Studies on genetic variability, heritability, correlation and path analysis in bitter gourd (*Momordica charantia* L.)

SUMMARY
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SUMMARY OF THESIS

The present investigation entitled **"Studies on genetic variability, heritability, correlation and path analysis in bitter gourd (*Momordica charantia* L.)"** was undertaken with the objectives:

1. To investigate the variability, heritability and genetic advance for the quantitative characters,
2. To estimate correlation among the important economic traits,
3. To find out the direct and indirect effects of yield components by path analysis and
4. To evaluate the genetic divergence for yield and yield attributing traits.

In the present study, 20 genotypes of bitter gourd sowing wide spectrum of variation for various marketable fruit yield per plant were evaluated in the field for twenty one characters during 2018-19 and 2019-20, respectively. The experiment was conducted in Randomized Block Design and replicated thrice at the Horticulture Research Farm-I, Babasaheb Bhimrao Ambedkar University (A Central University), Vidya Vihar, Rae Bareli Road, Lucknow, (U.P.), India. The observations were recorded on 15 physical characters and 6 chemical characters in field as well as laboratory conditions were considered *viz*., Node number to first staminate flowers, node number to first pistillate flowers, days to anthesis of first staminate flowers, days to anthesis of first pistillate flowers, days to first fruit harvest, vine length (m), fruit length (cm), nodes per plant, number of branches per plant, number of seeds per plant, fruit diameter (cm), number of fruits per plant, seeds weight per fruit (g), average fruit weight (g), ascorbic acid (mg/100g), reducing sugar (%), non-reducing sugar (%), total sugars (%), total soluble solids (^{0}Brix), titratable acidity (%) and marketable fruit yield per plant (kg). Row-to-row and plant-to-plant distances were maintained as 2.5 m × 0.5 m. Each entry was grown in the plot size of and 3.0 m x 2.0 m. The observations were recorded on twenty one quantitative and qualitative traits. The mean data were subjected to the various statistical and biometrical analyses. The salient findings of the study are summarized below:

1. The analysis of variance (mean sum of square) due to genotypes was highly significant for all the characters. In other words, the performances of the

genotypes with respect to the characters were statistically different, suggesting that there exists ample scope for selection in the available germplasm of bitter gourd.

2. Based on mean performance only one genotype Kalyanpur Barahmasi. Kashi Urvasi followed by Arka Harit, Selection-5 and Pusa hybrid-1were found significantly superior for marketable fruit yield per plant. These genotypes also showed significantly high mean performance for some other characters.

3. The estimates of phenotypic coefficients of variation (PCV) were higher than genotypic coefficients of variation (GCV) for all the traits. High magnitudes of variability were observed in case of marketable fruit yield per plant followed by average fruit weight, number of branches per plant, acidity, total soluble solids, fruit diameter, non-reducing sugar and number of fruits per plant.

4. High heritability coupled with high genetic advance in per cent of mean were observed for average fruit weight followed by total soluble solids, total sugars, days to anthesis of first pistillate flowers, nodes per plant, non-reducing sugar, marketable fruit yield per plant, number of branches per plant, vine length, days to first fruit harvest, number of fruits per plant, fruit diameter indicating scope of high selection response.

5. In general, genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients, suggesting a strong inherent relationship in different pairs of the traits. Marketable fruit yield per plant had exhibited highly significant and positive phenotypic correlation with fruit length, reducing sugar, number of fruits per plant showed significant and positive correlation with marketable fruit yield per plant. While, it showed negative significant correlation with ascorbic acid followed by days to anthesis of first pistillate flowers and total soluble solids and selection for traits with positive correlation. Would be effective for yield improvement in bitter gourd.

6. Path coefficient analysis revealed that marketable fruit yield per plant was exerted by fruit length, number of fruits plant, number of seeds per fruit, vine length, node number to first pistillate flowers, days to first fruit harvest and total sugars exhibited considerable positive direct effect on marketable fruit yield per plant. while negative direct contribution towards marketable fruit yield per plant were pronounced by days to anthesis of first pistillate flowers, ascorbic acid,

number of branches per plant, reducing sugar and non-reducing sugar both at phenotypic and genotypic levels.

7. Mahalanobis D^2 statistic distributed all the twenty genotypes into five diverse clusters.

8. Grouping of genotypes into V cluster indicated presence of considerable diversity among the different traits in the available germplasm. Cluster number I followed by cluster number II which contained 9 and 8 entries, respectively. The minimum number of cluster III, IV and V which had one entry from the three clusters, respectively, which compared to all genotypes.

9. The inter-cluster values between cluster II and V (401.57) followed by cluster II and IV (295.76), cluster IV and V (276.66), cluster II and III (272.23), cluster I and V (231.71), cluster I and II (201.99), cluster I and IV (167.65), cluster III and V (164.50) and cluster I and III (161.99) were very high. The minimum inter-cluster D^2 values were recorded in case of cluster III and IV (155.11). Whereas the lowest intra clusters distance showed by cluster III, IV and V, respectively (0.00) indicating genetic similarity of genotypes belonging to the respective clusters.

10. The quantitative traits which contributed maximum towards the genetic distance among the genotypes were of the average fruit weight followed by total sugars, total soluble solids, days to anthesis of first pistillate flowers, acidity. The genetic divergence were very low in manifestation genetically in the available genotypes of characters was node number to first staminate flowers was followed by node number to first pistillate flowers, vine length, fruit length, fruit diameter, seeds weight per fruit, marketable fruit yield per plant. The contribution of these traits for total genetic divergence.

Conclusion:

In the present study, maximum number of genotypes. Hence, it is concluded that there was a wide range of variation among the genotypes for all characters indicating that considerable scope existed for the improvement of bitter gourd through selections. Genetic parameters in association with correlation study indicated that for selection of superior genotypes. Out of twenty genotypes, five best high yielding genotypes Kalyanpur Barahmasi followed by Kashi Urvasi, Arka Harit, Selection-5 and Pusa hybrid-1were found superior for marketable fruit yield per plant and these genotypes may be recommended for large scale cultivation among the farmers after proper testing in multilocational trials and these superior genotypes further can be used as donors in breeding programme.