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Research Note :

CORRELATION AND PATH ANALYSIS IN SPONGE GOURD (*Luffa cylindrica Roem*)"

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ABSTRACT : Correlation and path analysis were carried out in order to quantify the contribution of explanatory characters towards yield for sponge gourd cultivation. The characters like number of fruits per plant and average fruit weight has significant and positive correlation with yield. Average fruit weight had the highest positive direct effect on fruit yield per plant.

Keywords : *Sponge gourd, correlation, path analysis.*

Luffa (*Luffa cylindrical Roem*), commonly called as sponge gourd, loofah vegetable, sponge or dish cloth, having diploid chromosome number 2n=26, is one of the most important cucurbits grown throughout the country and world. Sponge gourd originated in subtropical Asian region particularly India (Kalloo, 6). It is an annual plant, produces fruits containing a fibrous vascular system having vigorous, vines with cylindrical ten angled fruits, deltoid to nearly orbicular leaves exteriorly but acutely pointed at apex and usually three to seven lobes with dentate margin (Whitaker and Davis, 20). Sponge gourd is reported to be strictly monoecious crop with branched tendrils where anthesis and dehiscence takes place in the early morning. Though rich in medicinal and nutritive value, sponge gourd is one of the under exploited tropical vegetable crops (Indira and Peter, 5). The tender fruits are rich in vitamin A, Vitamin C and Iron (Porterfield, 13). It has certain medicinal uses. The cooked fruits are easily digestible and very appetizing, therefore, it is recommended to the patients suffering from malaria or other seasonal fevers. In sponge gourd large amount of variation has been observed for many economically important traits (Whitaker and Davis, 20), Robinson and Decker-Walters, 14,. Seshadri and More, 16; In India wide range of variability is available in the land races of cultivars in terms of qualitative as well as quantitative characters of sponge gourd. The main breeding objectives are high yielding varieties with greater fruit number, uniform thick cylindrical fruit free from bitterness, high female, male ratio, earliness, non fibrous fruit free at edible stage.

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Variability in cucurbitaceous crop occurs in the form of land races, traditional cultivars, wild relatives from and related non edible wild weedy species. In India little attention has been given for the genetic improvement of sponge gourd by collecting diverse germplasm their morphological characterization and assessing the variability parameters like coefficient of variation and path analysis.

The experiment was carried out during the summer season of 2012-2013, at vegetable Research form, Department of Horticulture, Post Graduate College, Ghazipur (U.P.). The materials for the present study comprised of twenty one germplasm of sponge gourd, which were planted in Randomized Block Design and replication thrice. Correlation coefficients were calculated for all quantitative character combinations at phenotypic and genotypic level by the formula given by Al Jibouri *et al.* (1). The direct and indirect contribution of various characters to yield was calculated through path coefficient analysis as suggested by (Wright, 21) and elaborated by Dewey and Lu (2).

Correlation coefficient is a statistical tool which is used to find out the degree and direction of relationship between two or more variable. A positive value shows that the changes of two variables are in the same direction i.e; values of one variable are associated with the other variables where as negative value shows that the movements of variables are in opposite direction. Results of present investigation indicated that genotypic correlation co-efficient in general were of higher magnitude than the corresponding phenotypic correlation coefficients on the basis of data, coefficient of correlation of yield and its component traits have

been depicted in Table 1. Fruit yield per plant exhibited a positive and significant correlation with number of fruit per plant (rp=0.408) and average fruit weight (rp=0.817) where as node number to first staminate flower an thesis showed significant and positive association with days to first staminate flower an thesis (rp=0.624) followed by node number to first pistillate flower anthesis (rp=0.489) Similar finding were reported by Prasad and Prasad (12); and Mangal *et al.* (1). Reddy and Rao (15), Mohanty (9) and Pandey *et. al.,* (11), Singh *et. al.* (17) and Singh *et. al.* (18).

While days to first staminate flower anthesis showed significant and positive association with days to first pistillate flower anthesis (rp=0.730) followed by days to first fruit harvest (0.610), days to first pistillate flower anthesis showed significant and positive association with days to first fruit harvest (rp=0.769) whereas fruit length showed significant and positive association with average fruit weight (rp=0.817) and days to first pistillate flower anthesis showed negative association with the number of fruit per plant (rp=-0.890) while number of fruit per plant showed negative association with average fruit weight (rp=-0.765),fruit length showed negative and significant correlation with the number of fruit per plant (rp=-0.740) while positive and non significant correlation were observed in node number to first staminate flower anthesis with node number to first pistillate flower (rp=0.422) where as negative and non significant correlation was observed in days to first fruit harvest with fruit diameter (rp=-0.265) followed by days to first pistillate flower anthesis (rp=-0.152) and days to first staminate flower anthesis (rp=-0.199) Similar observation were reported by Narayan *et al.* (10) and Sharma and Bhutani (19).

Path coefficient analysis is simply a standardized partial regression coefficient which splits the correlation coefficient into the measures of direct and indirect effects. In other words, it measures the direct and indirect contribution of various independent charaters on a dependent character. The results of path coefficient studies on the phenotypic data basis showing direct and indirect effects on yield and its component using fruit yield per plant as dependent variable have been given in Table 2. Path coefficient analysis of different traits contributing towards fruit yield per plant showed that average fruit weight (0.534g) followed by fruit length (0.505cm) and number of fruit per plant (0.239), node number to first pistillate flower anthesis (0.225) and days to first pistillate flower anthesis (0.108), fruit diameter (0.101cm) and days the first staminate flower anthesis (0.089) while vine length (-0.112m) exerted negative direct effect on fruit yield per plant followed by days to first fruit harvest(-0.329),

Table 1 : Estimates of Genotypic and phenotypic correlation coefficients among eleven characters of sponge gourd

Characters		Node no. to first staminate flower anthesis	Node no. to first pistillate flower anthesis	Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Days to first fruit harvest	Fruit length (cm.)	Fruit diameter (cm.)	Vine length (m)	Number of fruits per plant	Average fruit weight (g)	Fruit yield per plant (kg)
Node no. to first staminate flower anthesis	rg		0.461*	0.795**	0.519*	0.414	0.194	-0.237	0.015	-0.152	0.166	0.170
	rp		0.422	0.624**	0.406	0.341	0.163	-0.177	0.019	-0.136	0.145	0.137
Node no. to first pistillate flower anthesis	rg			0.599* *	0.549* *	0.423	0.002	0.153	0.131	-0.142	0.093	0.131
	rp			0.489*	0.475*	0.376	0.008	0.127	0.125	-0.135	0.098	0.119
Days to first staminate flower anthesis	rg				0.975**	0.812**	0.210	-0.244	-0.147	-0.183	0.206	0.174
	rp				0.730**	0.610**	0.111	-0.199	-0.095	-0.145	0.166	0.086
Days to first pistillate flower anthesis	rg					0.969**	0.098	-0.198	-0.224	-0.073	0.086	0.090
	rp					0.769**	0.094	-0.152	-0.195	-0.890**	0.095	0.056
Days to first fruit harvest	rg						0.242	-0.318	-0.206	-0.066	0.155	0.178
	rp						0.218	-0.265	-0.196	-0.025	0.126	0.064
Fruit Length (cm)	rg							0.083	0.175	-0.813**	0.918**	-0.022
	rp							0.066	0.170	-0.740**	0.817**	-0.023
Fruit diameter (cm)	rg								0.090	-0.136	0.421	0.318
	rp								0.071	-0.107	0.356	0.250
Vine length (m)	rg									-0.194	0.237	-0.048
	rp									-0.173	0.229	-0.046
Number of fruit per plant	rg										-0.846**	0.507*
	rp										-0.765**	0.408*
Average fruit weight (g)	rg											0.020
	rp											0.026

* Significant at 5% probability level. rp-Phenotypic correlation coefficient

** Significant at 1% probability level. rg-Genotypic correlation coefficient

Table 2 : Direct and indirect effects of eleven characters on fruit yield/plant(kg) at Genotypic and phenotypic level in sponge gourd.

S.No.	Characters		Node no. to first staminate flower anthesis	Node no. to first pistillate flower anthesis	Days to first staminate flower anthesis	Days to first pistillate flower anthesis	Days to first fruit harvest	Fruit length (cm.)	Fruit diameter (cm.)	Vine length (m)	No. of fruit per plant	Average fruit weight (g)	Phentoypic correlation coefficient for yield	
1	Node no. to first staminate flower anthesis	G	-0.499	0.603	0.697	-0.955	-0.367	-0.163	0.669	-0.011	-0.129	0.327	0.170
		P	0.083	0.095	0.055	0.044	-0.112	0.082	-0.017	-0.002	-0.169	0.078	0.137
2	Node no. to first pistillate flower anthesis	G	-0.191	0.307	0.278	-0.012	-0.375	-0.006	-0.432	-0.094	-0.085	0.743	0.131
		P	0.035	0.225	0.043	0.051	-0.124	0.004	0.012	-0.014	-0.168	0.052	0.119
3	Days to first staminate flower anthesis	G	-0.193	0.783	0.133	-0.796	-0.720	-0.218	0.687	0.106	-0.255	0.648	0.174
		P	0.052	0.110	0.089	0.079	-0.200	0.056	-0.020	0.011	-0.180	0.089	0.086
4	Days to first pistillate flower anthesis	G	-0.778	0.718	0.081	-0.141	-0.559	-0.337	0.558	0.162	-0.300	0.686	0.090
		P	0.034	0.107	0.065	0.108	-0.253	0.047	-0.015	0.022	-0.111	0.051	0.056
5	Days to first fruit harvest	G	-0.621	0.553	0.732	-0.785	-0.386	-0.324	0.896	0.149	-0.274	0.240	0.178
		P	0.028	0.084	0.054	0.083	-0.329	0.110	-0.026	0.022	-0.032	0.067	0.064
6	Fruit length (cm)	G	-0.092	0.002	0.450	-0.182	-0.214	-0.105	-0.034	-0.126	-0.053	0.334	-0.022
		P	0.013	0.002	0.009	0.010	-0.072	0.505	0.006	-0.019	-0.917	0.437	-0.023
7	Fruit diameter (cm)	G	0.356	0.200	-0.020	0.365	0.282	-0.283	-0.318	-0.065	-0.563	0.365	0.318
		P	-0.014	0.028	-0.017	-0.016	0.087	0.033	0.101	-0.008	-0.133	0.190	0.250
8	Vine length (m)	G	-0.022	0.171	-0.314	0.413	0.183	-0.097	-0.255	-0.721	-0.301	0.895	-0.048
		P	-0.002	0.028	-0.008	-0.021	0.064	0.086	0.007	-0.112	-0.215	0.122	-0.046
9	Number of fruit per plant	G	0.229	-0.185	-0.391	0.134	0.059	0.771	0.385	0.140	0.121	-0.755	0.507
		P	-0.011	-0.030	-0.013	-0.009	0.508	-0.374	-0.010	0.519	0.239	-0.409	0.408
10	Average fruit weight (g)	G	-0.249	0.121	0.440	-0.158	-0.137	-0.129	-0.188	-0.171	-0.488	0.981	0.020
		P	0.012	0.022	0.014	0.010	-0.041	0.413	0.036	-0.026	-0.949	0.534	0.026

Phenotypic Residual Effect = 0.1825

Genotypic Residual Effect =0.1576

however the direct effect of the rest of character were low to considered of any consequence. Similar finding were also reporting by Mohanty (9) and Dora *et. al.* (3).

The highest indirect postive effect on phenotypic correlation coefficient for yield showed by the fruit length (0.437) followed by fruit diameter (0.190) and vine length (0.122) via average fruit weight on phenotypic correlation coefficient for yield via fruit length (0.413), number of fruit per plant on phenotypic correlation coefficient for yield via day to first fruit harvest (0.508).

The negative indirect effect on phenotypic correlation coefficient for yield showed by the average fruit weight (-0.946) followed by fruit length (-0.917) and vine length (-0.215) via number of fruit per plant. The estimates of residual effect is very low. Similar Observation were also reported by Dey (4) and Karuppaiah *et. al.* (7)

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