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Correlation studies in tomato (*Solanum lycopersicum* L.)

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Tomato (*Solanum lycopersicum* Mill) is one of the most widely grown vegetable in India. Efforts are being made to increase its productivity by developing superior variety. Yield being a complex quantitative character, depends on a number of attributing traits. So the knowledge of association of different components together with their relative proportion indicates only the interrelationships of the characters but do not furnish information on cause and effects. This would aid in formation of efficient breeding programme. So, to increase plant productivity, a required consideration should be given not only to yield but also to its contributing traits. Therefore, the present study was undertaken to get the information on correlation coefficient in tomato genotypes which ultimately helps in developing the superior varieties.

Thirteen genotypes including 10 progenies of cross M-3-1 X H-36 along with two parents and check Dhanashree were laid out in Randomized Block Design (RBD) with 3 replication at All India Coordinated Research Project on Vegetable Crops, MPKV., Rahuri during autumn-summer season 2010-11. Transplanting was done at a spacing of 90 X 30 cm in a plot size 3.60 X 3.0 m^2. All the recommended cultivation practices were followed to raise a good crop. Observations were recorded on 5 randomly tagged competitive plants from each genotype for yield and yield contributing characters. Twelve important productivity traits, *viz.,* days to initiation of flowering, days to 50% flowering, days to first harvest, harvesting duration, number of harvestings, number of fruits per plant, average fruit weight, fruit length, fruit width, pericarp thickness, Total Soluble Solids (TSS) and fruit yield per plant were taken to find out genotypic and phenotypic correlation coefficient (Table 1). The estimates of genotypic and phenotypic correlation were worked out by the procedure described by Snedecor and Cochran (1967).

The estimate of genotypic and phenotypic correlation coefficient (Table 1) imparted that the genotypic correlation were of higher magnitude than the corresponding phenotypic ones for most of the characters combination. There by establishing dominant role of heritable factors (Singh, 2009). It indicates that the role of environment was limited in expression of these traits.

The genotypic and phenotypic association of fruit yield per plant were significantly positive with harvesting duration, number of harvesting, number of fruits per plants, average fruit weight, fruit length and fruit width. Similar findings are in broad conformity with Das *et al.,* (1998) and it was positively correlated with total soluble solids (Golani *et al.,* 2007). A negative significant correlation was observed with days to initiation of flowering, days to 50% flowering and days to first harvest. These findings were in consonance with Singh *et al.,* (2006). These results suggest that number of fruits per plant, number of harvest, harvesting duration, average fruit weight, fruit length and fruit width are considered for selection.

Days to first harvest showed negative significant association with harvesting duration, number of fruits per plant, number of harvests and fruit length and fruit width. While, non-significant association was observed for pericarp thickness at both genotypic and phenotypic levels. These results endured Sharma *et al.,* (2006) and Hidayatullah *et al.,* (2008).

A positive significant correlation was noticed between fruit width, number of harvesting, average fruit weight, pericarp thickness, T.S.S. with fruit length. These findings were in consonance with Das *et al*., (1998), Hidayatullah *et al.,* (2008) and Asati *et al.,* (2008). Golani *et al.,* (2007) and Kumar (2010) have also reported same findings.

According to Rani and Ashita (2011) reported number of locules was positively correlated with number of fruits per plant at both level and total soluble solids at phenotypic level. Number of locules was negative significantly correlated with plant height and fruit width. These results broadly stood parallel with Singh *et al.,* (2006) and

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Table 1. Estimates of genotypic (G) and phenotypic (P) correlations coefficient for different characters in tomato

Character	r	2	3	4	5	6	7	8	9	10	11	12
Days to initiation of flowering	G	1.00**	1.00**	-0.50**	-0.47**	-0.37*	-0.59**	-0.62**	-0.53**	-0.19	-0.55**	-0.84**
	P	0.83**	0.55**	-0.34*	-0.34*	-0.25	-0.40*	-0.28	-0.31	0.16	-0.32*	-0.53**
Days to 50% flowering	G		1.00**	-0.58**	-0.59**	-0.45**	-0.70**	-0.73**	-0.64**	-0.18	-0.53**	-0.95**
	P		0.63**	-0.38*	-0.40*	-0.32*	-0.40*	-0.32*	-0.38*	0.13	-0.29	-0.60**
Days to first harvest	G			-0.97**	-0.98**	-0.85**	-0.67**	-0.82**	-0.59**	-0.10	-0.40*	-1.15**
	P			-0.34*	-0.37*	-0.34*	-0.34*	-0.26	-0.36*	-0.11	-0.21	-0.59**
Harvesting duration	G				0.97**	0.94**	-0.23	-0.16	-0.22	0.62**	0.34*	0.48**
	P				0.93**	0.87**	-0.24	-0.13	-0.16	0.13	0.27	0.49**
Number of Harvesting	G					1.00**	-0.11	-0.07	-0.10	0.58**	0.27	0.60**
	P					0.94**	-0.12	-0.05	-0.08	0.16	0.22	0.61**
Number of Fruits/ plant	G						-0.13	-0.10	-0.17	0.68**	0.13	0.57**
	P						-0.15	-0.13	-0.14	0.14	0.10	0.61**
Average fruit weight (g)	G							0.98**	0.96**	-0.51**	-0.03	0.74**
	P							0.87**	0.88**	-0.29	-0.01	0.65**
Fruit length (cm)	G								1.00**	-0.61**	0.10	0.75**
	P								0.93**	-0.25	0.11	0.52**
Fruit width (cm)	G									-0.65**	0.15	0.67**
	P									-0.34*	0.11	0.56**
Pericarp thickness (cm)	G										0.03	0.02
	P										-	-0.06
Total Soluble Solids (ºBrix)	G											0.07
	P											0.05

Golani *et al.,* (2007). Fruit weight is positively significant with number of locules at genotypic level. This is in consonance with Das *et al.,* (1998).

Average fruit weight was negatively correlated with days initiation of flowering, days to 50% flowering, days to first harvest, harvesting duration, number of harvesting and number of fruits per plants. While it could be positively correlated with fruit width and fruit yield per plant. Similar results were also reported by Das *et al.,* (1998), Asati *et al.,* (2008) and Hidayatullah *et al.,* (2008).

Days to first harvest was negatively correlated with number of fruit per plant, fruit length, fruit width, and number of locules. Number of harvest was positively correlated with number of fruit per plant. These above stated results were in corroborating with Asati *et al.,* (2008) and Hidayatullah *et al.,* (2008), respectively. Total soluble solid was positively correlated with number of fruit per plant and negatively with pericarp thickness at phenotypic level. These findings were in agreement with Hidayatullah *et al.,* (2008).

From present investigation, at phenotypic level, pericarp thickness was positively correlated with total soluble solid. These results were in broad conformity with Singh *et al.,* (2006).

Thus, it could be concluded that fruit yield per plant can be improved by putting positive selection pressure on fruit and yield parameter and negative pressure on flowering parameter. And thus, fast development of new variety can be economically beneficial for the farmers.

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