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Diallel analysis, variance components and combining ability analyses for some metric attributes associated to quality and productivity in wheat

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SUMMARY
Sixty six genotypes involving 11 parents and 55 F_1s were developed from 11- parent diallel cross mating. The data on 13 morphological and chemical characters were subjected to biometrical computations namely, analysis of variance, genetic component and combining ability analyses. The analysis of variance showed highly significant differences among the treatments for all the 13 traits. The extent of variability in F_1s was higher in 8 characters, out of 13 studied. The genetic components analysis indicated significant additive ($\hat{D}$) and dominant ($\hat{H}1$ and $\hat{H}2$) were greater than additive genetic components in 8 attributes. GPR was less than unity in all the traits showing dominance of non-additive genetic effects. Over dominance was showing

Key words: Wheat, Quality, Productivity, Diallel analysis.

The success of our wheat varieties to a considerable extent is due to the incorporation of "Norin 10" dwarfing genes. Nevertheless, diverse agroecological conditions of India offer sizeable opportunities to this crop of quantum jump by accleration its yield potential through genetic manipulation. There is also a need to improve the quality of wheat nutritionally. Due to importance of genetic analysis of wheat the present investigation was undertaken with 55 F_1 hybrids generated from 11 genotypes of diverse morphological and quality attributes. The biometrical information on gentic analyses under reference would be utilized in planning of an efficient breeding programme.

MATERIALS AND METHODS

The basic material utilized in the present study was breeder wheat obtained from C.S. Azad University Ag. & Tech., Kanpur. It comprised of 11 diverse genotypes of broad genetic base. The details of their pedigree and morphological features are given in Table 1. 55 straight F_1 crosses involving 11 genotypes/varieties were produced at Nawabganj Research Farm, Kanpur. The genotypes were chosen on the basis of genetic variability in 13 characters mentioned in Table 3. The 66 genotypes involving 11 parents and 55 F_1s were developed from 11 parent diallel cross mating design. The experiment was raised in complete Randomized Block Design with three replications. Each replication represented single row of both the parents and their F_2s with 3 m length of each row. Early growth vigour synchrony of maturity and phenol colour reaction were recorded on the basis of scores; anthesis was observed in days; protein and tryptophan contents were expressed in %; seed hardness was expressed in kg; while other characters were recorded in grams. Protein content were estimated by Biuret method while tryptophan content was determined by colorimeter method.

The experimental data were compiled by calculating the mean of each treatment in all the three replicates and was subjected to following statistical and biometrical computations separately for each character. Besides analysis of variance, Diallel analysis for genetic component and combining ability analyses were made. Sheleton of ANOVA for Parents and F_1s was as suggested by Rathi (2001). Diallel analysis was used to test the variability Hypothesis of Hayman (1954a). The combining ability analysis was worked out by the procedure sugested by Griffing's Method 2, Model 1.

RESULTS AND DISCUSSION

The summary findings gathered on the above mentioned aspects are given as under :

Analysis of Variance (ANOVA) for all the 13 characters were subjected to F test (Table 2). Highly significant differences were observed among the treatments for all these traits. Since treatments consisted of parents and F_1s, the analysis of variance further indicated highly significant differences among the parents for these traits F_1s, the analysis of variance further indicated highly significant differences among the parents for these traits F_1s also showed highly significant differences for all traits. It reflected significant variability in base material and the material generated subsequently involving all possible straight single crosses minus reciprocal combination.

Parents vs F_1s revealed highly significant differences for early growth vigour, anthesis to maturity, synchrony to maturity, productive tillers per plant, biomass, no. of grains per spike, grain wt./spike and grain yield per plant, seed hardness and protein content while days to anthesis, tryptophan content and phenol colour reaction exhibited

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