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Performane of tomato genotypes in autumn season

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Abstract

The present study was carried out at Department of Vegetable Crops, Punjab Agricultural University, Ludhiana during 2010-2011. The experimental material consisted of 44 F_1s of tomato (obtained through line × tester method by using 11 lines and 4 testers). Maximum phenotypic and genotypic coefficients of variability was observed for lycopene content followed by number of fruits per plant, total fruit yield, marketable yield, average fruit weight and plant height. The presence of narrow gap between phenotypic coefficient and genotypic coefficient of variability for all the characters under study, suggested that the traits studied have low environmental influence. Maximum genetic advance was observed for lycopene content followed by number of fruits per plant, total fruit yield, marketable yield, average fruit weight and plant height and therefore these characters can be improved with selection.

Keywords: Genotypic coefficients of variability, phenotypic coefficients of variability, Genetic advance, Selection

Introduction

Tomato (*Solanum lycopersicum* L.) is a popular vegetable all over the world because of its high nutritive value and versatile uses. It is a rich source of vitamin A and C. It is eaten as salad and cooked as vegetable. It is the second largest crop among the processed vegetables. It is processed into various forms such as juice, ketchup, paste puree etc. In self-pollinated crops like tomato, improvement in yield and quality through hybrid breeding programme depends upon the extent of variability for desirable traits within the available germplasm. Therefore, the estimation of variability parameters for economically important characters is essential to formulate strategies for crop improvement. Variability studies supplemented with knowledge of heritability and genetic advance for a particular character provide information about the possible improvement that can be brought through selection.

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Material and Methods

The present investigation was carried out at the Department of Vegetable Science, Punjab Agricultural University, Ludhiana. Forty four F_1 crosses were made in a line x tester fashion by using eleven lines and four testers during February to March of 2010. The experimental material comprising of forty four F_1 hybrids, fifteen parental lines and two checks were sown in nursery beds on 24th July 2010. Transplanting was done in the field on 30th August 2010 in a Randomized Block Design with three replications. In each replication, there were ten plants in a row for each entry. The data were recorded on sixteen characters. Observations were based on five central plants in a row leaving one plant on each side of the row. The genetic variability was assessed by using the parameters like genotypic coefficient variation (GCV), phenotypic coefficient of variation (PCV) heritability and genetic advance. The genotypic and phenotypic coefficients of variation, heritability in broad sense and expected genetic advance were calculated as suggested by Burton and DeVane (1953) and Johnson *et al* (1955).

Results and Discussion

Analysis of variance for experimental design revealed that variance due to replications was very low in magnitude and differences were significant for most of the characters studied except plant height, average fruit weight, number of fruits per plant, harvesting span pericarp thickness and number of locules per fruit.. Highly significant differences among genotypes were present for all the characters studied.

The mean values and range for all traits under study are given in Table 1. The maximum value for phenotypic coefficient of variability was observed by lycopene content (41.21%), followed by number of fruits per plant (37.82%), total fruit yield (36.10%), marketable yield (33.82%), average fruit weight (28.63%) and plant height (26.08%). The estimates were moderate for titratable acidity (24.12%), pericarp thickness (22.04%), days to 50% flowering (21.34%) and numbers of locules per

fruit (20.53%). The coefficients of phenotypic variation were quite low for ascorbic acid (14.03%) followed by fruit shape index (13.13%), total soluble solids (TSS) (10.73%), harvesting span (10.04%), days to first harvest (9.75%) and dry matter (9.59%). Character having high phenotypic coefficients of variability was suitable for improvement through selection, because it shows the variability present in the population. Kumari *et al* (2007) observed the highest genotypic coefficient of variation for plant height followed by early yield, lycopene content, number of fruit bearing branches and titratable acidity.

In all the cases, phenotypic coefficient of variability is more than the genotypic coefficient of variability, indicating the role of environment in t expression of the traits under observation. The character having high

Table 1: Mean performance of parents and checks for different characters

Parent	Days to 50% flowering	Days to first harvest	Plant height (cm)	Average fruit weight (g)	Number of fruits/plant	Total fruit yield (kg/plant)	Marketable yield (kg/plant)	Harvesting span (days)
Line								
PVB-1	26.67	96.00	132.73	47.39	37.75	1.50	1.33	79.00
Sel 12-1-17	20.00	107.67	137.00	73.03	16.13	1.14	0.96	69.50
Sel 12-1-16	21.67	90.67	154.55	58.62	19.76	1.30	1.05	75.33
102-8-6-1	30.00	93.33	77.67	50.37	22.76	1.15	0.90	74.33
102-8-5-1	25.00	80.00	81.43	48.76	27.14	1.55	1.08	80.00
102-1-6-1	24.33	88.00	93.53	65.29	20.63	1.28	1.12	74.33
7-5-1	17.00	88.00	77.45	34.62	44.50	1.16	0.89	79.67
7-4	23.67	84.00	74.60	33.99	43.43	1.42	1.17	82.67
2-1	21.00	88.00	66.80	23.05	23.67	0.60	0.47	82.00
CH-2-2	30.00	102.67	97.80	65.18	12.21	0.71	0.50	59.67
CH-2-3-1	20.33	96.00	105.13	63.30	23.04	1.22	1.04	82.67
Tester								
115-1-8-1	24.00	88.00	75.93	55.41	33.39	1.64	1.35	80.33
58-18-1-1	17.00	76.00	94.00	47.32	25.00	1.02	0.91	73.00
55-26-1-1	26.00	80.00	74.97	55.67	24.42	1.33	1.07	78.00
PVB-2	29.33	107.67	121.27	60.64	21.5	1.34	0.97	84.67
Check								
Punjab Chhuhara	32.00	88.00	46.00	43.15	6.43	0.25	0.20	71.00
NS-524	31.65	107.67	97.03	42.04	30.11	1.26	1.11	84.00
Grand mean	24.69	91.86	94.58	51.05	25.40	1.17	0.95	77.07
CD at 5%	4.15	6.84	12.95	3.93	4.32	0.27	0.18	6.01
CD at 1%	5.46	9.00	17.04	5.17	5.68	0.35	0.24	7.91

Parent	Fruit shape index	Pericarp thickness (cm)	Number of locules per fruit	Dry matter (%)	TSS (%)	Lycopene content (mg/100g)	Titratable acidity (mg/100ml)	Ascorbic acid (mg/100 ml)
Line								
PVB-1	0.89	0.73	2.89	4.43	4.11	2.49	0.68	25.62
Sel 12-1-17	0.89	0.63	2.17	5.81	4.00	4.52	0.80	17.99
Sel 12-1-16	0.86	0.70	2.78	4.41	4.35	4.61	0.78	16.97
102-8-6-1	0.89	0.55	2.78	4.59	3.73	2.80	0.51	19.38
102-8-5-1	0.88	0.77	2.78	4.47	4.40	2.82	0.94	22.93
102-1-6-1	0.91	0.61	2.90	4.59	3.66	3.11	0.54	24.45
7-5-1	1.14	0.41	2.00	5.10	4.87	1.22	0.34	24.95
7-4	1.11	0.44	2.25	4.67	4.09	1.94	0.73	19.06
2-1	1.20	0.36	2.00	4.80	4.10	3.88	0.57	21.66
CH-2-2	0.90	0.81	2.56	4.35	3.50	4.64	0.65	20.39
CH-2-3-1	0.93	0.68	3.23	4.49	4.29	1.38	0.89	20.14
Tester								
115-1-8-1	1.01	0.68	3.00	4.46	3.85	5.50	0.77	16.09
58-18-1-1	0.95	0.45	2.25	4.03	4.28	2.23	0.60	17.23
55-26-1-1	0.92	0.69	3.22	4.37	3.69	2.78	0.96	16.09
PVB-2	0.88	0.75	4.11	4.72	4.19	3.74	0.82	16.47
Check								
Punjab Chhuhara	1.35	0.57	2.89	5.47	4.72	2.80	0.64	18.75
NS-524	0.98	0.77	3.08	4.27	4.19	2.80	0.66	19.51
Grand mean	0.98	0.62	2.76	4.65	4.12	3.13	0.70	19.86
CD at 5%	0.06	0.07	0.41	0.36	0.33	0.49	0.08	1.48
CD at 1%	0.08	0.09	0.54	0.47	0.43	0.64	0.11	1.94

Table 2: Mean performance of crosses for different characters

Crosses	Days to 50% flowering	Days to first harvest	Plant height (cm)	Average fruit weight (g)	Number of fruits/plant	Total fruit yield (kg/plant)	Marketable yield (kg/plant)	Harvesting span (days)
PVB-1 × 115-1-8-1	28.67	88.00	105.37	42.99	31.23	1.30	1.16	87.00
PVB-1 × 58-18-1-1	33.00	93.33	125.13	44.69	31.25	1.46	1.26	81.67
PVB-1 × 55-26-1-1	27.00	96.00	110.60	48.40	42.86	2.04	1.69	71.67
PVB-1 × PVB-2	24.00	90.67	127.37	43.32	35.89	1.60	1.36	85.00
Sel 12-1-17 × 115-1-8-1	16.33	93.33	111.47	67.26	12.56	1.39	1.25	67.00
Sel 12-1-17 × 58-18-1-1	17.67	107.67	130.20	73.16	18.04	1.28	1.15	78.33
Sel 12-1-17 × 55-26-1-1	25.67	109.33	150.23	73.87	19.79	1.47	1.18	79.00
Sel 12-1-17 × PVB-2	29.33	96.00	127.17	60.06	27.70	1.39	1.21	69.67
Sel 12-1-16 × 115-1-8-1	24.00	90.67	132.23	60.02	31.37	2.17	1.88	79.33
Sel 12-1-16 × 58-18-1-1	21.00	88.00	126.60	66.93	21.09	1.42	1.22	84.33
Sel 12-1-16 × 55-26-1-1	26.33	96.00	171.53	63.72	37.23	2.19	1.91	82.67
Sel 12-1-16 × PVB-2	19.67	90.67	129.77	61.99	17.43	1.09	0.85	86.67
102-8-6-1 × 115-1-8-1	29.00	84.00	77.33	55.64	17.33	1.02	0.75	83.67
102-8-6-1 × 58-18-1-1	20.33	90.67	117.07	60.16	16.58	0.94	0.81	64.33
102-8-6-1 × 55-26-1-1	26.33	99.33	87.80	53.60	30.24	1.40	1.05	70.00
102-8-6-1 × PVB-2	22.00	88.00	96.13	65.07	26.31	1.39	1.05	78.67
102-8-5-1 × 115-1-8-1	21.00	84.00	83.43	44.44	25.19	0.94	0.86	84.00
102-8-5-1 × 58-18-1-1	22.00	76.00	106.00	48.16	30.42	1.49	1.21	81.00
102-8-5-1 × 55-26-1-1	25.67	80.00	83.07	49.12	20.74	1.04	0.81	89.00
102-8-5-1 × PVB-2	22.00	84.00	92.97	53.24	15.70	0.89	0.72	79.67
102-1-6-1 × 115-1-8-1	29.67	93.33	69.47	46.88	28.70	1.31	1.18	70.33
102-1-6-1 × 58-18-1-1	24.00	84.00	88.93	55.73	27.46	1.63	1.22	84.33
102-1-6-1 × 55-26-1-1	25.00	80.00	109.53	54.49	27.38	1.59	1.21	86.67
102-1-6-1 × PVB-2	25.33	88.00	106.93	54.80	22.88	1.29	1.11	78.00

Crosses	Days to 50% flowering	Days to first harvest	Plant height (cm)	Average fruit weight (g)	Number of fruits/plant	Total fruit yield (kg/plant)	Marketable yield (kg/plant)	Harvesting span (days)
7-5-1 × 115-1-8-1	31.00	93.33	83.97	27.72	32.32	1.06	0.85	89.00
7-5-1 × 58-18-1-1	25.33	90.67	70.54	28.93	35.48	1.04	0.78	86.67
7-5-1 × 55-26-1-1	24.33	93.33	79.00	25.49	37.36	0.96	0.77	84.33
7-5-1 × PVB-2	22.67	96.00	91.73	34.74	40.81	1.35	1.09	83.33
7-4 × 115-1-8-1	23.67	76.00	78.13	35.93	41.72	1.46	1.20	81.00
7-4 × 58-18-1-1	19.67	84.00	75.47	31.39	36.68	1.10	0.92	86.67
7-4 × 55-26-1-1	16.00	80.00	80.80	33.80	40.94	1.35	1.21	89.00
7-4 × PVB-2	23.67	88.00	76.15	28.24	51.99	1.30	1.15	81.67
2-1 × 115-1-8-1	32.00	90.67	73.08	25.08	35.00	0.99	0.76	82.00
2-1 × 58-18-1-1	29.00	88.00	72.54	38.08	29.65	1.13	0.99	86.67
2-1 × 55-26-1-1	25.33	96.00	80.87	26.90	50.28	1.24	1.00	73.67
2-1 × PVB-2	23.67	90.67	93.47	36.44	48.38	1.90	1.49	80.33
CH-2-2 × 115-1-8-1	36.00	96.00	101.43	68.71	39.97	2.91	2.53	71.67
CH-2-2 × 58-18-1-1	32.00	90.67	120.13	66.88	25.92	1.74	1.33	66.33
CH-2-2 × 55-26-1-1	36.00	99.33	121.93	79.75	32.34	2.70	2.47	63.67
CH-2-2 × PVB-2	39.00	102.67	117.53	64.19	14.35	0.85	0.71	59.67
CH-2-3-1 × 115-1-8-1	22.67	90.67	76.27	63.83	13.36	1.55	1.10	78.67
CH-2-3-1 × 58-18-1-1	25.33	93.33	115.90	65.15	17.25	1.10	0.88	82.00
CH-2-3-1 × 55-26-1-1	30.33	107.67	83.13	69.97	22.12	1.41	1.14	82.67
CH-2-3-1 × PVB-2	29.00	90.67	84.87	57.97	13.58	1.15	0.90	71.67
CD at 5%	4.15	6.84	12.95	3.93	4.32	0.27	0.18	6.01
CD at 1%	5.46	9.00	17.04	5.17	5.68	0.35	0.24	7.91

Crosses	Fruit shape index	Pericarp thickness (cm)	Number of locules per fruit	Dry matter (%)	TSS (%)	Lycopene content (mg/100g)	Titratable acidity (mg/100ml)	Ascorbic acid (mg/100 ml)
PVB-1 × 115-1-8-1	0.97	0.76	2.77	4.68	3.71	1.82	0.73	21.78
PVB-1 × 58-18-1-1	0.91	0.73	3.55	4.25	3.23	2.79	0.62	20.58
PVB-1 × 55-26-1-1	0.91	0.87	3.22	4.65	4.01	1.61	0.79	22.24
PVB-1 × PVB-2	0.90	0.70	3.55	4.62	3.97	3.03	0.73	26.36
Sel 12-1-17 × 115-1-8-1	0.85	0.80	2.71	5.30	4.11	4.65	0.71	16.64
Sel 12-1-17 × 58-18-1-1	0.86	0.66	2.92	5.99	4.47	4.34	0.55	18.29
Sel 12-1-17 × 55-26-1-1	0.86	0.85	3.33	4.98	4.68	5.00	0.52	22.27
Sel 12-1-17 × PVB-2	1.03	0.73	3.39	4.75	4.43	4.09	0.65	17.11

Sel 12-1-16 × 115-1-8-1	0.79	0.73	3.22	4.94	5.21	7.08	1.21	17.52
Sel 12-1-16 × 58-18-1-1	0.93	0.76	3.22	4.50	4.88	4.62	0.71	18.68
Sel 12-1-16 × 55-26-1-1	0.87	0.83	2.89	4.73	5.12	4.90	0.86	15.83
Sel 12-1-16 × PVB-2	0.89	0.80	3.11	4.59	4.47	4.83	1.11	15.96
102-8-6-1 × 115-1-8-1	0.87	0.83	3.43	4.29	3.63	2.48	0.46	22.80
102-8-6-1 × 58-18-1-1	0.92	0.66	2.89	4.48	3.44	2.86	0.40	22.27
102-8-6-1 × 55-26-1-1	0.76	0.86	3.22	4.39	4.44	3.65	0.69	22.55
102-8-6-1 × PVB-2	0.82	0.80	3.11	4.74	4.43	3.35	0.41	21.66
102-8-5-1 × 115-1-8-1	0.92	0.70	2.66	4.85	4.34	4.40	1.00	20.39
102-8-5-1 × 58-18-1-1	0.97	0.66	3.78	3.83	4.43	2.61	0.77	17.61
102-8-5-1 × 55-26-1-1	0.93	0.73	3.11	4.02	4.51	1.95	0.78	24.19
102-8-5-1 × PVB-2	0.80	0.66	3.46	4.45	3.92	2.49	0.80	22.93
102-1-6-1 × 115-1-8-1	0.89	0.63	3.00	4.30	3.70	3.95	0.92	24.57
102-1-6-1 × 58-18-1-1	0.92	0.66	3.11	4.59	4.00	3.59	0.78	24.57
102-1-6-1 × 55-26-1-1	0.91	0.53	2.92	4.75	3.82	4.92	0.60	22.04
102-1-6-1 × PVB-2	1.04	0.54	3.67	4.97	3.88	3.16	0.98	23.94

Crosses	**Fruit shape index**	**Pericarp thickness (cm)**	**Number of locules per fruit**	**Dry matter (%)**	**TSS (%)**	**Lycopene content (mg/100g)**	**Titratable acidity (mg/100ml)**	**Ascorbic acid (mg/100 ml)**
7-5-1 × 115-1-8-1	1.18	0.56	2.44	4.37	4.03	1.57	0.67	23.05
7-5-1 × 58-18-1-1	1.08	0.50	3.00	4.12	4.26	1.09	0.75	22.04
7-5-1 × 55-26-1-1	1.14	0.46	2.22	4.71	3.57	1.71	0.64	21.53
7-5-1 × PVB-2	1.06	0.40	3.78	5.63	4.10	1.97	0.64	22.55
7-4 × 115-1-8-1	0.93	0.53	2.92	4.66	3.97	2.54	1.03	22.04
7-4 × 58-18-1-1	1.03	0.53	2.00	4.53	4.95	2.93	0.63	21.29
7-4 × 55-26-1-1	1.02	0.56	3.33	4.35	4.61	1.83	0.88	16.47
7-4 × PVB-2	1.17	0.50	2.78	4.69	4.29	1.69	0.67	22.17
2-1 × 115-1-8-1	1.20	0.49	2.00	4.90	4.81	3.84	0.51	22.67
2-1 × 58-18-1-1	0.89	0.50	2.55	4.29	3.86	3.01	0.89	18.75
2-1 × 55-26-1-1	1.02	0.46	2.31	4.63	4.45	3.48	0.68	20.02
2-1 × PVB-2	0.94	0.46	2.56	4.54	4.37	4.47	0.83	21.28
CH-2-2 × 115-1-8-1	0.94	0.80	3.77	4.13	4.19	3.07	0.63	19.25
CH-2-2 × 58-18-1-1	0.97	0.76	2.89	4.59	3.90	3.78	0.74	18.49
CH-2-2 × 55-26-1-1	0.84	0.86	2.89	4.55	4.22	3.89	0.89	18.49
CH-2-2 × PVB-2	0.88	0.76	4.11	4.16	3.89	4.66	0.64	22.17
CH-2-3-1 × 115-1-8-1	0.94	0.70	3.89	4.37	3.95	1.67	0.85	21.15
CH-2-3-1 × 58-18-1-1	0.80	0.80	3.34	4.77	4.05	1.19	0.64	17.10
CH-2-3-1 × 55-26-1-1	0.78	0.70	4.00	4.20	4.69	1.53	0.93	17.86
CH-2-3-1 × PVB-2	0.74	0.80	5.00	4.71	4.39	1.65	0.68	18.24
CD at 5%	0.06	0.07	0.41	0.36	0.33	1.48	0.08	1.48
CD at 1%	0.08	0.09	0.54	0.47	0.43	1.94	0.11	1.94

Table 3: Estimation of mean, range, phenotypic and genotypic coefficients of variation, heritability and genetic advance of different character in tomato

Character	Mean	Range	PCV	GCV	Heritability (bs)	Genetic advance	Genetic advance over mean (%)	CV (%)
Days to 50% flowering	25.43	16-39	21.34	18.79	77.55	8.67	34.09	10.11
Days to first harvest	91.32	76-107.6	9.75	8.85	77.59	14.22	15.58	4.61
Plant height (days)	99.20	46.00-171.53	26.08	24.81	90.50	48.23	48.62	8.04
Average fruit weight (g)	57.23	23.05-79.75	28.63	28.23	97.24	29.38	57.35	4.76
Number of fruits/plant	27.98	12.21-59.99	37.82	36.61	93.70	20.43	73.00	9.50
Total fruit yield (kg/plant)	1.11	0.25-2.91	36.10	34.59	77.97	12.67	68.27	10.34
Marketable yield (kg/plant)	1.34	0.20-2.53	33.82	31.42	89.36	0.23	60.14	12.50
Harvesting span (days)	78.50	59.67-89.00	10.04	8.86	86.32	0.26	16.12	4.71
Fruit shape index	0.95	0.74-1.34	13.13	12.41	91.79	1.07	24.18	4.28
Pericarp thickness (cm)	0.64	0.36-0.87	22.04	20.97	90.53	0.68	41.11	6.78
Number of locules per fruit	3.03	2.00-5.00	20.53	18.75	83.39	2.53	35.26	8.37
Dry matter (%)	4.62	3.83-5.99	9.59	8.27	74.37	0.33	14.69	4.85
TSS (%)	4.19	3.23-5.21	10.73	9.54	79.14	0.73	17.49	4.90
Lycopene content (mg/100g)	3.12	1.19-7.08	41.21	39.98	94.12	5.29	79.89	9.99
Titratable acidity (mg/100ml)	0.73	0.34-1.21	24.12	23.17	92.31	0.76	45.86	6.69
Ascorbic acid (mg/100ml)	20.44	16.09-26.36	14.03	13.27	89.50	8.67	25.86	4.55

genotypic coefficient of variability possessed better potential for improvement through selection. Similar projections have been made by Nandpuri *et al* (1974), Singh *et al* (1974) and Brar *et al* (1998). Genotypic coefficient of variability was highest for lycopene content (39.98%), followed by number of fruits per plant (36.61%), total fruit yield (34.59%), marketable yield (31.42%), average fruit weight (28.23%) and plant height (24.81%). The estimates were moderate for titratable acidity (23.17%), pericarp thickness (20.97%), days to 50% flowering (18.79%) and numbers of locules per fruit (18.75%). Genotypic coefficients of variability were low for ascorbic acid (13.27%) followed by fruit shape index (12.41%), TSS (9.45%), harvesting span (8.86%), days to first harvest (8.85%) and dry matter (8.27%). High genotypic coefficient of variation for fruit weight was earlier reported by Padamalata and Reddy (1990) and Reddy and Reddy (1992). Similarly for yield, high GCV was reported by Padamalata and Reddy (1990) and Das *et al* (1998). Maximum expression of genotypic and phenotypic coefficients of variation for lycopene content has been observed by Bajaj *et al* (1990), and Sharma *et al* (1996).

The estimates of heritability represent a measure of genetic relationship between parent and progeny and are of fundamental importance in the practicability of selection. It acts as a predictive instrument in expressing the reliability of phenotypic value, thus helping the plant breeder to make selection for a particular character when heritability is high. In present study, high heritability estimates (Table 3) were obtained for average fruit weight (97.24%) followed by lycopene content (94.12%), number of fruits per plant (93.70%), titratable acidity (92.31%), fruit shape index (91.79%), pericarp thickness (90.53%), plant height (90.50%), ascorbic acid (89.50%), marketable yield (89.36%), harvesting span (86.32%) and number of locules per fruit (83.39%), while moderate heritability was reported for TSS (79.14%), total fruit yield (77.97%), days to first harvest (77.59%), days to 50% flowering (77.55%) and dry matter (74.37%). Reddy and Reddy (1992) studied the heritability in tomato and found high heritability for yield/plant (97.99%), early yield/plant (97.06%), number of fruits/plant (95.96%) and average fruit weight (98.46%).

The estimates of expected genetic advance was highest for lycopene content (79.89%) followed by number of fruits per plant (73.02%), total fruit yield (68.27%), marketable yield (60.14%), average fruit weight (57.35%) and plant height (48.62%). The estimates were moderate for titratable acidity (45.86%), pericarp thickness (41.11%), numbers of locules per fruit (35.26%) and days to 50% flowering (34.09%). While low genetic advance were recorded for ascorbic acid (25.86%) followed by, fruit shape index (24.18%), TSS (17.79%), harvesting span (16.12%), days to first harvest (15.58%) and dry matter (14.69%). Nandpuri *et al* (1976) reported high genetic advance as per cent mean for plant height (102.66%), number of fruits per plant (123.24%) and average fruit weight (131.84%).

The traits having high estimates of heritability coupled with high genetic advance may help in establishing the close relationship between the genotype and phenotype (Burton and DeVane 1953). From the above observation it could be inferred that selection based on lycopene content, number of fruits per plant and average fruit weight would be effective. However, for ascorbic acid, fruit shape index, TSS and harvesting span the heritability estimates were high but coefficients of variability and genetic advance were low hence, selection for these characters would bring about limited improvement.

सारांश

वर्तमान अध्ययन सब्जी फसल विभाग, पंजाब कृषि विश्वविद्याालय लुधियाना में वर्ष 2010–2011 में किया गया। प्रायोगिक सामग्री में प्रयुक्त टमाटर की कुल 44 संकरों (11 लाइन एवं 4 टेस्टर का उपयोग लाइन x टेस्टर विधि से प्राप्त) का मूल्यांकन किया गया। अधिकतम लक्षण प्ररूपी एवं जीनप्ररूपी गुणांक की विविधता लाइकोपीन की मात्रा में पाया गया तथा इसके उपरांत फल/पौध, कुल फल उपज, बाजार योग्य उपज, औसत फल भार और पौध लम्बाई का स्थान रहा। लक्षण प्ररूपी तथा जीन प्ररूपी गुणांक विविधता बीच संकीर्ण अन्तर की उपस्थिति अध्ययन में सभी गुणों के लिये पाया गया जिससे संकेत मिलता है कि लक्षण अध्ययन में वातावर्णीय प्रभाव का योगदान निम्न है। अधिकतम अनुवांशिक उन्नयन लाइकोपीन की मात्रा का रहा तथा इसके उपरान्त फल/पौध, कुल फल उपज, बाजार योग्य उपज, औसत फल भार तथा पौध ऊँचाई का स्थान रहा। अतः इन गुणों में सुधार चयन पद्धति द्वारा किया जा सकता है।

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