

Character Association Study on Fruit Yield of Tomato (*Solanum lycopersicum* L.)

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Abstract: Fruit yield is a quantitative character, which is influenced by a number of yield contributing characters in tomato. To increase the genetic yield potential, maximum utilization of the desirable characters for synthesizing of any ideal genotypes is essential. The present investigation was carried out to determine simple correlation of fruit yield and 29 yield contributing and quality characters. The experiment was conducted at the experimental farm of the department of Vegetable science of VCSG Uttarakhand University of Horticulture and Forestry with 22 different tomato (*Lycopersicon esculentum* L.) genotypes. Two yield parameters fruit yield per plant and fruit yield per ha. (0.745) are positive and significantly correlated. Fruit yield per plant is also positive significantly correlated with days to fifty per cent flowering (0.475), fruit density (0.427), titratable acidity (0.522), fruit infected with insect (0.956) whereas, it is negative and significantly correlated with acidic acid (-0.450), fruit damage with insect (-0.466) and plant infected with disease (-0.945). However, fruit yield per ha is also positive and significantly correlated with number of node first flower (0.495). Therefore these characters can be explore directly to enhance fruit yield in tomato.

Keywords: Simple Correlation, Yield and quality characters, tomato, and *Solanum lycopersicon* L.

1. Introduction

Tomato (*Solanum lycopersicum* L.) is a self-pollinated diploid species with twelve pairs of chromosomes (2n = 24). It belongs to the Solanaceae family. Tomato is a rich source of vitamins (A and C), minerals (Ca, P and Fe) and a strong antioxidant against cancer and heart diseases (Dhaliwal *et al.*, 2003). Knowledge of inter-character relationship is very important in plant breeding for indirect selection to the characters that are not easily measured and for those that exhibit low heritability. Correlation studies between characters have also been of great value in the determination of the most effective breeding procedures. Yield is a complex trait that shows a chain of linear and non-linear associations among yield components with varying degree of effects. To increase the genetic yield potential, maximum utilization of the desirable characters for synthesizing of any ideal genotypes is essential. Fruit yield is a quantitative character, which is influenced by a number of yield contributing characters in tomato. Selection for higher yield, the complex interrelationship between the yield contributing characters usually shows a complex chain of interacting relationship. Understanding of relationships among these components lead to the choice of elite genotypes, authenticates the benefits of a selection pattern and highlights real-time increase in yield through inter related

characters. Various studies on such aspect had already been conducted using genetic pool viz. cultivars, elite lines, accessions and land races of tomato. Regarding the genetic parameters such as degree of association between the various characters and direct and indirect effects of characters contributory to total fruit yield are of permanent significance in formulator appropriate breeding strategy. The objective of this present research work has been undertaken in order to study interrelationship among varies component traits of fruit yield so as to devise a suitable selection criteria for its improvement.

2. Material and Methods

The experiment was undertaken in the Ranichauri campus of VCSG, Uttarakhand University of Horticulture and Forestry Bharsar (Pauri Garhwal) in the month of march 2016 august 2017. The experiment was laid out with 22 genotypes in a randomized block design (RBD) having 3 replications. The thirty day old seedlings transplanted from nursery to the field keeping the plant-to-plant and row-to-row distances of 45 and 60cm, respectively. The observations were recorded on various growth, yield and quality parameters from 10 randomly selected plants in each replication as per standard procedure. Simple correlation coefficient has obtained using the slandered procedure.

Table 1: Simple correlation among fruit yield, yield contributing and quality traits in tomato

	FYP	FY	FL	DF	NFF	NFCP	NFPC	PHF	PHFP	PHLP	NPB	NSB	LA	DAP	IL	FDI	LPF	FD2	FV	PT	PH	AA	LC	TA	DWC	TSS	FI	FDI	PID	PD	
FYP	1	0.745**	-0.203	0.475*	0.357	-0.328	0.347	0.128	0.025	0.076	0.073	0.201	0.061	0.358	-0.117	-0.221	-0.14	0.427*	-0.149	-0.177	0.215	-0.450*	0.174	0.522**	0.036	-0.158	0.956**	0.466*	0.065	0.945**	
FY		1	0.067	0.278*	0.495*	-0.028	0.145	0.206	0.115	0.17	0.178	-0.05	0.394	0.147	0.025	0.079	0.271	0.360	0.016	-0.207	0.198	-0.371	0.066	-0.394	0.082	0.142	0.715**	-0.175	0.093*	0.734**	
FL			1	0.277	0.142	0.649**	-0.299	0.263	0.142	0.096	0.128	*	0.158	-0.078	0.359	0.641**	-0.01	-0.171	0.415*	-0.04	0.019	0.096	0.103	0.17	-0.027	0.131	0.226	0.434*	0.009	0.188	
DF				1	0.516**	0.508**	0.520**	-	0.054	0.107	0.298	0.09	0.493*	0.137	0.84	-0.363	-0.348	0.425*	0.602**	-0.219	0.525**	0.071	0.219	0.011	0.398	-0.275	-0.369	0.496*	0.230	-0.373	
NFF					1	-0.249	0.181	0.222	0.480*	0.538*	*	0.112	0.112	0.234**	0.507**	-0.048	-0.041	0.272	0.37	-0.231	-0.337**	0.654**	0.238	0.176	0.215	0.6	0.046	-0.345	-0.135	0.110	-0.350
NFC						1	0.501	0.091	0.039	-0.036	-	-	0.109	-0.275	0.609	0.586	-	-0.286	0.433	0.138	-0.201	0.172	-	0.237	-0.229	0.332	0.28	0.62	-	0.229	

plant height at first picking (0.480), Plant height at last picking (0.538) daysv taken to first picking (0.507), pH (0.654), Number of flower cluster per plant is positively correlated with number of flower per cluster(0.501), Internodal length (0.609), fruit diameter (0.586), fruit volume (0.433) according to Reddy *et al.* (2013), Hasan *et al.* (2016), Meena *et al.* (2014), number of flower per cluster is positively signifying with days taken to first flowering. Plant height at first picking is So, selection for these traits can increase the fruit yield significantly. Plant height at first picking is positively correlated with plant height at last picking (0.95), fruit density (0.513), pH (0.608), Dry weight content (0.502). According to Hasan *et al.* (2016) reported that plant height at first picking is negative correlated with dry matter content, Rajoli *et al.* (2017) and Laxmi *et al.* (2017) reported that plant height at first flowering is significantly correlated with pH. Plant height at last picking is positively correlated with fruit density (0.591) and dry weight content (0.616). pH is positively correlated with dry weight content (0.915). Ascorbic acid is positively correlated with tritrate acidity (0.981). Rani *et al.* (2008), also reported positive correlation between these characters, but Sharma *et al.* (2015) and Singh *et al.* (2018) reported significant correlation between these characters.

Some parameters are negatively correlated such as fruit yield per plant is negatively correlated with tritrate acidity (-0.522) and fruit damaged with insects (-0.956), fruit yield per hectare negatively correlated with fruit damaged with insect, days taken to first flowering negatively correlated with number of flower cluster per plant (-0.508) and fruit volume (-0.602), number of flower cluster per plant with number of flower per cluster (-0.501), Number of secondary branches with internodal length (-0.545), and percentage of fruit damaged with insect (-0.605), fruit density with fruit volume (-0.657) and pericarp thickness (-0.685).

In conclusion, the correlation coefficient analysis of twenty nine quantitative traits revealed strong association among growth, quality and yield parameters of tomato under study. So we can be considered these characters as yield components of tomato. Selection should be based on these components for yield and quality improvement in tomato.

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