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Correlation and path coefficient analysis in sponge gourd [*Luffa cylindrica* (Linn.) M. Roem.]

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SUMMARY

Correlation studies in 30 genotypes of sponge gourd revealed that marketable fruit yield per plant exhibit significant positive correlation with number of fruit per plant and fruit length. In general, genotypic correlation coefficients were higher than the corresponding phenotypic correlation coefficients suggesting that the environmental influence reduces the relationship between yield and yield contributing characters of sponge gourd. Path coefficient analysis showed that number of fruit per plant, days to appear first female flower, fruit length, fruit diameter, number of seeds per fruit and 100-seed weight had direct positive effects on marketable fruit yield per plant. This indicates that this character was the major contributor to fruit yield. Therefore, maximum weightage should be given to this character for improvement of yield in sponge gourd.

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Key words : Correlation, Sponge gourd, Path analysis

To increase the yield, studies carried out on the direct and indirect effects of yield components provide the basis for its successful breeding programme. To make available high yield is one of the most important purposes for sponge gourd. As known, fruit yield is a complex character that can be determined by several components which reflect positive or negative effects upon these traits mean while, it is important to examine the contribution of each of the various components in order to attract the attention to which one has the greatest influence on fruit yield. Therefore, information on the relation of yield components with fruit yield is of great importance to a breeder in selecting a desirable genotype.

Correlations between yield and yield components have been analyzed in 30 genotypes of sponge gourd. There are a few investigations which have been recently released on sponge gourd. Basing decisions solely on correlation coefficients may not always be effective because they provide very limited information only, disregarding interrelations among components. Thus, many breeders were involved in analyzing the path coefficient. Usefulness of the information obtained from the correlation coefficients can be enhanced by partitioning into direct and indirect effects for a set of prior cause-effect interrelationships. The Path coefficient analysis has been used successfully to clarify interrelationships between yield and several other characteristics for sponge gourd.

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MATERIALS AND METHODS

Thirty sponge gourd genotypes were used as a plant material in the study. Field experiments were conducted at Vegetable Research Station Jagudan, (Gujarat) during 2007-08. The trials were carried out in complete randomized block design with 3 replications. The plots consisted of 2 rows with five plants each, which were spaced 1.5m x 1.5m, yield and yield contributing traits were recorded on five randomly selected plants. The simple correlation coefficients between all possible combinations of variables were worked out according to Al-Jibouri *et al.* (1958) and the Path-Coefficient technique was performed according to the method suggested by Dewey and Lu (1959). In path analysis, marketable fruit yield per plant was dependent variable and the other traits were considered as independent variables.

RESULTS AND DISCUSSION

The correlation studies revealed that in general an estimate of genotypic correlation coefficient was higher than corresponding phenotypic correlation coefficient,

which indicated a strong inherent association among different traits under study. The lower phenotypic values might be due to environmental interactions (Table 1). Similar observations were noticed in ridge gourd earlier (Karuppaiah *et al.*, 2005; Rao *et al.*, 2000). Results indicated that characters like number of fruit per plant

Table 1: Genotypic and phenotypic correlation coefficient among ten characters in sponge gourd

Characters		Days to appear first male flower	Days to appear first female flower	Node number at which first female flower appear	Number of fruit per plant	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Number of seeds per fruit	100-seed weight (g)
Marketable fruit yield per	G	-0.352	-0.500**	0.363*	0.920**	0.292	0.389*	0.317	-0.098	-0.439*
plant	P	-0.336	-0.468**	0.324	0.853**	0.264	0.373*	0.242	-0.066	-0.411*
Days to appear first male	G		0.962**	0.262	-0.226	-0.282	-0.284	-0.002	0.099	0.134
flower	P		0.877**	0.242	-0.204	-0.260	-0.263	-0.027	0.091	0.123
Days to appear first	G			0.389*	-0.399*	-0.268	-0.323	-0.026	0.185	0.180
female flower	P			0.347	-0.365*	-0.236	-0.302	0.057	0.139	0.159
Node number at which	G				-0.336	0.260	-0.152	-0.026	0.178	0.369*
first female flower appear	P				-0.275	0.228	-0.132	0.029	0.109	0.335
Number of fruit per plant	G					0.043	0.210	0.074	-0.293	-0.562**
	P					0.035	0.209	0.044	-0.253	-0.491**
Fruit weight (g)	G						0.567**	0.698**	0.533**	0.239
	P						0.493**	0.513**	0.419*	0.222
Fruit length (cm)	G							0.380*	0.166	-0.076
	P							0.288	0.143	-0.082
Fruit diameter (cm)	G								0.346	0.026
	P								0.200	0.027
Number of seeds per fruit	G									0.369*
	P									0.309

* and ** indicate significance of values at P=0.05 and 0.01, respectively

Table 2 : Path coefficient analysis showing direct and indirect effects of ten causal on fruit yield per plant variables in sponge gourd

Sr. No.	Characters	Days to appear first male flower	Days to appear first female flower	Node number at which first female flower appear	Number of fruit per plant	Fruit weight (g)	Fruit length (cm)	Fruit diameter (cm)	Number of seeds per fruit	100-seed weight (g)	Genotypic correlation with seed yield
1.	Days to appear first male flower	-0.478	0.376	-0.025	-0.224	0.001	-0.024	0.00	0.006	0.017	-0.352
2.	Days to appear first female flower	-0.460	0.390	-0.037	-0.396	0.001	-0.027	-0.005	0.010	0.023	-0.500**
3.	Node number at which first female flower appear	-0.125	0.152	-0.095	-0.334	-0.001	-0.013	-0.005	0.010	0.048	0.363*
4.	Number of fruit per plant	0.108	-0.156	0.032	0.993	0.00	0.018	0.015	-0.016	-0.073	0.920**
5.	Fruit weight (g)	0.135	-0.105	-0.025	0.043	-0.003	0.047	0.138	0.030	0.031	0.292
6.	Fruit length (cm)	0.136	-0.126	0.015	0.208	-0.002	0.084	0.075	0.009	-0.010	0.389*
7.	Fruit diameter (cm)	0.001	-0.010	0.003	0.074	-0.002	0.032	0.198	0.019	0.003	0.317
8.	Number of seeds per fruit	-0.047	0.072	-0.017	-0.291	-0.002	0.014	0.069	0.056	0.048	-0.098
9.	100-seed weight (g)	-0.064	0.070	-0.035	-0.558	-0.001	-0.006	0.005	0.021	0.130	-0.439*

Residual effect = .0469 * and ** indicate significance of values at P=0.05 and 0.01, respectively

and fruit length showed significant positive correlation with marketable fruit yield per plant at both genotypic and phenotypic levels and node number at which first female flower appeared was at genotypic level while, negative and significant correlation of days to appear first female flower was observed with marketable fruit yield per plant. The ultimate goal of increased fruit yield per plant was achieved in view of increased number of fruit per plant and fruit length which are major yield contributing traits. Hence, for effective yield improvement in sponge gourd selection should be made for higher values of number of fruit per plant and fruit length. The present results confirm the findings of Varalakshmi and Reddy (1994), Rao *et al.* (2000) and Chaudhary *et al.* (2002).

The direct and indirect relationship of marketable fruit yield per plant with competent traits and estimates of correlation among path analysis helps in indirect selection for genetic improvement in yield as shown in (Table 2). The data revealed that number of fruit per plant had highest positive direct effect on marketable fruit yield per plant followed by days to appear first female flower, fruit length, fruit diameter, number of seeds per fruit and 100-seed weight. The data further revealed that days to appear first female flower and number of fruit per plant showed maximum positive indirect effects through days to appear first male flower and fruit length, respectively, on marketable fruit yield per plant. It is concluded that sufficient genetic variability is present for all traits studied. Therefore, crop improvement could be made on the basis of this genetic variability. In view of character association and path coefficients for yield and its contributing characters, it can also be concluded that breeders should give attention on characters like number of fruit per plant, days to appear first female flower, fruit length, fruit diameter, number of seeds per fruit and 100-seed weight while selecting high yielding genotypes in sponge gourd.

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