

Short Communication

Genetic variability and correlation coefficient for horticultural traits in bottle gourd (*Lagenaria siceraria*)

Pradip Pandey^{1*}, Deepa Dewedi¹, Maneesh Pandey² and Kuldeep Singh³

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Bottle gourd belong to family Cucurbitaceae, which primarily comprised species consumed as food worldwide. Bottle gourd [*Lagenaria siceraria* (Mol.) Standl.] is important cucurbitaceous vegetable crop having chromosome number $2n=2x=22$. is cultivated, both as rainy and summer season vegetable. The tender fruits of bottle gourd can be used as a culinary vegetable, *Kofta* or for making sweets viz. *Halva*, *Kheer*, *Petha*, *Burfi* and pickles. A decoction made from the leaf is a very good medicine for jaundice. Bottle gourd production is 2.68 MT from an area of 0.157 m/ha with 17.08 metric tons productivity and total vegetable production 184.39 MT from an area 10.259 MT with 17.97 metric tonnes productivity during 2017-2018 in India (NHB data 2018). The observed variability is a combined estimate of genetic and environment factors of which only former one is heritable. However, the estimate of heritability alone does not provide an idea about the expected gain in next generation, therefore it has been considered in conjunction with genetic advance, correlation and path analysis establish the extent association between yield and its components and bring out relative importance of their direct and indirect effects. This gives a clear understanding of their association with yield. Hence, the present study was carried out to assess the performance of economic traits and to measure the extent of variability, heritability, expected genetic advance and interrelationship of yield components in bottle gourd.

The experimental material for the present study was comprised of 16 genotypes of bottle gourd were collected from different parts of the India and grown at Vocational Floriculture Farm, Department of Horticulture, Babasaheb Bhimrao Ambedkar University, Vidya Vihar, Lucknow, UP (altitude 113 m ASL and 26.56 ÚN and

83.98 ÚE). The soil is sandy loam with pH 6.5. The experiment was laid out in RBD with three replications during November 2017 to April 2018. Bottle gourd seed were sown row to row 3.5 m and plant to plant 80 cm. The observations were recorded on five plants from each genotype in each replication mean of the data from the sampled plant of each plot in respect of different characters was used for various statistical analysis.

The analysis of variance indicated highly significant variation among the genotype for all the 15 characters. This variability may be due to genetic constitution of the materials as well as environmental influences. The estimates of mean, range, phenotypic coefficient of variance (PCV) and genotypic coefficient of variance (GCV), heritability (h^2) and genetic advance is presented in Table 1. Maximum mean value (54.70–71.77) was observed for days to first fruit harvest with an average of, days to first fruit harvest (60.06). The minimum range of mean value (0.60–0.73) with an average of 0.67cm was recorded in seed width. High magnitude of phenotypic coefficient of variance than the genotypic values indicated considerable influence of environment on the expression of the characters. The maximum phenotypic coefficient of variation (PCV) was observed for, No. of primary branches per plant, 100 seed weight, node at which first female flower appears while the lowest phenotypic coefficient of variation was observed for days to first male flower anthesis followed by seed width and days to first fruit harvest. Moderate phenotypic coefficient of variation was exhibited by fruit length, node at which first male flower appears, vine length the similar result has been reported by (Prasad and Prasad 1978a). Whereas, high genotypic coefficient of variation was observed for, yield per plant, vine length, fruit length, and also similar result have been reported by (Duhan et al. 2017). Whereas, high genotypic coefficient of variation observed in number of primary branches per plant, yield per plant, node at which first male flower appears. The lowest value of genotypic coefficient of

¹Babasaheb Bhimrao Ambedkar University, Lucknow, UP

²RLBCAU, Jhansi, UP

³UP College, Varanasi, UP

*Corresponding author, Email: pradippandey2010@gmail.com

variance were observed for days to first male flower anthesis followed by seed width, fruit weight. These results are in conformity with the findings of (Singh et al. 1989). Average genotype coefficient of variability recorded for fruit length, vine length, number of fruits per plant.

Heritability values ranged from 4.11-36.25% for the characters under this study (Table 1). The highest heritability was noted for number of primary branches per plant, 100 seed weight, node at which first female flower appears. The above estimation gave an indication that substantial genetic improvement can be achieved

in this character also reported by (Dwivedi 2000). The medium heritability was noted for fruit length, node at which first male flower appears, node at which first female flower appears, number of fruits per plant, fruit diameter. Whereas, lowest heritability was noted days to first male flower anthesis, seed width, days to first fruit harvest, fruit weight and this similar study was reported by (Janaranjani et al. 2016). The value of expected genetic advance was highest for fruit length, days to first female flower anthesis, days to first fruit harvest. However, low value of genetic advance was recorded for seed width, fruit weight, seed length,

Table 1: Estimates of range, variability, heritability and expected genetic advance as per cent of mean for various traits in bottle gourd

Traits	Range		General mean	Variability		Heritability in broad sense (%) (h^2_{bs})	Genetic advance	Genetic advance as %age of mean
	Min.	Max.		PCV %	GCV %			
Node at which first male flower appears	5.50	9.17	7.54	18.62	15.29	18.62	1.95	25.86
Node at which first female flower appears	10.00	20.63	15.07	21.15	20.17	21.15	5.97	39.61
Days to first male flower anthesis	41.83	46.50	43.74	4.11	3.42	4.11	2.56	5.85
Days to first female flower anthesis	44.53	61.37	49.08	9.25	8.90	9.25	8.67	17.66
Days to first fruit harvest	54.70	71.77	60.06	7.37	6.99	7.37	8.19	13.64
No. of primary branches per plant	1.87	6.33	3.05	36.25	30.70	36.25	1.63	53.56
Fruit length (cm)	22.86	43.80	33.55	18.89	18.44	18.89	12.44	37.07
Fruit diameter (cm)	6.63	10.00	7.58	13.11	10.75	13.11	1.38	18.17
No. of fruits per plant	5.47	8.03	6.65	13.78	10.25	13.78	1.04	15.72
Vine length (m)	3.23	5.40	4.26	16.45	14.34	16.45	1.10	25.73
100 seed weight(g)	8.00	20.00	13.22	26.09	25.65	26.09	6.87	51.96
Seed length (cm)	1.00	1.67	1.46	11.53	10.93	11.53	0.31	21.35
Seed width (cm)	0.60	0.73	0.67	7.27	4.95	7.27	0.05	6.93
Fruit weight (kg)	0.77	1.04	0.86	8.97	6.75	8.97	0.09	10.47
Yield per plant (kg)	4.52	6.80	5.62	16.14	12.46	16.14	1.11	19.81

Table 2: Estimates of genotypic correlation coefficients among of yield and its contributing traits

Trait	Node at which first male flower appears	Node at which first female flower appears	Days to first male flower anthesis	Days to first female flower anthesis	Days to first fruit harvest	No. of primary branches per plant	Fruit length (cm)	Fruit diameter (cm)	No. of fruit per plant	Vine length (m)	100 seed weight (g)	Seed length (cm)	Seed width (cm)	Fruit weight (kg)	Yield (kg/plant)
Node at which first male flower appears	1.00	0.517**	0.011	-0.411	-0.029	0.053	0.479*	-0.335	0.527**	0.057	-0.048	0.033	-0.140	0.544	0.622*
Node at which first female flower appears		1.00	0.401*	-0.342	0.213	-0.224	0.426**	-0.470	0.478	0.177	-0.524	-0.102	-0.263	0.526	0.667*
Days to first male flower anthesis			1.00	0.374**	0.586	-0.408	-0.030	-0.239	0.442	-0.160	-0.188	0.110	-0.120	0.103	0.499
Days to first female flower anthesis				1.00	0.439*	-0.427	-0.66**	0.038	-0.302	0.014	-0.051	0.089	-0.124*	-0.443	-0.413
Days to first fruit harvest					1.00	-0.416	-0.237	-0.099	0.338	0.193	0.032	0.167	-0.280*	-0.269	0.225
No. of primary branches per plant						1.00	0.103	0.171	-0.233	0.249	0.567	0.225	0.323	-0.306	-0.319
Fruit length (cm)							1.00	-0.592	0.513	-0.212	-0.159	-0.047	0.166	0.754	0.745
Fruit diameter (cm)								1.00	-0.155	0.323**	0.512	0.472	0.417	-0.434	-0.336
No. of fruits per plant									1.00	-0.062	-0.197	-0.172	0.112	0.179	0.872**
Vine length (m)										1.00	-0.059	0.304**	0.146	-0.280	-0.147
100 seed weight (g)											1.00	0.532	0.561	-0.297	-0.308
Seed length (cm)												1.00	0.461	-0.149	-0.167
Seed width (cm)													1.00	-0.201	-0.076
Fruit weight (kg)														1.00	0.617**

*Significant at 5% probability level, ** Significant at 1% probability level

number of fruits per plant and vine length also given by (Kumar et al. 2007). High heritability along with high expected genetic advance were recorded for fruit length, days to first female flower anthesis, days to first fruit harvest also given by (Kumaran 1998). The magnitude of high heritability coupled with moderately low genetic advance was observed for fruit weight, seed width, seed length, and yield, which may be due to dominance and inter-allelic interaction also state by (Mandal et al. 2015).

Genotypic correlation coefficient was higher than their corresponding phenotypic correlation coefficient for most of the characters except yield per plant, number of fruits per plant, fruit weight (Table 2). A perusal of data revealed that yield has positive and significant correlation with fruit weight, node at which first female flower appears, node at which first male flower appears had positive correlation coefficient among themselves (Maurya 1994). Higher and positive direct effect (at the genotypic level) on yield was exerted by number of fruits per plants followed by node at which first female flower appears, fruit weight, days to first fruit harvest, number of primary branches, days to first male anthesis and seed length. From the results of this investigation it is concluded that besides direct selection for fruit yield, number of fruits per plant should be considered. For further improvement of yield in bottle gourd, few genotypes Punjab Long, Pusa Naveen, NDBG-619, K. Long Green, KBGR- 12 and Pant Lauki-1 were found promising in order as for as yield and yield contributing traits are concerned. Thus, by exploiting the above listed genotypes, there is good scope of improvement through selection in many of the economic traits by making judicious use of the available information gathered from the study. High heritability along with high expected genetic advance were recorded for fruit yield per plant, vine length, were as yield has positive and significant correlation with fruit weight, fruit per plant which first female flower appears, node at which first male flower

appears had positive correlation coefficient among themselves.

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