Biparental crosses utilizing design II of Comstock and Robinson (1952) were made in the $F_2$ population of U.P.301 and N.P.388 in the year 1971-72. The material consisting of $F_1$, $F_2$, $F_1$, $F_2$ selves and $F_2$ biparentals were grown in the year 1972-73 at the Agricultural Research Station, Dhaulakuan, Himachal Pradesh and data were recorded for grain yield per plant, 1000-grain weight, number of grains per spike, spike length, spikelets per spike, number of tillers per plant, plant height and days to flower. Different components of genetic variance and covariance based upon the methods given by Hather (1949) and Nei (1960) respectively and simple correlation were studied to understand the effects of gene action for different traits.

The results of variance for various generations indicated significant differences among the generations for all the characters except days to flower in Env.I and number of tillers per plant in Env.II. The analysis of the data pooled over environments showed highly significant generation-environment interaction for all the characters studied. The combined analysis over environments also revealed that the estimates of variance genotypes were larger than the variance of genotypes x environments in respect of number of grains per spike, spike length, spikelets per spike, plant height and days to flower. This suggested that these characters had greater stability under the two
environments sampled than grain yield per plant, 1000-grain weight and 
tillers per plant.

The performance of $F_1$ hybrids was greater than the mid parent as 
well as the better parent mean values in six traits in Env.I. Under 
Env.II, the $F_1$ mean values were greater than the mid parent and better 
parent mean values in five traits. This indicated over-dominance of 
positive alleles. $F_3$ selfs recorded significant reduction for number 
of grains per spike and spikelets per spike under both the environments 
and for grain yield per plant and spike length under Env.II. The 
biparental progenies were slightly better than the $F_3$ selfs for all the 
characters except tillers per plant in Env.I and recorded appreciably 
better values than the $F_3$ selfs for grain yield, 1000-grain weight, 
spike length and tillers per plant in Env.II.

Correlation coefficient studies revealed that the association of 
grain yield with spike length and tillers per plant; 1000-grain weight 
with plant height; spike length with number of spikelets per spike and 
tillers per plant were significant, positive and plant height with days 
to flower was significant, negative and similar in $F_3$ selfs and hips at 
both the environments.

Shifts in correlation in hips as compared to the $F_3$ selfs due to 
breakage of linkages was noticed in characters- grain yield with number 
of grains per spike in Env.I, grain yield with spikelets per spike in 
Env.II; 1000-grain weight with number of grains per spike, 1000-grain 
weight with spikelets per spike and days to flower in Env.II; number of 
grains with number of tillers and days to flower in Env.II; number of 
spikelets per spike with days to flower in Env.I and with tiller per
plant in Env.II. The shift in bip increased in magnitude which could be due to breakage of repulsion phase linkages. Thus if biparental crosses are made for some successive generations in this material, there were chances of producing good recombinants having higher yield.

The biparental progenies indicated highly significant additive variance for spike length, tillers per plant under Env.II. Significant dominance variance was recorded for all the characters under both the environments except 1000-grain weight, tillers per plant and days to flower.

Least squares estimates indicated significant additive variance for number of grains at both the environments and for spikelets per spike and plant height under Env.II. It also indicated highly significant negative additive variance for grain yield, 1000-grain weight and number of grains per spike under both the environments and tillers per plant and days to flower in Env.I.

Dominance variance was observed to be highly significant for grain yield, 1000-grain weight and number of grains per spike under both the environments and for spikelets per spike and tillers per plant under Env.I.

Additive x additive variance was highly significant for spike length in Env.I.

Component of variance analysis indicated that additive gene effects were more important for all the characters except spikelets per spike and tillers per plant. For these two characters dominance gene effects (H) were more important.
The present studies, therefore, revealed that additive variance was quite important for spike length, tillers per plant, number of grains per spike, spikelets per spike and plant height. While dominance variance was observed to be more important for grain yield, 1000-grain weight, number of grains per spike, spikelets per spike and tillers per plant. For characters—number of grains per spike, spikelets per spike and tillers per plant both additive and dominance variance were equally important.

The genetic basis of the association between different characters were studied in a cross of wheat varieties, U.P.301 x N.P.388 using the technique suggested by Nei and Syakudo (1956). Parental (P₁, P₂), F₁, F₂ selves and F₂ biparental generations were used in the study. It revealed that L component had positive significant association in 11 and 19 out of 28 associations in Env.I and Env.II respectively. It was, therefore, quite important in all these cases. In 5 out of 28 associations in Env.I and 3 out of 28 associations in Env.II, L component had negative significant association, which suggested that the effects of the genes responsible for various characters were linked in the repulsion phase. H component was observed to have positive significant association for number of grains x plant height in Env.I only, which indicated that the effects of genes responsible for this association acted in the same direction. H component in 8 out of 28 and 9 out of 28 associations in Env.I and Env.II respectively had negative significant association, which suggested that the genes for all these associations were linked in the repulsion phase.
Components of covariation studies, therefore, revealed that most of the associations which were of any significance under both the environments, fixable component (L), in general, was quite important in those associations.