

INTERRELATIONSHIP BETWEEN YIELD AND YIELD ATTRIBUTES IN TOMATO (*LYCOPERSICON ESCULENTUM* MILL)

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ABSTRACT

In tomato, yield/plant was associated significantly with number of fruits/plant, fruits number/raceme, fruit length, fruit diameter, fruit weight and number of laterals. Significant positive correlations were observed between plant height with number of laterals and fruit diameter; number of laterals with days to 50% flowering; days to maturity with fruit weight; fruit number/raceme with fruit number/per plant and fruit diameter with locule number/fruit and fruit weight. Significant negative correlations were observed between plant height and fruits per raceme.; days to 50% flowering and fruit number per raceme; and fruit number per raceme and fruit diameter.

INTRODUCTION

Yield in tomato, as in any other crop plants, is a complex quantitative character, influenced by environmental fluctuations. Direct selection for yield as such, therefore, will not be effective. Hence selection criteria based on yield components would be helpful in selecting suitable plant types. Correlation studies between yield and its components provide a measure of association between different variables. Knowledge of association of the simply inherited characters which are less affected by environment, is required to construct suitable selection indices for the improvement of complex characters like yield. A study was, therefore, taken up in tomato to know the nature of association between yield and yield contributing characters both at genotypic and phenotypic levels.

MATERIALS AND METHODS

A field experiment was laid out during the *rabi* season of 1993-94 at Imphal, Manipur. The materials comprised 19 genotypes of tomato and was grown in randomized block design with 3 replications. Each plot consisted of 3 rows 70 cm. apart, having plant spacing of 60 cm. The plot was fertilized with N, P and K at 50, 50 and 50 kg/ha. respectively. On 5 random plants, data were recorded on plant height (cm), number of laterals, number of fruits / raceme, number of fruits/plant (kg). On 5 randomly selected fruits of each of the selected plants, data were recorded on fruit length (cm), locule number fruit and fruit weight (g). Genotypic and phenotypic correlations were calculated following standard procedure.

RESULTS AND DISCUSSION

Variations were observed in the means of the genotypes studied for all the characters (Table 1). AAU-5 exhibited highest yield/plant (4.284 kg), followed by Arka Saurab (4.075 kg) and Punjab Chhuarah (4.070 kg).

The yield / plant had positive and highly significant correlation with number of fruits/plant, fruit weight, number of lateral, fruit diameter, fruit length and number of fruits/raceme (Table 2). Most of these characters also had positive association among themselves, indicating that selection for these characters may improve the fruit yield simultaneously. This confirms the findings of Cuartero and Cubero (1982), Dudi and Kalloo (1982) and Rajadthav et al. (1986).

Among the correlations between yield components, highly significant and positive genotypic correlations were observed between days to 50% flowering with days to maturity, fruit diameter, fruit weight and number of laterals; days to maturity with fruit weight and number of laterals; number of laterals with number of fruits/plant, fruit diameter and fruit weight; number of fruits/raceme with number of fruits/plant; fruit length with fruit diameter and fruit weight; and locule number/fruit with fruit weight. The positive intercorrelations observed from the investigation indicated that such characters are indirect selection indices for tomato improvement. For almost all the character pairs, the genotypic correlations were of higher magnitude than the corresponding phenotypic correlations; which indicated that there is strong inherent association between the characters.

However, the negative association that existed between different pairs of yield attributing characters has suggested that selection for these characters has to be exercised concurrently rather than in isolation. Number of fruits per plant exhibited significant and negative association with fruit diameter and fruit weight; this appears to be enforced by the genetic limitation on the capacity of fruit production. This has emphasized that a balanced number of fruits with medium fruit size is an ideal approach in yield improvement of tomato.

Thus, it may be concluded that simultaneous selection for fruits with medium size and weight with medium ealliness and plant height may be given due consideration in selection programmes in tomato.

REFERENCES

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Table 1. Mean performance of the tomato genotypes for different characters

Genotype	Days to 50% flowering	Days to maturity	Number of laterals	Plant height (cm)	No. of fruits per raceme	No. of fruits per plant
AAU-2	31.37	78.29	14.47	94.12	5.00	60.23
AAU-3	37.57	81.46	15.60	129.48	4.93	46.77
AAU-4	41.37	85.49	14.50	113.55	4.33	44.65
AAU-5	38.17	80.32	17.33	87.07	7.50	90.22
AAU-6	40.43	83.61	17.03	96.25	6.50	55.00
EP-84	47.33	89.45	18.83	176.82	4.67	57.11
VC-48-1	45.73	87.49	19.50	187.02	4.17	53.45
Marglobe	43.07	86.32	17.13	96.07	4.27	44.56
Pusa Ruby	38.07	79.09	17.87	118.83	4.67	47.89
Punjab Chhuarah	42.80	81.92	17.77	88.73	6.47	77.53
Roma	40.27	83.69	15.07	84.03	5.73	54.87
Pant-T ₂	47.40	89.32	16.30	87.47	5.63	46.20
Pant-T ₃	49.47	87.61	17.37	96.13	5.43	41.95
Pusa Sel-2	52.50	90.31	18.40	113.27	5.70	54.28
ATH-1	50.03	95.64	16.93	98.67	5.47	45.88
Arka Saurab	53.92	96.57	15.93	127.40	4.33	47.20
Pusa Early	28.47	68.49	11.63	76.57	5.07	37.84
KS ₀ -6	44.43	90.53	13.50	110.47	3.83	37.67
ACC-238	50.70	84.61	16.80	108.32	4.03	42.07
SE	1.60	1.08	0.63	4.84	0.62	1.93
CD (5%)	3.14	2.12	1.23	9.49	1.22	3.78

Table 1 (contd.)

Genotype	Fruit length (cm)	Fruit diameter (cm)	Locule No. per fruit	Fruit weight (g)	Yield per plant (kg)
AAU-2	2.93	3.44	3.73	38.92	2.343
AAU-3	3.95	4.94	4.07	44.68	2.088
AAU-4	3.13	3.89	4.00	48.90	2.185
AAU-5	3.07	3.39	4.00	47.50	4.284
AAU-6	3.15	3.70	3.53	49.83	2.741
EP-84	5.47	7.38	4.20	62.08	3.546
VC-48-1	5.10	6.82	4.67	66.90	3.578
Marglobe	3.54	5.49	4.27	55.13	2.457
Pusa Ruby	3.44	5.57	4.00	57.87	2.773
Punjab Chhuarah	7.24	4.57	2.20	52.47	4.070
Roma	5.50	3.07	2.00	34.98	1.922
Pant-T ₂	3.92	4.57	2.27	60.51	2.794
Pant-T ₃	4.28	5.52	3.27	68.86	2.883
Pusa Sel-2	4.60	5.75	3.13	74.46	4.043
ATH-1	4.12	5.39	5.87	76.57	3.515
Arka Saurab	4.70	5.52	3.27	86.33	4.075
Pusa Early	3.10	4.23	3.67	50.03	1.892
KS ₆	3.20	3.97	3.83	41.55	1.554
ACC-2-38	3.27	4.53	3.87	46.67	1.991
SE	0.20	0.27	1.16	0.2944	
CD (5%)	0.39	0.53	0.53	2.27	0.580

Table 2. Genotypic (rg) and phenotypic (rp) correlation coefficients for different pairs of characters

Characters	Correlation coefficient	Days to flowering		Days to maturity	Number of laterals	Plant height	Number of fruits/plant	Number of fruits/locule	Fruit length	Locule No. diameter	Fruit per fruit	weight
		50%	raceme									
Yield per plant	rg	0.4800	0.2639	0.3751	0.7019**	0.2639	0.5335**	0.7181**	0.5635**	0.5678**	0.0295	0.7680**
	rp	0.4177	0.2367	0.3455	0.6183**	0.2367	0.3782	0.4728*	0.3458	0.3946	0.0263	0.4901*
Days to 50% flowering	rg	-	0.3280	0.9428**	0.5840**	0.3280	-0.7045**	-0.1696	0.3705	0.5352**	0.1001	0.7060**
	rp	-	0.3210	0.8471**	0.5004*	0.3210	-0.4467	-0.1543	0.3478	0.4769*	0.1082	0.6808**
Days to maturity	rg	-	0.3584	-	0.4659*	0.3584	-0.1516	-0.1755	0.2748	0.4487	0.2751	0.6432**
	rp	-	0.3400	-	0.4047	0.3400	-0.3307	-0.1740	0.2751	0.3957	0.2203	0.6264**
Number of laterals	rg	-	0.5660**	-	-	0.5660**	0.3340	0.5126*	0.4061	0.3014**	0.4544*	0.5086*
	rp	-	0.4969*	-	-	0.4969*	0.3480	0.3247	0.3663	0.3225	0.2337	0.4639*
Plant height	rg	-	-	-	-	-	-0.5363**	-0.0757	0.2876	0.7830**	0.3286	0.3444
	rp	-	-	-	-	-	-0.3725	-0.0785	0.2762	0.7336**	0.3045	0.3412
No. of fruits per raceme	rg	-	-	-	-	-	-	0.8314**	0.1911	-0.6098**	-0.3054	-0.1037
	rp	-	-	-	-	-	-	0.6222**	0.1426	-0.7997**	-0.2512	-0.0618
No. of fruits per plant	rg	-	-	-	-	-	-	-	0.3400	-0.2043	-0.2689	-0.1498
	rp	-	-	-	-	-	-	-	0.3180	-0.1904	-0.2490	-0.1451
Fruit length	rg	-	-	-	-	-	-	-	-	0.3959	-0.3123	0.2895
	rp	-	-	-	-	-	-	-	-	0.3644	-0.3486	0.2850
Fruit diameter	rg	-	-	-	-	-	-	-	-	-	0.5044*	0.7140**
	rp	-	-	-	-	-	-	-	-	-	0.1434	0.6762**
Locule number per fruit	rg	-	-	-	-	-	-	-	-	-	-	0.2967
	rp	-	-	-	-	-	-	-	-	-	-	0.2872

** Significant at 1% level, * Significant at 5% level