol colour reaction apart from biometrical analysis of data.

MATERIALS AND METHODS

66 genotypes of wheat were subjected to biometrical computations under reference at Chandrashekhar Azad University of Agriculture and Technology, Kanpur wherein, 55 straight F_1 crosses involving 11 genotypes like HUW 452, UP 2338, HP 1744, K 9329, HD 2643, K 9451, HP 1731, RAJ 3765, K 9330, K 9305 and PBW 378 were produced at Research Farm of the University. These were planted in randomized complete block design with three replications. 13 morphological and quality traits referred to in the introduction were recorded after 15 days of sowing as described by Rathi *et al* (2006). Variance components analysis following the equation of Hayman (1954) and combining ability analysis following Griffing's method (1956), ANOVA for combining ability including GCA and SCA as reported by Rathi *et al* (2006) and estimation of economic heterosis was done with the help of following formula:

Heterosis (%) over EP = $[(F_1 - EP/EP)] \times 100$, where, F_1 = Mean of the F_1, EP = Mean of the economic parent. Selection parameter used were heritability and genetic advance being calculated per formula of Crumpacker and Allard (1962) and Robinson *et al* (1949). For calculating the genotypic and phenotypic coefficients of correlation in both the parental and F_1 generations, formula of Al jibouri *et al* (1958) was used.

RESULTS AND DISCUSSION

The data obtained for 13 characters were earlier subjected to GCA and SCA by Rathi *et al* (2006). Herein, biometrical analyses were made with respect to heterotic parameters, its effects and selection parameters i.e. heritability and genetic advance as well as correlation coefficients.

Heterotic Parameters and effects:

The mean sum of squares for crosses and its subdivisions into GCA and SCA presented as per Griffing

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