



Short communication

Character association studies in bottle gourd

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Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is an important member of family cucurbitaceae grown commercially in almost all parts of India during summer as well as rainy season. The natural genetic variation for many of the economically important traits is considerable in this crop. Correlation studies between yield and its attributes, and their relative contribution to yield will be of great value in planning breeding programme. The present investigations were undertaken on twelve genotypes to study the association of important metric traits by correlation analysis and to determine the direct and indirect effects between the components of yield by path analysis in bottle gourd. Twelve diverse genotypes viz., DVBG-1, DVBG-2, NDVG-56, NDVG-58, PBOG-40, PBOG-61, Pusa Naveen, Pusa Summer Prolific Long, PGOG-62, VRBG-40, VRBG-101 and VRBG-110 obtained from Indian Institute of Vegetable Research, Varanasi, were evaluated in randomized block design with three replication during rainy season at Vegetable Research Farm of Department of Horticulture, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi. The seeds were sown on at a spacing of 2 m x 1 m row-to-row and plant-to-plant, respectively in a 5 m x 4 m plot size. Observations were recorded on five randomly selected plants for fourteen traits viz., days to 50% germination, days to anthesis of first staminate and first pistillate flower, node number to first staminate and first pistillate flower, days to first fruit harvest, length of edible green fruit, weight of edible green fruit, number of fruits per plant, number of seeds per fruit, 100-seed weight and edible fruit yield per plant. The genotypic and phenotypic correlation coefficients were estimated as per standard method suggested by Panse and Sukhatme (6) and path coefficient analysis as outlined by Dewey and Lu (3).

The genotypic and phenotypic correlation coefficients between all the characters except vine length and number of primary branches showing non significant correlation with other characters are presented in Table 1. Perusal of data revealed that the magnitude of genotypic

correlation coefficients was higher than their corresponding phenotypic ones for most of the characters. The lower value at phenotypic level could be due to modifying effects of environment on the association of characters at genotypic level. The edible fruit yield per plant had significant positive correlation with number of fruits per plant, weight of edible green fruit and number of seeds per fruit at both genotypic and phenotypic level. However, it showed significant and negative correlation with node number to first pistillate flower appearance at genotypic level only. Similar results were reported by Singh *et al.* (7), Hawaldar (4), and Badade *et al.* (1) for number of fruits in bottle gourd and Chaudhary *et al.* (2) and Mehta *et al.* (5) in musk melon.

Among other important attributes, the positive and significant correlation was observed for days to first fruit harvest with days to germination, days to anthesis of first staminate and pistillate flower; weight of edible fruit with days to germination and fruit length; number of fruits per plant with node number to first pistillate flower; number of seeds per fruit with fruit length; and node number to first staminate flower with node number to first pistillate flower appearance at genotypic and phenotypic level. The partitioning of genotypic correlation coefficients of prominent yield components with edible fruit yield per plant, into direct and indirect effects following path analysis (Table 2) indicated that the number of fruits per plant exhibited highest positive direct effect on edible fruit yield per plant. The other important attributes exhibiting high direct effect on edible fruit yield per plant were weight of edible fruit, number of seeds per fruit, 100-seed weight, days to first fruit harvest and days to anthesis of first staminate flower. The positive and significant association of number of fruits per plant with edible fruit yield per plant appeared to be due to its high positive direct effect and indirect effect via node number to first pistillate flower appearance and 100-seed weight. The positive and significant associations of weight of edible fruit with edible fruit yield per plant due to its direct effect and indirect effects via days to first fruit harvest, days to anthesis of first staminate flower and number of seeds per fruit. Node number to first pistillate flower exhibited positive direct effect and indirect

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Table 1. Phenotypic Correlation (r_p) lower half and Genotypic Correlation (r_g) upper half among different characters in bottle gourd.

Character	Days to germination (50%)	Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Node No. to first staminate flower appearance	Node No. to first pistillate flower appearance	Days to first fruit harvest	Length of edible green fruit (cm)	No. of fruits/plant	Weight of edible green fruit (cm)	No. of seeds/fruit	100 - seeds weight	Fruit yield/plant
	1	2	3	4	5	6	7	8	9	10	11	12
1												
2	0.397	0.454	0.632*	0.305	0.175	0.732**	0.284	-0.287	0.677**	-0.178	-0.275	0.396
3	0.583*	0.919**	0.931**	-0.064	0.058	0.675**	0.186	-0.170	0.435	-0.282	-0.556*	0.351
4	0.164	0.053	-0.111	-0.116	0.024	0.855**	0.300	-0.209	0.440	-0.320	-0.517	0.292
5	0.667**	0.057	0.020	0.714**	0.736**	0.045	-0.592*	-0.157	-0.007	-0.454	-0.131	-0.278
6	0.270	0.670**	0.844**	0.039	0.194	0.187	-0.128	0.657*	0.181	-0.303	-0.400	-0.534*
7	0.277	0.179	0.286	-0.498	-0.122	0.223	0.234	-0.487	0.440	-0.468	-0.395	-0.067
8	0.587*	-0.157	-0.220	-0.085	-0.566*	-0.446	-0.417	-0.451	0.654*	0.706**	-0.291	0.351
9	0.129	0.395	0.412	0.070	0.196	0.388	0.606*	-0.547*	-0.579*	-0.017	0.210	0.697**
10	0.265	0.278	-0.300	-0.353	-0.267	-0.447	0.876**	-0.008	0.363	0.376	-0.202	0.600*
11	0.181	-0.545*	-0.509	-0.111	-0.383	-0.383	-0.285	0.199	-0.194	0.069	0.072	0.547*
12		0.300	0.220	-0.036	-0.298	-0.024	0.265	0.609*	0.582*	0.533*	0.103	0.126

*, ** Significant at 5 and 1% levels, respectively.

Table 2. Estimates of Direct and Indirect effects of important traits on fruit yield in bottle gourd (at genotypic level).

Character	Days to germination (50%)	Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Node No. to first staminate flower appearance	Node No. to first pistillate flower appearance	Days to first fruit harvest	Length of edible green fruit (cm)	No. of fruits/plant	Weight of edible green fruit (cm)	No. of seeds/fruit	100 - seeds weight	Correlation coefficient with fruit yield/plant
	1	2	3	4	5	6	7	8	9	10	11	12
1												
2	-0.024	0.424	-0.220	0.029	0.401	0.002	-0.275	0.395	-0.157	-0.199	-0.199	0.396
3	-0.011	0.935	-0.325	0.010	0.370	0.001	0.163	0.254	-0.249	-0.402	-0.402	0.351
4	-0.015	0.870*	-0.349	0.004	0.468	0.002	-0.200	0.256	-0.282	-0.374	-0.374	0.292
5	-0.004	0.005	-0.008	0.163	0.102	-0.001	0.630	0.105	-0.267	-0.289	-0.289	-0.534*
6	-0.017	0.631	-0.298	0.030	0.548	0.002	-0.467	0.256	-0.413	-0.285	-0.285	-0.067
7	-0.007	0.174	-0.105	-0.021	0.128	0.008	-0.432	0.381	0.623	-0.210	-0.210	0.351
8	0.007	-0.159	0.073	0.107	-0.267	-0.003	0.959	-0.337	-0.015	0.152	0.152	0.697*
9	-0.016	0.407	-0.153	0.029	0.241	0.005	-0.555	0.583	0.332	-0.146	-0.146	0.600*
10	0.004	-0.264	0.111	-0.049	-0.257	0.005	-0.017	0.219	0.882	0.052	0.052	0.547*
11	0.007	-0.520	0.180	-0.065	-0.216	-0.002	0.201	-0.118	0.064	0.723	0.723	0.126

*, ** Significant at 5 and 1% levels, respectively; Genotypic residual effect = 0.1182

effect via number of fruits per plant and weight of edible fruit though, had negative correlation with the edible fruit yield per plant. Days to anthesis of pistillate flower had negative direct effect on edible fruit yield per plant and positive indirect effect via days to anthesis of staminate flower and days to first fruit harvest. The present findings indicated that the characters viz., number of fruits per plant, edible fruit weight and number of seeds per fruit and days to first fruit harvest, days to first pistillate and staminate flower anthesis were the major yield contributing traits in bottle gourd. It is suggested that more emphasis should be given on these traits over others during selection for improvement of fruit yield in bottle gourd.

REFERENCES

1. Badade, D.S., Warade, S.D. and Gaikwad, S.K. 2001. Correlation studies in bottle gourd. *J. Maharashtra Agril. Univ.* **26**: 20-22.
2. Chaudhary, B.R., Dhaka, R.S. and Fageria, M.S. 2003. Association studies in muskmelon (*Cucumis melo* L.). *Haryana J. Hort. Sci.* **32**: 98-101.
3. Dewey, D.R. and Lu, K.H. 1959. A correlation and Path coefficient analysis of yield component of the crested wheat grass seed production. *Agron. J.* **51**: 515-18.
4. Hawaldar, M.S.H., Hawue, M.H. and Islam, M.S. 1999. Variability, Correlation and Path analysis in bottle gourd. *Bangladesh J. Sci. Industrial Res.* **34**: 50-54.
5. Mehta, Reetu, Singh, D. and Bhalala, M.K. 2009. Correlation and path analysis in musk melon. *Indian J. Hort.* **66**: 396-99.
6. Panse, V.G. and Sukhatme, P.V. 1967. *Statistical Methods for Agricultural Workers*. Indian Council of Agricultural Research, New Delhi.
7. Singh, S.P., Singh, N.K. and Maurya, I.B. 1996. Genetic variability and correlations studies in bottle gourd [*Lagenaria siceraria* (Mol.) Standl.]. *Panjabrao Krishi Vidyapeeth J.* **20**: 88-89.

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