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Correlation and path coefficient analysis in bottle gourd (*Lagenaria siceraria* (Mol.) Standl.)

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Abstract
The present study was conducted with 20 bottle gourd genotypes sown in Randomized Block Design (RBD) with three replication in the year 2016-2017 to assess the nature and magnitude of association among yield and its contributing traits in bottle gourd. Correlation studies revealed that yield highly significant and positive correlation of fruit yield per vine with fruit length, fruit girth, average fruit weight and 100 seed weight but significant and negative correlation of yield per vine with number of fruits per vine were observed at genotypic level, indicating mutual association of these traits. The direct effect of number of fruits per vine, fruit length, fruit girth, 100 seed weight, days to first male flowering, days to first female flowering, days to first fruit harvest and node number of first female flower on yield was high in magnitude in bottle gourd.

Keywords: Bottle gourd, correlation, path coefficient analysis

Introduction
Bottle gourd (*Lagenaria siceraria* (Mol) Standl) is one of the most important cucurbitaceous vegetable crop in India grown in both rainy and summer seasons. It belongs to the family cucurbitaceae having chromosome number 2n = 22. It is highly cross pollinated crop due to its monoecious and andromonoecious nature (Swiander *et al.,* 1999). It has been found in wild form in India and Southern Africa. Bottle gourd is a white flowered, monoecious, diploid self compatible, annual climbing or prostrate species in the cucurbitaceae. It is widely cultivated in tropics and subtropical region in India. The fruits are used as a vegetable, container, bowl, decoration, musical instrument or fishing floats. Seeds, tendrils, leaves and immature fruits of the bottle gourds are also utilized for different purposes especially for some medicinal treatments. Bottle gourd are known to lower cholesterol, triglyceride, low density lipoproteins, pain and inflammation (Ghule *et al.,* 2006) [4]. In any selection programme, it may not be always possible to select on the basis of yield alone for evolving superior yielding genotypes because yield is a complex character and is collectively influenced by many component characters. The inter-relationships between yield and yield contributing characters are estimated by correlation co-efficient analysis. Such association studies provide information on nature, extent and direction of selection. Further, the partitioning of correlation coefficient into direct and indirect effects of independent variables on the dependant variables like yield. It will also throw more light on selection programme.

Materials and methods
The basic material for the study included 20 accessions of various genotypes of bottle gourd. They were grown in the experimental field of Vegetable Unit, Department of Horticulture, Faculty of Agriculture, Annamalai University. The experiment was laid out in Randomised Block Design with three replications. Pits of 60 cm diameter and 30 cm depth were taken at a spacing of 2 x 1.5 m. In each pit, four seeds were sown. Sowing was done in such a way that in each replication there was a single row of four plants per accession. The cultural and management practices were adopted according to the package of practices recommended by Tamilnadu Agricultural University. The observation were recorded on five randomly selected plants with respect to characters viz., vine length (cm), days to first male flowering, days to first female flowering, node number of first male flower, node number of first female flower, days to first fruit harvest, fruit length (cm), fruit girth (cm), average fruit weight (kg), number of fruits per vine, 100 seed weight (g) and yield per vine (kg). The phenotypic, genotypic and environmental correlation coefficient were worked out following Al-Jibouri *et al.* (1958) [1]. The direct and indirect effect of yield attributing traits on yield were calculated through path-coefficient analysis as suggested by Wright (1921) [11] and elaborated by Dewey and Lu (1959) [3]. The following set of simultaneous equations were formed and solved for estimating direct and indirect effects.

Results and discussion

Correlation coefficients were estimated for 12 different characters in bottle gourd and inter relationship among yield and yield attributing characters are presented in Table (1 & 2). The genotypic correlations were higher than the phenotypic correlations which revealed that the phenotypic expression of the correlation is reduced under the influence of environment, although there is a strong inherent association between various characters.

In all the instances, however more reliance may be placed on genotypic correlation with yield and yield components. Highly significant and positive correlation of fruit yield per vine with fruit length, fruit girth, average fruit weight and 100 seed weight but significant and negative correlation of yield per vine with number of fruits per vine was observed at genotypic level, indicating mutual association of these traits (Table.2). It would be suggested from correlation estimates that fruit yield could be improved through manipulation of either of these characters (Wani *et al*., 2008) [10]. The inter correlation among yield components reveal that fruit length was positively and significantly associated with days to first female flowering, days to first fruit harvest, fruit girth, average fruit weight and 100 seed weight (Husna *et al*. 2011; Mandal *et al*. 2015) [6, 8]. Fruit girth showed positive significant association with days to first female flower, node number of first female flower, days to first fruit harvest, fruit length, average fruit weight and 100 seed weight (Sultana *et al*., 2015) [9]. It is obvious that higher fruit length and fruit girth produce heaviest fruit that results in high yield. Fruit yield per plant showed significant and negative correlation with number of fruits per vine. Number of fruits per vine had significant and negative correlation with fruit length, fruit girth, average fruit weight indicating less number of fruits formed with increase in fruit size and weight. Among the components, 100 seed weight showed positive correlation with node number of first female flower, days to first fruit harvest, fruit length, fruit girth, average fruit weight. The results indicated that selection exercised for fruit length, fruit girth, average fruit weight may lead to simultaneous improvement of yield per vine. The result of present investigation on correlation recorded that most important positive characters contributing towards yield per vine at genotypic level were fruit length, fruit girth, average fruit weight and 100 seed weight, suggesting that selection procedure applied for increasing these traits will help in eventually of yield per vine in bottle gourd.

The path analysis made in the present study revealed that the characters number of fruits per vine, fruit length, fruit girth, 100 seed weight, days to first male flowering, days to first fruit harvest and node number of first female flower (Table.3) exhibited direct positive effects on yield per plant. Among these traits, number of fruits per vine, fruit length, fruit girth, 100 seed weight and days to first male flower showed high magnitude of positive direct effect on yield per plant. Average fruit weight, 100 seed weight, fruit girth and fruit length showed higher genotypic correlation with yield per plant. Earlier workers also substantiated the higher positive direct effect of average fruit weight and fruit length (Arun Kumar *et al*., 2011) [2]. Though the direct effects of days to first fruit harvest were low in magnitude, it exerted high and positive indirect effect through fruit length. Positive effect of days to first fruit harvest on yield was reported by Janaranjani and Kanthaswamy (2015) [7]. Similarly, node number of first female flower also exerted direct positive effect on yield in accordance with the findings of Mandal *et al*. (2015) [8]. Direct effects of 100 seed weight on yield was moderate in magnitude, it exerted high and positive indirect effects through fruit length and fruit girth. These results are confirmed by Deepthi *et al*. (2016). Average fruit weight exerted negative direct effect even though its total correlation with yield was positive. Its positive indirect effect through fruit length could be considered as the cause for this. This is in agreement with the findings of Hossain *et al*. (2010) [5]. The residual effect observed in the present study was very low (0.6107) indicating almost 39% of the variation in yield per vine was attributable to factors considered in this study. From the above result of path analysis, it might be concluded that while selecting high yielding types, major emphasis should be given to number of fruits per vine, fruit length, fruit girth with due consideration for 100 seed weight, days to first male flowering and days to first fruit harvest.

Table 1: Phenotypic correlation between various characters in bottle gourd genotypes

Characters	Vine length (cm)	Days to first male flowering	Days to first female flowering	Node number of first male flower	Node number of first female flower	Days to first fruit harvest	Fruit length (cm)	Fruit length (cm)	Average fruit weight (kg)	Number of fruits per vine	100 seed weight (g)	Yield per vine (kg)
Vine length (cm)	1.000	-0.015	0.008	-0.090	-0.005	0.001	-0.007	0.247	0.071	0.031	0.045	0.235
Days to first male flowering		1.000	0.681**	0.532*	0.419	0.588**	0.188	0.243	0.123	-0.249	0.021	-0.183
Days to first female flowering			1.000	0.420	0.453*	0.808**	0.456*	0.505*	0.469*	-0.518	0.250	-0.019
Node number of first male flower				1.000	0.702**	0.452*	0.022	0.316	0.161	-0.121	0.147	0.038
Node number of first female flower					1.000	0.550*	0.269	0.502*	0.257	-0.265	0.369	0.160
Days to first fruit harvest						1.000	0.585**	0.786**	0.607**	-0.679**	0.547*	0.218
Fruit length (cm)							1.000	0.569**	0.607**	-0.753**	0.503*	0.370
Fruit girth (cm)								1.000	0.607**	-0.701**	0.736**	0.488*
Average fruit weight (kg)									1.000	-0.612**	0.465*	0.241
Number of fruits per vine										1.000	-0.589**	-0.221
100 seed weight											1.000	0.460*

(g)												
Yield per vine (kg)												1.000

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

Table 2: Genotypic correlation between various characters in bottle gourd genotypes

Characters	Vine length (cm)	Days to first male flowering	Days to first female flowering	Node number of first male flower	Node number of first female flower	Days to first fruit harvest	Fruit length (cm)	Fruit length (cm)	Average fruit weight (kg)	Number of fruits per vine	100 seed weight (g)	Yield per vine (kg)
Vine length (cm)	1.000	-0.032	0.017	-0.121	-0.005	0.009	-0.010	0.258	0.120	0.042	0.052	0.369
Days to first male flowering		1.000	0.951**	0.715**	0.544*	0.774**	0.210	0.340	0.569**	-0.351	0.146	-0.246
Days to first female flowering			1.000	0.670**	0.544*	0.922**	0.514*	0.553*	0.868**	-0.709**	0.366	-0.149
Node number of first male flower				1.000	0.963**	0.566**	0.113	0.438	0.389	-0.297	0.346	0.089
Node number of first female flower					1.000	0.602**	0.265	0.536*	0.580**	-0.387	0.491*	0.279
Days to first fruit harvest						1.000	0.671**	0.840**	0.927**	-0.913**	0.742**	0.236
Fruit length (cm)							1.000	0.621**	0.925**	-0.910**	0.665**	0.535*
Fruit girth (cm)								1.000	0.942**	-0.856**	0.974**	0.378**
Average fruit weight (kg)									1.000	-0.950**	0.903**	0.873**
Number of fruits per vine										1.000	-0.847**	-0.484*
100 seed weight (g)											1.000	0.871**
Yield per vine (kg)												1.000

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

Table 3: Path coefficient analysis between various characters in bottle gourd genotypes

Characters	Vine length (cm)	Days to first male flowering	Days to first female flowering	Node number of first male flower	Node number of first female flower	Days to first fruit harvest	Fruit length (cm)	Fruit length (cm)	Average fruit weight (kg)	Number of fruits per vine	100 seed weight (g)	Yield per vine (kg)
Vine length (cm)	-0.299	-0.036	-0.015	0.126	-0.002	0.005	-0.025	0.408	-0.026	0.168	0.065	0.369
Days to first male flowering	0.010	1.129	-0.964	-0.744	0.224	0.369	0.530	0.539	-0.123	-1.397	0.181	-0.246
Days to first female flowering	-0.005	1.186	-0.918	-0.697	0.224	0.440	1.298	0.876	-0.187	-2.821	0.455	-0.149
Node number of first male flower	0.036	0.808	-0.615	-1.040	0.396	0.270	0.287	0.694	-0.084	-1.182	0.431	0.089
Node number of first female flower	0.001	0.614	-0.499	-1.001	0.411	0.287	0.670	0.849	-0.125	-1.538	0.611	0.279
Days to first fruit harvest	-0.003	0.874	-0.846	-0.589	0.247	0.477	1.696	1.330	-0.243	-3.632	0.923	0.236
Fruit length (cm)	0.003	0.237	-0.471	-0.118	0.109	0.320	2.527	0.984	-0.264	-3.619	0.828	0.535*
Fruit girth (cm)	-0.077	0.384	-0.508	-0.456	0.221	0.401	1.570	1.584	-0.247	-3.406	1.212	0.678**
Average fruit weight (kg)	-0.036	0.642	-0.796	-0.405	0.238	0.537	3.097	1.809	-0.216	-5.369	1.373	0.873**
Number of fruits per vine	-0.013	-0.396	0.651	0.309	-0.159	-0.435	-2.299	-1.356	0.291	3.977	-1.053	-0.484*
100 seed weight (g)	-0.016	0.165	-0.336	-0.360	0.202	0.354	1.681	1.542	-0.238	-3.367	1.244	0.871**

Residual effect = 0.6107 Bold values indicate direct effects

References

1. Al-Jibouri HA, Miller PA, Robinson HF. Genotypic and environmental variances and covariances in upland cotton cross of interspecific origin. Agron. J. 1958; 50:633-636.
2. Arun Kumar KH, Patil MG, Hachinamani CN, Shanker Goud I, Hiremath SV. Genetic relationship of growth and development traits with fruit yield in F1 population of

BGDL x Hot season of cucumber. Karnataka J Agri. Sci. 2011; 24(4):497-500.
3. Dewey DR, Lu KH. Correlation and path analysis of components of crested wheat grass seed production. Agronomy J. 1959; 51:515-518.
4. Ghule BV, Ghante MH, Saoji AN, Yeole PG. Hypolipidermic and antihyperlipidermic effects of *Lagenaria siceraria* (Mol.) fruit extracts. Indian J Experimental Biol. 2006; 44(11):905-909.
5. Hossain MF, Rabbani MG, Hakim MA, Amanullah ASM, Ahsannulah ASM. Study on variability character association and yield performance of cucumber (*Cucumis sativus* L.). Bangladesh Res. Pub. J. 2010; 4(3):297-311.
6. Husna A, Mahmud F, Islam MR, Mahmud MAA, Ratua M. Genetic variability, correlation and path coefficient analysis in bottle gourd (*Lagenaria siceraria* L.). Adv. Bio. Res. 2011; 5(6):323-327.
7. Janaranjani KG, Kanthaswamy V. Correlation studies and path analysis in bottle gourd. J Hort. 2015; 2(1):1000125
8. Mandal J, Tirumalash M, Vinod Kumar Dhangrah. Studies on genetic variability and trait inter-relationship in bottle gourd (*Lagenaria siceraria* (Mol.) standl.). Hort. Flora Resrch Spectrum. 2015; 4(1):34-38.
9. Sultana S, Kawachar MA, Naznin S, Sadhik A, Mahmmud F. Variability, correlation and path analysis in pumpkin (*Cucurbita moschata* L.). Bangladesh J Agri. Res. 2015; 42(3):479-489.
10. Wani KP, Ahmed N, Hussain K, Mehfuza Habib Kant RH. Correlation and path coefficient analysis in bottle gourd (*Lagenaria siceraria* (mol.) Standl.) under temperate conditions of kashmir valley. Environment and Ecology. 2008; 26(2A):822-824.
11. Wright S. Correlation and causation. J Agri. Res. 1921; 20:557-585.