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Correlation Studies in Bottle Gourd *Lagenaria siceraria* (Molina) Standl

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Abstract

The present experiment was carried out during *kharif* 2008—2009. Fifteen diverse genotypes of bottle gourd were used as experimental materials. The genotypes were AD-1, DK, PBOG-22, VRBG-1, VRBG-18, VRBG-40, VRBG-44, VRBG-88, VRBG-105, VRBG-107, VRBG-112, VRBG-148, Pusa Naveen, PSPL and NDBG-104. The trial was conducted in randomized block design with three replications. The plant to plant and row to row spacing were maintained at 1.0 × 2.0 m respectively. The observations were recorded on 12 characters of bottle gourd. Positive and significant correlation coefficient were recorded for fruit per plant with days to first female flower anthesis, vine length (m), number of primary branches per plant, length of fruit (cm), weight per fruit (kg) and number of fruits per plant, while, length of fruits (cm), weight per fruit (kg) and number of fruits per plant also had positive and direct effect on fruit on fruit per plant, thus, indicating desirable improvement towards fruit yield per plant. Days to first female flower anthesis, number of primary branches per plant, length of fruits (cm), weight per fruit (kg) and number of fruits per plant also had positive and direct effect on fruit on fruit per plant, thus indicating desirable improvement towards fruit yield per plant. Days to first female flower anthesis, number of primary branches per plant, length of fruits (cm), weight per fruit (kg) and number of fruits per plant was given high priority in the selection programme for further improvement of bottle gourd.

Key words : Correlation, Bottle gourd, Improvement of yield.

Bottle gourd *Lagenaria siceraria* (Molina) Standl belongs to the family Cucurbitaceae having chromosome number 2n = 22. Bottle gourd is one of the most important cucurbits cultivated in India. It is grown in rainy season and as well as in summer season vegetable. It is also known as a white flowered gourd. Bottle gourd is a good source of minerals. The 100 g edible portion of bottle gourd fruit contains 96.1% moisture, 0.2% protein, 2.5% carbohydrate, 0.2% fat, 0.03% mg thiamine, 0.1 mg riboflavin, 0.2mg niacin, 12.0 mg ascorbic acid, 0.6% fiber, 20 mg Ca, 10 mg P, and 0.7 mg Fe per 100 g edible portion. The fruits of bottle gourd can be used as a vegetable or for making sweets (e.g. halva, kheer, petha and burfi) and pickles. As a vegetable it is easily digestible even by patients. A decoction made from the leaf is a good medicine for curing jaundice. The fruit has a cooling effect, it is an cardiotonic and diabetic. The pulp is good for overcoming constipation cough, night blindness and as an antidote against certain poisons. The plant extract is used as a cathartic and seeds are used in dropsy. Kofta is most popular preparation of bottle gourd. It is good for people suffering from biliousness and indigestion (1). Bottle gourd is monoecious, highly cross pollinated, annual vine with soft pubescence. The flowers are white, solitary and open in afternoon. The flowers have five petals. The staminate flowers are long, pedicels exceeding the foliage. The pistillate flower are single with short peduncle and hairy ovary. Ovary has three placentae with numerous ovules. There are three stamens two as compound and one as single. Since flower open at night, crossing/selfing must be done early in the morning. The shape of bottle gourd fruits are cylindrical, round oval and oblong. The correlation coefficient indicates the degree of relationship between characters but does not any significant association between yield and its components. Correlation and path analysis furnish information regarding the nature and magnitude of various association and help in measurement of direct effect of one variable on other. It is most important to know the direct and indirect effect on yield component for selecting suitable genotypes for improving the yield. Therefore, present investigation

Table 1. Genotypic (G) and phenotypic (P) correlation coefficient for different pairs of characters in 15 parents of bottle gourd. *,** Significant at 5 and 1% level, respectively.

Parents Line (Female)	Symbol	Days to first male flower anthesis	Days to first female flower anthesis	Node number to first male flower	Node number to first female flower	Vine length (m)	Number of nodes per vine
Days to fifty percent	G	-0.181	-0.119	-0.381	-0.400	-0.284	-0.012
germination	P	-0.180	-0.110	-0.367	-0.389	-0.269	-0.012
Days to first male	G		0.931**	0.141	0.169	0.078	-00.27
flower anthesis	P		0.921**	0.136	0.170	0.072	-00.27
Days to first female	G			0.117	0.147	0.047	-00.48
flower anthesis	P			0.121	0.149	0.052	-00.48
Node number to	G				0.893**	0.307	0.167
first male flower	P				0.884**	0.307	0.167
Node number to	G					0.202	0.051
first female flower	P					0.204	0.053
Vine length (m)	G						0.781**
	P						0.767**
Number of nodes	G						
per vine	P						
Number of primary	G						
branches per plant	P						
Length of fruit	G						
(cm)	P						
Weight per	G						
fruits (kg)	P						
Number of fruits	G						
per plant	P						

Table 1. Continued.

Parents Line (female)	Symbol	Number of primary branches per plant	Length of fruit (cm)	Weight per fruits (kg)	Number of of fruits per plant	Fruit yield per plant (kg)
Days to fifty percent	G	-0.119	-0.615**	-0.518**	-0.300	0.083
germination	P	-0.112	-0.611**	-0.507**	-0.278	0.078
Days to first male	G	0.273	0.079	0.251	-0.121	0.058
flower anthesis	p	0.268	0.078	0.231	-0.112	0.056
Days to first	G	0.271	0.060	0.194	-0.081	0.506**
female flower anthesis	P	0.272	0.061	0.173	-0.080	0.492**
Node number to	G	0.246	0.101	0.328	-0.345	0.029
first male flower	P	0.245	0.100	0.295	0.336	0.025
Node number to	G	0.194	0.184	0.427	0.420	0.042
first female flower	P	0.195	0.184	0.387	0.400	0.033
Vine length (m)	G	0.696**	0.306	0.382	0.015	0.584**
	P	0.693**	0.301	0.337	0.025	0.577*
Number of nodes	G	0.707**	0.309	0.339	0.152	0.592**
per vine	P	0.703**	0.308	0.307	0.148	0.490**
Number of primary	G		0.107	0.785**	0.882**	0.545**
branches per plant	P		0.107	0.642**	0.674**	0.525**
Length of fruit (cm)	G			0.543**	0.098	0.668**
	P			0.498**	0.094	0.565**
Weight per fruits (kg)	G				0.167	0.767**
	P				0.137	0.605**
Number of fruits per plant	G					0.596**
	P					0.568**

was carried out to generate such information for bottle gourd.

Methods

The present experiment was carried out at Horticulture Research Farm, Department of Applied Plant Science (Horticulture), Babasaheb Bhimrao Ambedkar University, Vidya-Vihar, Rae Bareli Road, Lucknow 226025 during *kharif* of 2008—2009. Fifteen diverse genotypes of bottle gourd were used as experimental materials. The 15 genotypes are AD-1, DK, PBOG-22, VRBG-1, VRBG-18, VRBG-40, VRBG-44, VRBG-88, VRBG-105, VRBG-107, VRBG-112, VRBG-148, Pusa Naveen, PSPL and NDBG-104. The trail was conducted in Randomized Block Design with three replications. The row to row and plant to plant spacing were maintained at 2.0 × 1.00 m, respectively. All the recommended cultural and management practices were followed to raise a healthy crop. There were five plants were randomly selected for recording observations. The observations were recorded on twelve characters viz. days to 50% germination, days to first male flower anthesis days to first female flower, node number to first male flower, node number to first female flower anthesis, vine length (m), number of nodes per vine, number of primary branches per plant, length of fruit (cm), weight per fruit (kg), number of fruits per plant and fruit yield per plant. The analysis of variance was done as suggested by Panse and Sukhatme (2). Correlations of various biometrical characters were undertaken as per procedure suggested by Al-Jibouri et al. (3) and path coefficient analysis by Dewey and Lu (4).

Results and Discussion

The phenotypic and genotypic correlation coefficient among all the characters is given in Table 1. A perusal of the magnitude of correlation coefficient revealed that the genotypic correlation were higher than the corresponding phenotypic correlation, indicating the inherent association among the various traits. Genotypic correlation of 12 yield and yield attributing traits presented in Table 1, revealed that the fruit yield per plant had positive and significant genotypic and phenotypic correlation coefficient with number of fruits per plant, weight per fruit, length of fruits (cm), number of primary branches per plant, number of nodes per vine, vine length (cm) and days to first female flower anthesis. The number of fruits per plant had positive and significant correlation with number of primary branches per plant and node number to first female flower anthesis both at genotypic level and phenotypic level. The weight per fruit had positive and significant genotypic and phenotypic correlation with length of fruits and number of primary branches per plant. The number of primary branches per plant had positive and significant correlation with number of nodes per vine and vine length both at genotypic and phenotypic level. The number of nodes per vine had positive and significant correlation with vine length at both genotypic and phenotypic level. The node number to first female flower had positive and significant correlation with node number to first male flower both at genotypic level and days to first female flower anthesis had positive and significant correlation with days to first male flower anthesis.

However, negative and significant correlations were also observed for length of fruit and weight per fruit had negative and non significant correlation with days to 50% germination both at genotypic and phenotypic level.

Correlation studies alone are not adequate to establish clear associations among the various characters as number of variables are considered to be the correlated as their indirect associations become more complex, less obvious and somewhat perplexing. So, the assessments of real contribution of individual characters towards the fruit yield become essential. Path coefficient analysis gives an idea of direct and indirect effect of certain character on targeted traits.

The perusal of path coefficient analysis (Table 2) show that weight per fruit (kg) exhibited maximum direct effect on fruit followed by number of fruits per plant, number of nodes per vine, length of fruit, days to first female flower anthesis and node number to first female flower, however, vine length (m), node number to first male flower, days to first male flower anthesis and number of primary branches per plant had negative direct effects on fruit yield. High direct effect of weight of individual fruit and number of fruit per plant on fruit yield was earlier reported by Dhiman et al. (5) and the characters which showed maximum

Table 2. Genotypic path coefficient analysis (direct and indirect effect) of yield contributing characters in 15 parents of bottle gourd. Residual effect = 0.1363.

Characters	Days to fifty percent germination	Days to male flower anthesis	Days to first female flower anthesis	Node number to first male flower	Node number to first female flower	Vine length (m)
Days to percent germination	**0.011**	0.021	0.014	0.014	0.047	0.033
Days to first male flower anthesis	0.014	**-0.081**	0.076	0.015	0.013	0.064
Days to first female flower anthesis	0.003	0.029	**0.316**	0.037	0.047	0.015
Node number to first male flower	0.047	0.017	0.014	**-0.123**	0.110	0.038
Node number to first female flower	0.057	0.024	0.021	0.127	**0.243**	0.029
Vine length (m)	0.020	0.056	0.034	0.022	0.014	**-0.716**
Number of nodes per vine	0.006	0.014	0.024	0.081	0.025	0.037
Number of primary branches per plant	0.007	0.016	0.016	0.015	0.012	0.018
Length of fruit (cm)	0.053	0.036	0.028	0.046	0.085	0.014
Weight per fruits (kg)	0.189	0.218	0.169	0.285	0.371	0.331
Number of fruit per plant	0.213	0.086	0.058	0.245	0.298	0.011

Table 2. Continued.

Characters	Number of nodes per vine	Number of primary branches per plant	Length of fruit (cm)	Weight per fruits (kg)	Number of fruits per plant	Fruit per plant (kg)
Days to percent germination	0.001	0.014	0.013	0.025	0.035	0.083
Days to first male flower anthesis	0.023	0.224	0.065	0.020	0.100	0.058
Days to first female flower anthesis	-0.015	0.086	0.019	0.062	0.026	0.506
Node number to first male flower	0.027	0.030	0.012	0.045	0.042	0.029
Node number to first female flower	0.074	0.028	0.021	0.061	0.060	0.042
Vine length (m)	0.056	-0.021	0.015	0.027	0.001	0.584
Number of nodes per vine	**0.486**	0.014	0.006	0.016	0.074	0.592
Number of primary branches per plant	0.018	**-0.060**	0.026	0.023	0.005	0.545
Length of fruit (cm)	0.014	0.049	**0.459**	0.025	0.045	0.668
Weight per fruits (kg)	0.294	0.334	0.472	**0.868**	0.145	0.767
Number of fruit per plant	0.108	0.058	0.700	0.119	**0.710**	0.596

direct effect were considered in this programme for improving fruit yield.

Indirect effect towards fruit yield through various characters suggested for selecting best genotypes with higher fruit yield. (6—9). The indirect effect of various characters should be given due weightage along with characters which exerted direct effects to change the yield pattern. Thus, it can be concluded that selection of genotypes from the present materials on the basis of weight of per fruit and number of fruit per plant could lead to proportional increase in the fruit yield of bottle gourd.

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