

Correlation and Regression Studies in Peppers (*Capsicum spp. L*)*

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Thirty cultivars of peppers were considered for estimation of simple, partial and multiple correlations for yield and yield components. Significant and positive correlations were found between yield and fruit size, plant height and negative with days to flower. The association of fruit size was significant and positive with plant height and negative with days to flower. Partial correlation studies indicated that fruit size, plant height and duration of availability of green fruits have more effect on fruit yield than the days to flower and capsaicin content.

Fruit yield is a complex trait and is the ultimate expression of its individual components in a breeding programme, the knowledge of extent of correlation and regression between different yield components and their inter-relationship with each other is of great importance in making the selection more effective. In the present studies, correlation and regression co-efficients were obtained for certain characters in all combinations. These studies can indicate that how far these inter-relationships can help a plant breeder in developing high yielding cultivars having desirable characters blended in them.

MATERIAL AND METHODS

The experiment was carried out during 1970 at the Vegetable Research Station, Solan. Thirty cultivars of peppers were grown in a randomised block design with three replications. Observations were recorded on (1) Fruit yield per plant, (2) Days to flower, (3) Plant

height, (4) Fruit size (5) Capsaicin content and (6) Duration of availability of green fruits per plant at ten randomly selected plants.

Simple, partial and multiple correlations were estimated between fruit/plant with above mentioned characters and among the characters in all possible combinations. The correlation and regression co-efficients were calculated from the variance and co-variance components.

Partial correlations were determined by Doolittle method and multiple correlations with the help of Gau's multipliers suggested by Goulden (1959). Multiple regression equations were worked out to construct a selection index.

RESULTS AND DISCUSSION

Simple correlations presented in Table I. clearly showed that fruit yield/plant had a positive and highly signifi-

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TABLE I. Simple and Partial Correlation of fruit yield per plant with five characters in *Capsicum* spp.

Characters		Days to flower	Plant height (cm)	Fruit size /plant (Sq. cm)	Capsaicin content (%)	Duration of availability of green fruits/plant (days)
Fruit yield/plant (g)	S	-0.3997*	0.5297**	0.8245**	-0.0143	0.1686*
	P	-0.0087	-0.2098*	0.8125**	-0.0009	0.0076
Days to flower		—	S 0.2550	-0.4373*	-0.0033	-0.2083
			P 0.0061	-0.0022	-0.0001	0.0014
Plant height (cm)			—	S 0.5375**	0.0038	-0.0726
				P 0.0023	0.0020	-0.0020
Fruit size/plant (Sq.cm)				—	S -0.0102	0.3079*
					P -0.00002	0.0031
Capsaicin content (%)					—	S -0.0088
						P -0.00007

S = Simple correlations

P = Partial correlations

* = Significant at 5% level of probability

** = Significant at 1% level of probability.

cant correlation with fruit size and plant height, which indicated that these two characters have major influence on fruit yield/plant. Association between fruit yield/plant and days to flower was negative and significant, this is in agreement with Paul (1940).

The days to flower had negative and significant correlation with fruit size but had positive and but non-significant correlation with plant height. There was no correlation with capsaicin content and duration of availability of green fruits/plant. The character days to flower did not affect other characters studied. There was negative and non-significant correlation of fruit yield and capsaicin content while it had positive and non-significant correlation with duration of availability of green fruits/

plant. These findings are in accordance with reports of Michna (1968) and Ohta (1958), but in contrary with the reports of Kamalam and Rajamani (1955), who reported that (pungency) capsaicin content is correlated with fruit yield/plant.

The association of plant height with fruit size was found to be positive and highly significant, but non-significant with capsaicin content. (Kamalam and Rajamani 1955). The duration of availability of green fruits/plant had no correlation with plant height and capsaicin content, but there was a positive and significant correlation with fruit size.

The partial correlations in all possible combinations of fruit yield/plant with the other five characters are given in Table I. It is evident that the fruit

yield showed positive and highly significant partial correlation with fruit size and negative and significant with plant height. All other partial correlations were non-significant. It was clear that the characters individually had no contribution towards fruit yield/plant.

The calculations of multiple correlation co-efficients were made with the help of partial regression co-efficients (Table II). It is evident from Table II that only three partial co-efficients were found to be significant viz: fruit size plant height and duration of availability of green fruits for fruit yield/plant.

The partial regression co-efficients for fruit size and plant height were positive while for duration of availability of green fruits/plant, it was negative

and highly significant, therefore, these are the important characters which tended to influence the fruit yield/plant in pepers while the other characters have very little influence. The character duration of availability of green fruits/plant showed non-significant, simple and partial correlations with fruit yield/plant, but negative and significant partial regression co-efficient, which could reveal its influence on fruit yield/plant. The multiple correlation co-efficient of fruit yield/plant with five characters was highly significant. With progressive deletion (Table II) it was observed that the values of multiple correlation co-efficients tended to decrease.

Since, the fruit size, plant height and duration of availability of green fruits/plant were the most important characters contributing towards fruit yield/plant. Actual dependence of fruit

TABLE II. Partial regression co-efficients of fruit yield factor with progressive deletion

Deletion of character	Capsaicin content (%)	Days to flower	Duration of availability of green fruits/plant (days)	Plant height (cm)	Fruit size/plant (Sq.cm)
Partial Regression of co-efficient	-14.0772	-1.5843	-17.7990**	12.5874*	16.5475**
Capsaicin content (%)	--	-1.6613	-17.8635**	12.9223*	16.3092*
Days to flower		--	-20.9376**	12.0025*	16.4581*
Duration of availability of green fruits/plant (days)			--	--	--
Multiple correlation co-efficients of yield with five characters					
	Ry 12345 = 0.9569**				
	Ry 1235 = 0.9480**				
	Ry 235 = 0.3734*				

Ry = Multiple correlation co-efficient of yield

* = Significant at 1% level of probability

** = Significant at 5% level of probability

yield/plant on these characters was used for forming a selection index. The estimation of co-efficient of determination (R^2) was 0.7629 showing that about 76.29 per cent of total variability for fruit yield/plant could be accounted for if selection is based on these characters with their due weightage as given in the prediction earlier.

Selection index for the prediction of yield;

$$Y_e = 120.03 + 12.0025X_1 + 16.4881X_2 - 20.9376X_3$$

On the basis of present investigations, conclusion can be made in peppers that due attention should be paid in the improvement of fruit size plant height and duration of availability of green fruits/plant as they jointly control the fruit yield to a greater extent.

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