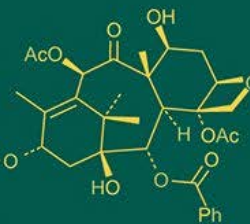
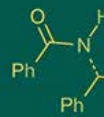
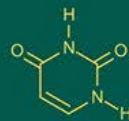
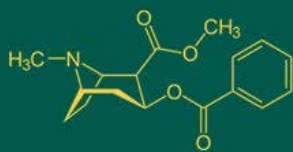


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Storage Performance of Tomato (*Solanum lycopersicum* L.) Parents and Hybrids under Ambient Room Conditions

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Abstract

A total of 18 F₁ hybrids developed through a Line × Tester mating design involving six lines and three testers were evaluated in a completely randomized block design with a factorial concept and three replications. The treatments comprised 18 F₁ hybrids along with nine parents (six lines and three testers), two commercial hybrids, and one variety used as checks. Among the treatments, the highest ascorbic acid content was recorded in LE-56 × Pusa Gaurav (35.49 mg/100 g), which was on par with LE-64 × Punjab Chhuhara (34.94 mg/100 g) and LE-56 × Pant T-3 (34.17 mg/100 g). The significantly highest total carotenoid content was observed in LE-64 (19.74 mg/100 g), followed by LE-64 × Punjab Chhuhara (19.13 mg/100 g) and LE-56 × Punjab Chhuhara (18.32 mg/100 g). The highest lycopene content was recorded in LE-56 × Punjab Chhuhara (15.72 mg/100 g), which was on par with LE-64 × Punjab Chhuhara (15.60 mg/100 g), followed by LE-64 (14.74 mg/100 g) and LE-62 × Punjab Chhuhara (14.71 mg/100 g). The organoleptic score was significantly highest in LE-56 × Punjab Chhuhara (4.52), which was on par with LE-64 × Punjab Chhuhara (4.47) and LE-56 × Pusa Gaurav (4.42), while the lowest score was recorded in LE-67 (2.85). After storage up to 16 days, the highest organoleptic score was observed in LE-56 × Punjab Chhuhara (2.78), followed by LE-64 × Punjab Chhuhara (2.70). Across all storage intervals, LE-56 × Punjab Chhuhara and LE-64 × Punjab Chhuhara consistently recorded the highest organoleptic scores.

Keywords: Tomato, Parents, Hybrids, Storage studies

Introduction

Tomato (*Solanum lycopersicum* L.) is an important vegetable crop valued for its nutritional content and wide use in fresh and processed forms. However, tomato fruits are highly perishable and suffer heavy post-harvest losses under ambient room conditions due to rapid physiological changes. Genetic differences among parents and hybrids influence shelf life and storage behavior. Therefore, evaluating tomato parents and hybrids under ambient room conditions is important to identify genotypes with better keeping quality. The present study focuses on assessing the storage performance of tomato parents and hybrids based on physical and quality changes during storage.

Materials and Methods

The present investigation was carried out at the Experimental Farm of the Vegetable Research Station, Agricultural Research Institute, Rajendranagar, Dr. Y.S.R. Horticultural University, Hyderabad. The experimental material consisted of nine parents, namely EC-165749 (L₁), LE-56 (L₂), LE-62 (L₃), LE-64 (L₄), LE-65 (L₅) and LE-67 (L₆) used as lines (females), and Punjab Chhuhara (T₁), Pant T-3 (T₂) and Pusa Gaurav (T₃) used as testers (males). These parents were crossed following the Line × Tester mating design as suggested by Kempthorne (1957)^[1]. A total of 18 F₁ hybrids developed from the Line × Tester design involving six lines and three testers were evaluated along with nine parents, two commercial hybrids, and one variety used as checks. The experiment was laid out in a completely randomized block design with a factorial concept and three replications. Storage studies were conducted under ambient room conditions, and observations were recorded at four-day intervals. Ascorbic acid (mg/100 g), total carotenoid content (mg/100 g) and lycopene

content (mg/100 g) were estimated using standard procedures described by Ranganna (1986) [2]. The data obtained were subjected to statistical analysis following the methods outlined by Panse and Sukhatme (1967) [3].

Results and Discussion

The treatment details comprising of the 18 F₁s along with 9 parents (6 lines and 3 testers) and 2 commercial hybrids and a variety as checks. Effect of different treatments on the storage of tomatoes at ambient condition and the physico-chemical parameters of tomato are presented in Table 1 to Table 4.

Ascorbic acid content (mg/100 g)

The results in Table 1 indicate that there was a significant change in ascorbic acid content during the storage period. Significant decrease was observed among the treatments, storage intervals and their interactions. Among the treatments, the highest ascorbic acid content was observed in LE-56 × Pusa Gaurav (35.49 mg/100 g) which was on par with LE-64 × Punjab Chhuhara (34.94 mg/100 g) which in turn was on par with LE-56 × Pant T-3 (34.17 mg/100 g) and lowest in EC-165749 × Pant T-3 (14.63 mg/100 g). In the fruits stored upto 16 days, the highest ascorbic acid content was recorded in LE-56 × Pusa Gaurav (24.16 mg/100 g) followed by LE-64 × Punjab Chhuhara (23.50 mg/100 g). Significant declining trend in the ascorbic acid content was noticed among the days of storage period from 0th day (27.71 mg/100 g) to 12th day (18.82 mg/100 g). The interaction effect between treatments and storage period was found to be significant. The treatment LE-56 × Pusa Gaurav (41.67 mg/100 g) recorded the highest ascorbic acid content on 0th day while the lowest was observed in EC-165749 × Pant T-3 (11.53 mg/100 g) on 12th day of storage. There was a significant decrease in ascorbic acid content in all the treatments with increase in duration. Ascorbic acid or vitamin C is an important water soluble antioxidant present in tomatoes and has been credited to have many health benefits. There was a significant decrease in ascorbic acid content with increase in duration (Table 1). This loss in ascorbic acid content during storage may be attributed to its antioxidant function when the ripening cells absorb high amounts of oxygen as a result of increasing rate of respiration as opined by Islam *et al.* (1996) [4].

Total carotenoid content (mg/100 g)

The data on total carotenoid content as influenced by the treatments, storage period and their interactions were presented in Table 2. Significant changes in total carotenoids were observed among the treatments, storage periods and their interactions. Among the treatments, the significantly highest total carotenoid content was observed in LE-64 (19.74 mg/100 g) followed by LE-64 × Punjab Chhuhara (19.13 mg/100 g) and LE-56 × Punjab Chhuhara (18.32 mg/100 g) and lowest in LE-62 × Pusa Gaurav (11.03 mg/100 g) and EC-165749 (11.03 mg/100 g). In the fruits stored upto 16 days, the highest total carotenoid content was recorded in LE-64 × Punjab Chhuhara (16.83 mg/100 g) followed by LE-56 × Punjab Chhuhara (16.56 mg/100 g). Total carotenoid content differed significantly due to interaction between treatments and storage period. The treatment LE-64 (27.25 mg/100 g) recorded the highest values on 8th day while the lowest values were with EC-165749 (6.80 mg/100 g) on 0th day.

Lycopene content (mg/100 g)

The data pertaining to the lycopene content was presented in the Table 3 which indicates that there were significant changes among the treatments, duration and interactions between the treatments and the days of storage. Among the treatments, the significantly highest lycopene content was recorded in LE-56 × Punjab Chhuhara (15.72 mg/100 g) which was on par with LE-64 × Punjab Chhuhara (15.60 mg/100 g) and these are followed by LE-64 (14.74 mg/100 g) and LE-62 × Punjab Chhuhara (14.71 mg/100 g) and lowest in EC-165749 (7.13 mg/100 g). In the fruits stored upto 16 days, the highest lycopene content was recorded in LE-56 × Punjab Chhuhara (14.10 mg/100 g) followed by LE-64 × Punjab Chhuhara (13.87 mg/100 g). Storage period was also found to exert significant influence on lycopene content of fruits. Lycopene content increased from 0th day (6.64 mg/100 g) to 8th day (15.33 mg/100 g) of storage and gradually declined thereafter towards the end of storage. The interaction effect between treatments and storage period was also found significant. LE-56 × Punjab Chhuhara (21.78 mg/100 g) recorded the highest values 8th day of storage and the lowest values were observed in LE-62 × Pusa Gaurav (4.03 mg/100 g) on the initial day. The decline in chlorophyll was accompanied by a gradual increase in lycopene content which reached its peak when the fruits became red ripe (Table 3). This increase in lycopene was followed by a gradual decline towards the end of storage. Colour changes during ripening are due to alterations in chlorophyll and the chloroplast in tomato undergoes ultra-structural and functional transformations into chromoplasts (Cheung *et al.*, 1993) [5]. This is characterized by the loss of chlorophyll pigment followed by accumulation of carotenoid lycopene within chloroplast envelope (Lawrence *et al.* 1993) [6]. The loss of lycopene after red ripe stage might be due to progressive senescence of the tissue. The changes in lycopene content observed in the present study corroborate with those reported by many workers (Balla *et al.*, 1994) [7].

Overall acceptability

It is evident from the data presented in Table 4 that there was a significant difference in organoleptic score among treatments, storage intervals and with their interactions. Among the treatments, organoleptic score was found to be significantly highest in LE-56 × Punjab Chhuhara (4.52) which was on par with LE-64 × Punjab Chhuhara (4.47) which in turn was on par with LE-56 × Pusa Gaurav (4.42) and lowest in LE-67 (2.85). In the fruits stored upto 16 days, the highest lycopene content was recorded in LE-56 × Punjab Chhuhara (2.78) followed by LE-64 × Punjab Chhuhara (2.70). Organoleptic score significantly increased from 4th day (3.95) to 8th day (4.36) and then declined towards the end of storage. In the interactions, the highest organoleptic score was recorded in LE-56 × Punjab Chhuhara (4.87) 8th day while the lowest was observed in LE-67 (1.69) on 12th day of storage. At any storage interval, the highest organoleptic score was recorded in LE-56 × Punjab Chhuhara and LE-64 × Punjab Chhuhara. Organoleptic scoring was significantly influenced by different treatments (Table 4.31). There was a increase in organoleptic score from 4th day of storage to 8th day of storage. This increase was further followed by a gradual decrease towards the end. Higher organoleptic score in the treatments may be due to slow buildup of sugars and acids which reflect flavour and taste component of the fruit.

Among the thirty treatments of tomato under ambient room conditions the hybrids LE-56 × Pusa Gaurav, EC-165749 X

Pant T-3, LE-56 × Punjab Chhuhara, LE-64 × Punjab Chhuhara and LE-64 × Pant T-3 had better keeping quality for 16 days. It was inferred that a hybrid having moderate fruit weight and moderate pericarp thickness can be stored

for 16 days with minimum loss in fruit weight. Similar results were reported by Saimbhi *et al.* (1995)^[8], Joshi *et al.* (1998)^[9], Singh *et al.* (2007)^[10] in tomato.

Table 1: Ascorbic acid content of tomato during storage at room temperature

S.No	Treatments	Days					
		0	4	8	12	Mean	16
1	EC -165749 x Punjab Chhuhara	26.00	23.90	21.03	17.60	22.13	*
2	EC -165749 x Pant T-3	17.06	15.90	14.03	11.53	14.63	8.10
3	EC -165749 x Pusa Gaurav	18.00	15.70	13.80	11.75	14.81	*
4	LE-56 x Punjab Chhuhara	38.67	35.63	32.90	26.20	33.35	21.74
5	LE-56 x Pant T-3	40.65	37.50	31.80	26.70	34.17	*
6	LE-56 x Pusa Gaurav	41.67	38.40	33.63	28.25	35.49	24.16
7	LE-62 x Punjab Chhuhara	24.00	22.12	19.40	16.27	20.45	*
8	LE-62 x Pant T-3	17.33	16.60	14.54	13.00	15.37	*
9	LE-62 x Pusa Gaurav	34.30	32.35	28.37	23.80	29.71	*
10	LE-64 x Punjab Chhuhara	41.00	37.80	33.14	27.80	34.94	23.50
11	LE-64 x Pant T-3	39.33	36.25	31.25	27.56	33.60	23.20
12	LE-64 x Pusa Gaurav	22.67	20.90	17.78	15.82	19.29	*
13	LE-65 x Punjab Chhuhara	19.33	17.50	16.97	14.23	17.01	*
14	LE-65 x Pant T-3	26.00	22.72	19.93	17.18	21.46	*
15	LE-65 x Pusa Gaurav	21.00	19.35	15.35	13.10	17.20	*
16	LE-67 x Punjab Chhuhara	23.33	21.50	18.86	15.80	19.87	*
17	LE-67 x Pant T-3	27.33	25.20	22.08	18.98	23.40	*
18	LE-67 x Pusa Gaurav	37.33	34.40	30.17	25.31	31.80	*
19	EC -165749	31.00	28.57	27.75	21.03	27.09	*
20	LE-56	30.00	27.65	24.24	20.34	25.56	*
21	LE-62	19.00	17.82	15.62	12.90	16.34	*
22	LE-64	21.31	19.64	17.20	14.45	18.15	*
23	LE-65	35.11	31.65	25.08	23.28	28.78	*
24	LE-67	27.33	25.20	22.63	18.50	23.42	*
25	Punjab Chhuhara	28.00	25.80	22.10	18.53	23.61	*
26	Pant T-3	23.33	21.50	18.30	15.36	19.62	*
27	Pusa Gaurav	25.33	23.97	21.03	17.62	21.99	*
28	Lakshmi	22.00	20.28	18.86	14.92	19.01	*
29	US-618	24.67	23.30	20.47	16.72	21.29	*
30	Arka Vikas	29.33	25.74	23.70	20.00	24.69	*
	Mean	27.71	25.49	22.4	18.82		
		S.Em±		CD (0.05)			
	Treatments (T)	0.31		0.87			
	Days (D)	0.11		0.32			
	T×D	0.62		1.73			

* Indicates termination of storage

Table 2: Total carotenoid content of tomato during storage at room temperature

S. No	Treatments	Days					
		0	4	8	12	Mean	16
1	EC -165749 x Punjab Chhuhara	9.20	13.06	21.25	17.02	15.13	*
2	EC -165749 x Pant T-3	8.54	13.52	20.43	16.34	14.71	11.16
3	EC -165749 x Pusa Gaurav	7.97	12.10	18.40	14.52	13.25	*
4	LE-56 x Punjab Chhuhara	11.14	16.67	25.72	19.73	18.32	16.56
5	LE-56 x Pant T-3	7.85	12.20	18.13	14.00	13.05	*
6	LE-56 x Pusa Gaurav	10.63	16.32	24.00	20.60	17.89	16.62
7	LE-62 x Punjab Chhuhara	10.39	16.26	24.56	19.65	17.72	*
8	LE-62 x Pant T-3	9.00	14.46	20.80	15.78	15.01	*
9	LE-62 x Pusa Gaurav	6.92	10.40	15.98	12.80	11.03	*
10	LE-64 x Punjab Chhuhara	11.53	17.04	26.62	21.32	19.13	16.83
11	LE-64 x Pant T-3	7.33	11.20	16.92	13.23	11.67	9.65
12	LE-64 x Pusa Gaurav	10.15	15.52	23.45	18.78	16.98	*
13	LE-65 x Punjab Chhuhara	7.30	11.18	16.86	13.50	11.71	*
14	LE-65 x Pant T-3	9.34	14.08	21.57	16.65	15.41	*
15	LE-65 x Pusa Gaurav	10.90	15.90	25.18	20.16	18.03	*
16	LE-67 x Punjab Chhuhara	7.98	12.20	18.43	14.76	13.34	*
17	LE-67 x Pant T-3	7.35	11.75	17.74	14.20	12.76	*
18	LE-67 x Pusa Gaurav	8.84	13.76	19.72	17.28	14.90	*

19	EC -165749	6.80	11.03	15.70	12.58	11.03	*
20	LE-56	7.68	12.01	16.98	14.73	12.35	*
21	LE-62	8.28	12.65	19.12	15.30	13.84	*
22	LE-64	11.80	18.06	27.25	21.83	19.74	*
23	LE-65	10.67	17.63	24.63	19.20	18.03	*
24	LE-67	9.55	14.60	22.06	17.65	15.96	*
25	Punjab Chhuhara	10.10	15.45	23.34	18.68	16.89	*
26	Pant T-3	9.46	14.30	21.84	17.50	15.77	*
27	Pusa Gaurav	8.07	12.34	18.64	14.92	13.49	*
28	Lakshmi	7.91	11.24	18.28	14.63	13.02	*
29	US-618	7.21	10.40	16.65	13.80	12.02	*
30	Arka Vikas	8.50	13.01	19.63	15.26	14.10	*
	Mean	8.95	13.68	20.66	16.21		
		S.Em±		CD (0.05)			
	Treatments (T)	0.17		0.47			
	Days (D)	0.06		0.17			
	T×D	0.34		0.95			

* Indicates termination of storage

Table 3: Lycopene content of tomato during storage at room temperature

S. No	Treatments	Days					
		0	4	8	12	Mean	16
1	EC -165749 x Punjab Chhuhara	6.92	10.92	15.96	13.20	11.75	*
2	EC -165749 x Pant T-3	6.62	10.23	15.28	11.98	11.03	9.80
3	EC -165749 x Pusa Gaurav	6.48	9.90	14.97	12.24	10.90	*
4	LE-56 x Punjab Chhuhara	9.43	14.23	21.78	17.45	15.72	14.10
5	LE-56 x Pant T-3	5.42	7.08	12.50	10.03	8.76	*
6	LE-56 x Pusa Gaurav	8.58	13.24	19.76	15.90	14.37	13.43
7	LE-62 x Punjab Chhuhara	8.96	13.15	20.70	16.02	14.71	*
8	LE-62 x Pant T-3	7.14	10.56	16.50	12.80	11.75	*
9	LE-62 x Pusa Gaurav	4.03	8.00	10.28	7.96	7.57	*
10	LE-64 x Punjab Chhuhara	9.30	14.43	21.45	17.20	15.60	13.87
11	LE-64 x Pant T-3	4.63	8.26	10.70	8.56	8.04	7.34
12	LE-64 x Pusa Gaurav	7.55	13.14	17.43	13.97	13.02	*
13	LE-65 x Punjab chhuhara	4.45	6.60	9.30	8.23	7.15	*
14	LE-65 x Pant T-3	6.90	9.70	15.45	12.37	11.10	*
15	LE-65 x Pusa Gaurav	8.60	11.48	19.82	15.86	13.94	*
16	LE-67 x Punjab Chhuhara	5.73	8.98	13.24	10.61	9.64	*
17	LE-67 x Pant T-3	5.41	8.30	12.50	10.08	9.07	*
18	LE-67 x Pusa Gaurav	6.34	10.12	14.65	11.73	10.71	*
19	EC -165749	4.31	6.81	9.94	7.46	7.13	*
20	LE-56	5.40	8.28	12.47	9.24	8.85	*
21	LE-62	5.87	9.43	13.55	10.85	9.93	*
22	LE-64	8.66	13.71	20.00	16.58	14.74	*
23	LE-65	7.55	11.56	17.44	13.96	12.63	*
24	LE-67	7.37	11.38	17.02	13.63	12.35	*
25	Punjab Chhuhara	7.50	11.54	17.32	13.87	12.56	*
26	Pant T-3	7.44	11.27	17.20	13.78	12.42	*
27	Pusa Gaurav	5.47	8.30	12.62	10.05	9.11	*
28	Lakshmi	5.43	8.37	12.54	10.12	9.11	*
29	US-618	5.00	7.65	11.54	10.00	8.55	*
30	Arka Vikas	6.69	10.60	15.94	12.77	11.50	*
	Mean	6.64	10.24	15.33	12.28		
		S.Em±		CD (0.05)			
	Treatments (T)	0.08		0.24			
	Days (D)	0.03		0.09			
	T×D	0.17		0.47			

* Indicates termination of storage

Table 4: Overall acceptability of tomato during storage at room temperature

S. No	Treatments	Day 4	Day 8	Day 12	Mean	Day 16
1	EC-165749 × Punjab Chhuhara	4.43	4.64	3.54	4.20	*
2	EC-165749 × Pant T-3	4.59	4.76	3.76	4.37	2.59
3	EC-165749 × Pusa Gaurav	4.05	4.47	3.01	3.84	*
4	LE-56 × Punjab Chhuhara	4.76	4.87	3.93	4.52	2.78
5	LE-56 × Pant T-3	3.76	4.27	2.34	3.46	*
6	LE-56 × Pusa Gaurav	4.67	4.79	3.80	4.42	2.62
7	LE-62 × Punjab Chhuhara	3.65	4.20	2.21	3.35	*
8	LE-62 × Pant T-3	4.03	4.43	2.90	3.79	*
9	LE-62 × Pusa Gaurav	3.83	4.30	2.46	3.53	*

10	LE-64 × Punjab Chhuhara	4.73	4.82	3.85	4.47	2.70
11	LE-64 × Pant T-3	4.50	4.70	3.75	4.32	2.55
12	LE-64 × Pusa Gaurav	3.50	4.14	2.08	3.24	*
13	LE-65 × Punjab Chhuhara	4.34	4.62	3.48	4.15	*
14	LE-65 × Pant T-3	4.26	4.57	3.37	4.07	*
15	LE-65 × Pusa Gaurav	3.39	4.00	2.01	3.13	*
16	LE-67 × Punjab Chhuhara	4.30	4.60	3.41	4.10	*
17	LE-67 × Pant T-3	3.29	3.85	1.89	3.01	*
18	LE-67 × Pusa Gaurav	4.12	4.50	3.03	3.88	*
19	EC-165749	3.86	4.32	2.55	3.58	*
20	LE-56	3.21	3.80	1.80	2.94	*
21	LE-62	3.70	4.23	2.29	3.41	*
22	LE-64	3.32	3.90	1.95	3.06	*
23	LE-65	3.43	4.03	2.03	3.16	*
24	LE-67	3.15	3.70	1.69	2.85	*
25	Punjab Chhuhara	4.20	4.57	3.24	4.00	*
26	Pant T-3	3.97	4.40	2.82	3.73	*
27	Pusa Gaurav	3.90	4.32	2.64	3.62	*
28	Lakshmi	4.16	4.53	3.14	3.94	*
29	US-618	3.93	4.38	2.75	3.69	*
30	Arka Vikas	3.59	4.17	2.14	3.30	*
	Mean	3.95	4.36	2.80		

Table 5: Statistical Analysis

Source	S.Em ±	CD (0.05)
Treatments (T)	0.03	0.09
Days (D)	0.01	0.03
T × D	0.06	0.16

* Indicates termination of storage

References

1. Kempthorne O. *An introduction to genetic statistics*. New York: John Wiley and Sons Inc.; 1957. p. 208-223.
2. Ranganna S. *Manual of analysis of fruit and vegetable products*. New Delhi: Tata McGraw-Hill Publishing Co.; 1986. p. 89-90.
3. Panse VG, Sukhatme PV. *Statistical methods for agricultural workers*. New Delhi: Indian Council of Agricultural Research (ICAR); 1967.
4. Islam MS, Miyasaki T, Yoshida Y. Effect of carbon dioxide enrichment on physicochemical and enzymatic changes in tomato fruits at various stages of maturity. *Sci Hortic (Amsterdam)*. 1996;65:137-149.
5. Cheung AY, McNellis T, Piekos B. Maintenance of chloroplast components during chromoplast differentiation in the tomato mutant green flesh. *Plant Physiol*. 1993;101:1223-1229.
6. Lawrence SD, Cline K, Moore GA. Chromoplast-targeted proteins in tomato (*Lycopersicon esculentum* Mill.) fruit. *Plant Physiol*. 1993;102:789-794.
7. Balla C, Saray T, Horti K, Konez A, Polyak K, Hribar J, et al. Study of the colour development of tomato during postharvest handling. In: Proceedings of the Workshop on the Postharvest Treatment of Fruit and Vegetables—Quality Criterion; 1994 Apr 19-21; pp. 81-92.
8. Saimbhi MS, Singh S, Cheena DS. Shelf life of different varieties of tomato. *Punjab Veg Grower*. 1995;30:45-46.
9. Joshi AK, Suman BC, Raheja SR. Shelf life of tomato cultivars. *Punjab Veg Grower*. 1998;33:19-20.
10. Singh MKP, Singh N, Singh L, Prasad R. Studies on quality traits of open pollinated varieties and hybrids of tomato responsible for their shelf life at ambient conditions. *Indian J Agric Biochem*. 2007;20:17-22.