

## Morphological Variability for Economic Traits in Tomato

**Jag Paul Sharma, Neerja Sharma, A. K. Singh and Satesh Kumar**

Division of Vegetable Science & Floriculture, S.K. University of Agricultural Sciences & Technology (J), Chatha, Jammu – 180 009 (J&K)

### ABSTRACT

Forty-eight genotypes of tomato were analyzed for various morphological and economic traits under agro-climatic conditions of Jammu. The study revealed that the yield ranged from 125.4 - 455.4 q/ha and the entries showing yield above 400q/ha were CTS-05-34, CTS -05-33 and CTS-05-28 with 9.9, 4.2 and 3.18% higher in yield than the check SKAU-T-2 (414.3 q/ha). The entries showing good performance on the basis of fruit weight and number of fruits were CTS-05-21, SKAU-T-2, CTS-05-16, CTS-05-17 CTS-05-33 and CTS-05-34; CTS-05-08, CTS-05-28 and CTS-05-32. However, the fruits from the entry CTS-05-08 were lighter in weight and accordingly showed poor performance in total yield. In case of earliness, genotypes CTS-05-28, CTS-05-04, CTS-05-19 performed better. With respect to fruit colour 34 genotypes were red in colour. Round and flattened round type dominated in fruit shape. Number of locules ranged from 1.5 to 6.0 with pericarp thickness varying from 0.13 to 0.73 cm. Keeping in view the consumptional preference high yielding entries with red round colour having relatively thicker pericarp can be selected for promotion of large scale cultivation namely, CTS-05-34, CTS-05-33, CTS-05-18 and CTS-05-19.

**Keywords:** Tomato, genotypes, morphological, performance

### INTRODUCTION

Tomato (*Lycopersicon esculentum* Mill) is the most popular and widely grown vegetable in the world. It has become an important commercial crop so far as its area, production, industrial value and its contribution to the human health are concerned. Crop is rich in biological diversity and more than 100 varieties have been released in it so far. The total area under this crop is 0.29 million ha having the production and productivity of 4.6 MT and 15.86 t/ha respectively. But as far as Jammu and Kashmir State is concerned, it covers an area of 1526 ha giving the production of 34500 MT (Masoodi, 2003). In the present time, hybrids are gaining popularity among the progressive farmers who can procure these costly seeds with ease, but the marginal or small farmers who dominate the farming community, cannot afford such costly hybrids for cultivation and need open pollinated varieties with high yield and quality. Thus, to cater the above-mentioned objective, an attempt was made to evaluate different tomato genotypes for yield and quality under the subtropical conditions of Jammu region.

## MATERIAL AND METHODS

Forty-eight genotypes of tomato were evaluated in an augmented block design with two replications at Vegetable Experimental Farm, S. K. University of Agricultural Sciences & Technology (J), Chatha, Jammu during summer season of 2006. Transplanting was done at a spacing of 45 x 60 cm between plant to plant and row to row, in 2 rows of 3 meter accommodating 10 plants for each genotype in each replication. All the recommended agronomic practices of the crop were uniformly followed for all the genotypes. Ten competitive plants were selected randomly and tagged for recording the observations on various non-metrical and metrical parameters, like plant height (cm), number of branches/plant, days to 50% flowering, average fruit weight, pericarp thickness, number of locules/fruit, fruit shape, fruit colour, number of fruits/plant, fruit yield (q/ha) using standard procedures. The data was statistically analyzed as per the method prescribed by Panse and Sukhtme (1978).

## RESULTS AND DISCUSSION

Analysis of data depicted significant differences between the genotypes under test. Among the various genotypes SKAU-T-2, which was used as check, recorded the maximum plant height of 110.3 cm which was significantly higher to the rest of genotypes, followed by CTS-05-26 where the plant height of 104.7 cm was recorded. The maximum number of branches/plant (12.0) were recorded in CTS-05-04, while in SKAU-T-2, only 6.0 branches were recorded per plant. In case of earliness of crop, the minimum days taken to 50% flowering (29 days) were showed by CTS-05-28, which was followed by 29.3 days in CTS-05-04. In case of SKAU-T-2 (check) an increment of 8 days i.e., 37 days were recorded as compared to CTS-05--28 in case of 50% flowering. Maximum number of days to 50% flowering i.e. 42.3 and 42.0 days were recorded from the genotypes CTS-05-18, CTS-05-47 and CTS-05-49 (Table 1). The results of Alam *et al.*, (1996) in chilli are in complete agreement with the present study.

The quality of fruit which was taken on the basis of pericarp thickness, fruit shape, fruit colour and number of locules per fruit, was found highly fluctuating among the genotypes studied (Table 2). Maximum pericarp thickness (0.73 cm) was shown by CTS-05-17, which was statistically followed by CTS -05-18 (0.67cm) and CTS-05-19 (0.63cm) as compared to 0.37 cm in SKAU-T-2. In the present study, a significant variation ranging between 2.0 and 6.0 regarding the number of locules per fruit were found. Maximum number of locules (6.00) were recorded in CTS-05-21 as compared to check (2.67). The genotypes having more than 5 locules per fruit were CTS-5-06 and CTS-05-22 (5.3), CTS-05-20 (5.7) while rest of genotypes showed less than 5 loculos per fruit. With respect to fruit colour genotypes were categorized into 5 groups 34 were red, 2 2 were orange, 1 was pink and 7 were light red and remaining were yellowish red. Regarding fruit shape, 21 were round, 20 flattened round, 4 showed pyriform shape and the remaining were oval. Similar findings were reported by Hassan *et al.* (2000) while evaluating the parents of tamoto hybrids under Egyptian conditions. In case of yield and yield attributing characters, the

maximum average fruit weight (63.0 g) was reported from CTS-05-21, followed by SKAU-T-2 (62.7 g). The other yield related parameters recorded significant differences with best check, SKAU-T-2 (Table 1).

**Table 1: Yield and yield attributing characters of tomato genotypes**

S. No.	Genotype	Plant height (cm)	Branches/plant	Days to 50% flowering	Av. fruit weight (g)	No. of fruits/plant	Fruit yield (q/ha)
1	CTS-05-03	90.00	11.67	39.67	52.67	27.73	322.49
2	CTS-05-04	57.67	12.00	29.33	48.00	29.27	313.63
3	Pusa Ruby	81.00	6.67	32.00	43.00	28.13	310.84
4	CTS-05-06	85.00	6.33	40.00	32.67	25.27	194.69
5	CTS-05-07	101.00	10.00	41.00	34.00	30.13	125.40
6	CTS-05-08	91.67	6.00	41.27	17.00	58.27	310.97
7	CTS-05-09	70.00	6.33	41.40	56.00	24.40	369.99
8	CTS-05-10	71.33	5.33	41.40	42.00	18.20	143.64
9	CTS-05-11	85.00	4.33	39.07	45.00	18.13	133.13
10	CTS-05-12	69.33	5.00	33.40	38.00	25.27	224.20
11	CTS-05-13	75.67	7.67	38.27	42.33	26.20	264.61
12	Punjab Chuhhara (C)	82.33	5.67	34.60	42.67	30.13	325.28
13	CTS-05-15	59.00	8.00	39.00	61.67	32.20	313.88
14	CTS-05-16	66.00	5.00	39.33	62.33	26.27	385.19
15	CTS-05-17	63.33	4.33	36.40	62.33	20.87	267.77
16	CTS-05-18	63.00	5.00	42.33	42.33	33.20	392.92
17	CTS-05-19	74.33	8.00	30.47	52.33	29.33	373.29
18	CTS-05-20	69.67	8.00	32.40	42.67	22.20	266.00
19	CTS-05-21	54.00	7.00	39.27	63.00	22.13	290.70
20	CTS-05-22	48.00	5.33	35.07	61.00	17.07	181.64
21	CTS-05-23	69.67	5.67	38.07	43.00	27.33	275.88
22	CTS-05-24	50.33	5.67	32.00	48.00	21.13	201.40
23	CTS-05-25	49.00	6.00	34.00	46.67	22.07	220.27
24	CTS-05-26	104.67	8.00	40.00	46.00	29.20	367.33
25	SKAU-T-2 (C)	110.33	6.00	37.00	62.67	27.93	414.33
26	CTS-05-27	64.00	5.00	31.00	42.00	31.27	319.96
27	CTS-05-28	85.00	6.00	29.00	46.00	33.27	401.15
28	CTS-05-29	62.67	7.00	32.00	38.00	29.20	321.61
29	CTS-05-30	80.33	8.33	34.00	51.00	21.13	250.80
30	CTS-05-31	95.00	7.67	31.00	37.33	28.40	255.61
31	CTS-05-32	95.33	7.67	40.00	32.00	32.27	262.71
32	CTS-05-33	77.33	6.00	37.00	62.33	28.47	431.68
33	CTS-05-34	54.00	5.00	39.00	62.00	29.27	455.37
34	CTS-05-35	54.33	5.00	39.00	41.67	26.60	266.63
35	CTS-05-36	65.33	8.00	38.00	41.33	24.07	224.07
36	CTS-05-37	84.67	6.33	38.33	51.67	21.53	243.20
37	CTS-05-38	91.00	7.67	34.33	40.00	29.27	292.60
38	CTS-05-39	40.00	6.33	31.33	45.00	22.13	190.00
39	CTS-05-40	60.33	4.33	39.67	48.67	21.60	206.47
40	CTS-05-41	45.00	4.33	40.67	24.67	23.60	198.99
41	CTS-05-42	45.33	5.67	39.67	32.00	14.20	165.30
42	CTS-05-43	50.33	4.33	34.67	25.00	19.20	155.29
43	CTS-05-44	65.33	4.00	41.33	42.00	19.20	157.83
44	CTS-05-45	65.00	4.67	34.33	49.00	21.13	205.20
45	CTS-05-46	64.67	5.00	36.33	51.67	18.40	155.29
46	CTS-05-47	39.67	4.67	42.00	35.00	22.27	163.65
47	CTS-05-48	50.00	5.33	40.33	30.00	24.80	172.39
48	CTS-05-49	69.00	3.33	42.00	37.67	25.20	211.03
	CD at 5%	10.80	2.11	1.67	3.27	3.09	26.11
	CV	7.31	18.79	2.97	5.20	6.23	6.21

**Table 2: Quality characters of tomato genotypes**

S. No.	Genotype	Pericarp thickness (cm)	Number of locules per fruit	Fruit Shape	Fruit colour
1	CTS-05-03	0.40	3.00	Flattened Round	Red
2	CTS-05-04	0.43	3.33	Round	Orange
3	Pusa Ruby	0.50	2.67	Flattened Round	Red
4	CTS-05-06	0.47	5.33	Round	Red
5	CTS-05-07	0.40	4.00	Flattened Round	Red
6	CTS-05-08	0.37	4.00	Round	Red
7	CTS-05-09	0.30	4.33	Round	Red
8	CTS-05-10	0.33	3.33	Round	Pink
9	CTS-05-11	0.53	3.67	Round	Light red
10	CTS-05-12	0.53	3.33	Round	Red
11	CTS-05-13	0.47	3.00	Round	Red
12	Punjab Chuhhara (C)	0.53	4.00	Pyriforme	Red
13	CTS-05-15	0.33	3.33	Flattened Oval	Red
14	CTS-05-16	0.53	2.67	Pyriforme	Red
15	CTS-05-17	0.73	2.33	Pyriforme	Yellowish red
16	CTS-05-18	0.67	2.67	Round	Red
17	CTS-05-19	0.63	3.67	Flattened Round	Red
18	CTS-05-20	0.43	5.67	Flattened Round	Red
19	CTS-05-21	0.43	6.00	Round	Orange
20	CTS-05-22	0.43	5.33	Round	Red
21	CTS-05-23	0.47	5.00	Flattened Round	Red
22	CTS-05-24	0.47	5.00	Pyriforme	Light red
23	CTS-05-25	0.37	2.33	Flattened Round	Yellowish red
24	CTS-05-26	0.50	2.33	Oval	Yellowish red
25	SKAU-T-2 (C)	0.57	2.67	Oval	Red
26	CTS-05-27	0.43	2.33	Round	Red
27	CTS-05-28	0.63	2.33	Round	Red
28	CTS-05-29	0.33	3.67	Round	Red
29	CTS-05-30	0.53	3.67	Round	Red
30	CTS-05-31	0.37	4.67	Round	Red
31	CTS-05-32	0.47	4.00	Flattened round	Light red
32	CTS-05-33	0.37	4.00	Flattened round	Red
33	CTS-05-34	0.43	3.67	Oval	Red
34	CTS-05-35	0.47	3.00	Round	Red
35	CTS-05-36	0.47	3.33	Flattened round	Red
36	CTS-05-37	0.37	3.67	Round	Red
37	CTS-05-38	0.30	4.33	Flattened round	Yellowish red
38	CTS-05-39	0.43	5.33	Flattened round	Red
39	CTS-05-40	0.40	5.00	Flattened round	Red
40	CTS-05-41	0.33	5.00	Round	Red
41	CTS-05-42	0.33	3.33	Flattened round	Red
42	CTS-05-43	0.30	4.00	Flattened round	Light red
43	CTS-05-44	0.30	4.33	Round	Red
44	CTS-05-45	0.40	3.00	Oval	Red
45	CTS-05-46	0.47	2.00	Flattened round	Red
46	CTS-05-47	0.40	4.00	Flattened round	Light red
47	CTS-05-48	0.43	4.33	Flattened round	Light red
48	CTS-05-49	0.40	3.67	Flattened round	Light red
	CD at 5%	0.13	1.49		
	CV	20.60	27.77		

Maximum number of fruits per plant, (58.3) were reported from CTS-05-08, followed by 33.2) in CTS-05-28. While as CTS-05-42 and CTS-05-22 recorded the

minimum number of fruits (14.2 and 17.1) respectively. Irrespective of having maximum number of fruits per plant the genotype, CTS-05-08 showed less yield per hectare (310.97 qt/ha) which was due to less fruit weight (17 g). CTS-05-34 and CTS-05-33 recorded the maximum yield of 455.4 q/ha and 431.7 q/ha, which was supported by the more fruit weight, followed by the check SKAU-T-2 (414.3 qt/ha), significantly higher to the yields recorded by other genotypes. Both these genotypes recorded an average yield advantage of 9.9% and 4.2% over the best check SKAU-T-2. While, the genotypes CTS -05-07, CTS-05-11 and CTS-05-10 were recorded minimum yield of 125.4, 133.1 and 143.6 q/ha. and there was reduction of 69.73% and 67.86% and 65.33% in yield when the yield of both these genotypes were compared with SKAU-T-2. The yield of rest of genotypes falls between 150 -392.9 q/ha. The present study is duly supported by the findings of Tripathy *et al.*, (2001) in tomato under Orissa conditions.

On the basis of yield performance of different genotypes, it was concluded that the genotypes, CTS-05-34, CTS-05-33, SKAU-T-2 and CTS-05-28 were high yielding as their yield crossed the limit of 400 qt/ha. For earliness, entry CTS-05-28 and CTS-05-04 were selected. Since local preference is for red round medium bold fruit with relatively more shelf life so CTS-05-34, CTS-05-33, CTS-05-18 and CTS-05-19 need to be tested in larger plots as well as in farmers fields to determine their suitability for large scale cultivation.

## REFERENCES

- Alam, N., Nigar, M., Khair, A. and Jabbar, A. 1996. Comparative study of growth and yield performances in some cultivars of chilli. *Bangladesh J. Bot.*, **25**(2):203-208.
- Anonymous, 2006. *Horticulture Data-Base*, Website of National Horticulture Board, Ministry of Agriculture. Gurgaon Haryana.
- Anonymous, 2006. Package of practices for vegetable crops. 2006. Directorate of Extension Education. *J. Res. SKUAST-J.*, 50-54 pp.
- Hassan, A.A., Mostafa, S.E.S., Abdel, K.E.A and Mohammed, A.A. 2000. Development and release of some new tomato hybrids, Parental evaluation, hybrid yield, performance and yield heterosis. *Egyptian J. Hort.*, **27** (2):201-218
- Panase, V.G. and Sukhatme, P.V. 1978. *Statistical Methods for Agricultural Workers*. ICAR, New Delhi, India.
- Masoodi, M.A. 2003. *Agriculture in Jammu and Kashmir – A Perspective*, Mohisarw Book Serise, Srinagar. pp. 111-126.
- Sharma, J.P. 2002. Tomato. pp.123-145. In: *Crop Production Technology for Cold Arid Region*. Kalyani Publication, Ludhiana.
- Tripathy, L., Mahapatra, P. and Dash, S.K. 2001. Evaluation of relative yield performance of available F<sub>1</sub> hybrids of tomato under Orissa conditions. *Orissa J. Hort.*, **29** (2):13-15.

