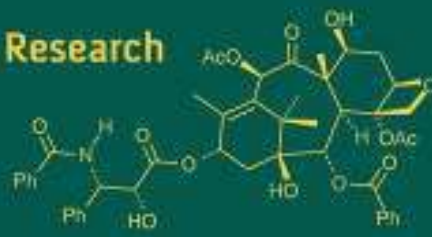
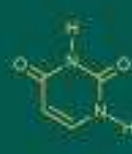
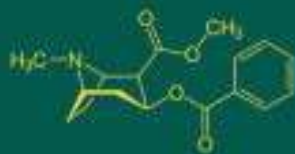


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Evaluation of Tomato (*Solanum lycopersicum* L.) Parents and Hybrids for Suitability in Puree and Paste Preparation

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Abstract

A set of 18 F1 hybrids developed as a result of line x tester mating design involving six lines and three testers were evaluated in completely randomized block design in three replications for their suitability to prepare tomato paste and puree. The highest ascorbic acid content of paste and puree was recorded by the parent LE-56 (76.20 mg/100 g and 49.40 mg/100 g) followed by Punjab Chhuhara (74.62 mg/100 g and 44.20 mg/100 g). The hybrid LE-64 x Punjab Chhuhara (88.45 mg/100 g and 55.36 mg/100 g), LE-56 x Pusa Gaurav (84.40 mg/100 g and 58.64 mg/100 g), LE-56 x Pant T-3 (82.32 mg/100 g and 57.24 mg/100 g) and LE-64 x Punjab chhuhara (80.54 mg/100 g and 54.42 mg/100 g). Considering the lycopene content and total carotenoid content, the parent LE-64 (21.79 mg/100 g and 14.50 mg/100 g for lycopene content and 22.40 mg/100 g and 16.03 mg/100 g for total carotenoid content) recorded the highest paste and puree followed by LE-65 (20.68 mg/100 g and 13.24 mg/100 g for lycopene content and 22.46 mg/100 g and 15.38 mg/100 g for total carotenoids) and Punjab Chhuhara (20.90 mg/100 g and 13.20 mg/100 g for lycopene and 21.86 mg/100 g and 15.44 mg/100 g for total carotenoid content). The hybrids LE-56 x Punjab Chhuhara (25.86 mg/100 g and 16.80 mg/100 g for lycopene content and 26.95 mg/100 g and 17.96 mg/100 g for total carotenoid content), LE-64 x Punjab Chhuhara (23.70 mg/100 g and 15.40 mg/100 g for lycopene content and 24.95 mg/100 g and 14.98 mg/100 g for total carotenoid content), LE-62 x Punjab Chhuhara (23.20 mg/100 g and 14.98 mg/100 g for lycopene content and 24.84 mg/100 g and 16.36 mg/100 g for total carotenoid content) and LE-65 x Pusa Gurav (22.43 mg/100 g and 14.60 mg/100 g for lycopene content and 24.26 mg/100 g and 16.65 mg/100 g for total carotenoid content)

Keywords: Tomato, Parents, Hybrids, Puree, Paste

Introduction

Tomato (*Solanum lycopersicum* L.) is an important vegetable crop grown all over the world because it grows well in many conditions and gives good yields. Tomatoes are eaten fresh as well as cooked and are available throughout the year. They are rich in vitamins, minerals, and other nutrients that are good for health. In India, tomato breeding has mainly focused on increasing yield, with less attention given to fruit quality. However, growing consumer demand and the expansion of the processing industry have increased the need for better fruit quality. Although higher yield and good quality are often difficult to achieve together, proper breeding efforts can improve both. Tomato processing in India has good potential due to increasing demand and export opportunities for products like ketchup, paste, and puree. Therefore, this study was conducted to find suitable tomato varieties for processing purposes.

Materials and Methods

The study was conducted at the Experimental Farm of the Vegetable Research Station, Agricultural Research Institute, Rajendranagar, Dr. Y.S.R. Horticultural University, Hyderabad, India. The experimental material included nine parental genotypes, consisting of six lines—EC-165749 (L₁), LE-56 (L₂), LE-62 (L₃), LE-64 (L₄), LE-65 (L₅), and LE-67 (L₆)—and three testers—Punjab Chhuhara (T₁), Pant T-3 (T₂), and Pusa Gaurav (T₃). The crosses were made using the Line x Tester mating design as suggested by Kempthorne (1957)^[1].

The experiment included 18 F₁ hybrids obtained from these crosses, along with the nine parents, two commercial hybrids, and one standard variety as checks. Tomato puree and paste were prepared from all the treatments for evaluation. The experiment was laid out in a Complete Randomized Block Design (CRBD). Observations were recorded from freshly prepared tomato puree and paste for ascorbic acid (mg/100 g), total carotenoid content (mg/100 g) and lycopene content (mg/100 g). These traits were estimated using standard procedures described by Ranganna (1986) [2]. The data obtained were statistically analyzed following the methods given by Panse and Sukhatme (1967) [3].

Results and Discussion

The data regarding the chemical composition of tomato puree and paste are presented in Table 1 and Table 2.

Ascorbic acid content of the paste was recorded significantly highest in the parent LE-56 (76.20 mg/100 g) which was on par with Punjab Chhuhara (74.62 mg/100 g). Among the hybrids LE-64 × Punjab Chhuhara (88.45 mg/100 g) recorded significantly highest ascorbic acid content which was on par with LE-56 × Pusa Gaurav (84.40 mg/100 g) and these are followed by LE-56 × Pant T-3 (82.32 mg/100 g), LE-67 × Pusa Gaurav (80.92 mg/100 g) and LE-56 × Punjab Chhuhara (80.54 mg/100 g), while the lowest ascorbic acid was recorded with LE-62 × Pant T-3 (40.67 mg/100 g). The checks Lakshmi, US -618 and Arka Vikas recorded 65.80, 67.42 and 64.36 mg/100 g ascorbic acid content, respectively. It might be due to one of them as their parent recorded the highest ascorbic acid content and also be due to its higher ascorbic acid content in the juice. Similar findings were reported by Gowda *et al.* (1993) [4] and Jawaharlal *et al.* (1999) [5].

Considering the total carotenoid content, the parent LE-65 recorded the highest in paste (22.46 mg/100 g) which was on par with LE-64 (22.40 mg/100 g) and Punjab Chhuhara (21.86 mg/100 g). The hybrid LE-56 × Punjab Chhuhara (26.95 mg/100 g) recorded significantly highest total carotenoids followed by LE-64 × Pusa Gaurav (24.95 mg/100 g), LE-64 × Punjab Chhuhara (24.84 mg/100 g), LE-56 × Pusa Gaurav (24.26 mg/100 g) and LE-65 × Pusa Gaurav (23.86 mg/100 g), while the lowest total carotenoid content was recorded with LE-65 × Punjab Chhuhara (12.18 mg/100 g). The checks Lakshmi, US -618 and Arka Vikas recorded 18.76, 16.37 and 20.36 mg/100 g total carotenoid content, respectively. The significantly highest lycopene content of paste (Fig. 11) was recorded by the parent LE-64 (21.79 mg/100 g) which was on par with Punjab Chhuhara (20.90 mg/100 g) and LE-65 (20.68 mg/100 g). The hybrid LE-56 × Punjab Chhuhara (25.86 mg/100 g) recorded significantly highest lycopene content followed by LE-64 × Pusa Gaurav (23.70 mg/100 g), LE-56 × Pusa Gaurav (23.20 mg/100 g), LE-65 × Pusa Gaurav (22.43 mg/100 g) and LE-64 × Punjab Chhuhara (22.06 mg/100 g), while the lowest lycopene content was recorded with LE-65 × Punjab Chhuhara (11.06 mg/100 g). The checks Lakshmi, US -618 and Arka Vikas recorded 17.52, 15.07 and 18.72 mg/100 g lycopene content, respectively. It might be due to one of them as their parent recorded the highest lycopene content and total carotenoid content and it might also be due to its higher sugar content and TSS in the juice. These findings are in line with those reported by Gowda *et al.* (1993) [4] and Jawaharlal *et al.* (1999) [5].

Organoleptic score of the paste was recorded highest in the parent LE-65 (4.53) followed by LE-64 (4.47) and Punjab Chhuhara (4.47). Among the hybrids LE-56 × Punjab Chhuhara (4.73) recorded highest organoleptic score followed by LE-64 × Punjab Chhuhara (4.63), LE-62 × Punjab Chhuhara (4.60) and LE-56 × Pusa Gaurav (4.57), while the lowest organoleptic score was recorded with LE-62 × Pusa Gaurav (3.70). The checks Lakshmi, US -618 and Arka Vikas recorded 4.07, 4.00 and 4.30 organoleptic score, respectively.

Ascorbic acid content of the puree was recorded significantly highest in the parent LE-56 (49.40 mg/100 g) followed by Punjab Chhuhara (44.20 mg/100 g), LE-67 (43.28 mg/100 g) and LE-65 (42.85 mg/100 g). Among the hybrids LE-56 × Pusa Gaurav (58.64 mg/100 g) recorded significantly highest ascorbic acid which was on par with LE-56 × Pant T-3 (57.24 mg/100 g) and these are followed by LE-64 × Punjab Chhuhara (55.36 mg/100 g), LE-56 × Punjab Chhuhara (54.42 mg/100 g) and LE-67 × Pusa Gaurav (52.54 mg/100 g), while the lowest ascorbic acid content was recorded with LE-62 × Pant T-3 (30.96 mg/100 g). The checks Lakshmi, US -618 and Arka Vikas recorded 40.39, 48.30 and 35.72 mg/100 g ascorbic acid, respectively. It might be due to one of them as their parent recorded the highest ascorbic acid content and also be due to its higher ascorbic acid content in the juice. Similar findings were reported by Gowda *et al.* (1993) [4] and Jawaharlal *et al.* (1999) [5]. Considering the total carotenoid content, the parent LE-64 recorded the highest in puree (16.03 mg/100 g) which was on par with Punjab Chhuhara (15.44 mg/100 g) and LE-65 (15.38 mg/100 g). The hybrid LE-56 × Punjab Chhuhara (17.96 mg/100 g) recorded significantly highest total carotenoids which was on par with LE-64 × Punjab Chhuhara (17.41 mg/100 g) and these are followed by LE-64 × Pusa Gaurav (16.65 mg/100 g), LE-62 × Punjab Chhuhara (16.36 mg/100 g) and LE-56 × Pusa Gaurav (16.08 mg/100 g), while the lowest total carotenoid content was recorded with LE-64 × Pant T-3 (11.84 mg/100 g) in hybrids. The checks Lakshmi, US -618 and Arka Vikas recorded 13.84, 12.89 and 13.46 mg/100 g total carotenoid content, respectively. The significantly highest lycopene content of puree was recorded by the parent LE-64 (14.50 mg/100 g) followed by LE-65 (13.24 mg/100 g), Punjab Chhuhara (13.20 mg/100 g) and Pant T-3 (13.12 mg/100 g). The hybrid LE-56 × Punjab Chhuhara (16.80 mg/100 g) recorded significantly highest lycopene content followed by LE-64 × Punjab Chhuhara (15.40 mg/100 g), LE-65 × Pusa Gaurav (14.98 mg/100 g), LE-64 × Pusa Gaurav (14.60 mg/100 g) and LE-62 × Punjab Chhuhara (14.54 mg/100 g), while the lowest lycopene content was recorded with LE-62 × Pusa Gaurav (9.68 mg/100 g) in hybrids. The checks Lakshmi, US -618 and Arka Vikas recorded 12.10, 10.70 and 11.67 mg/100 g lycopene content, respectively. It might be due to one of them as their parent recorded the highest lycopene content and total carotenoid content and it might also be due to its higher sugar content and TSS in the juice. These findings are in line with those reported by Gowda *et al.* (1993) [4] and Jawaharlal *et al.* (1999) [5].

Organoleptic score of the puree was recorded highest in the parent LE-64 (4.60) followed by LE-65 (4.57) and Punjab Chhuhara (4.57). Among the hybrids LE-62 × Punjab Chhuhara (4.73) recorded highest organoleptic score followed by LE-64 × Punjab Chhuhara (4.70), LE-56 × Punjab Chhuhara (4.68) and LE-56 × Pusa Gaurav (4.67), while the lowest organoleptic score was recorded with EC-165749 × Pusa Gaurav (3.70). The checks Lakshmi, US -618 and Arka Vikas recorded 4.20, 4.10 and 4.40

organoleptic score, respectively. The hybrids LE-56 × Punjab Chhuhara, LE-64 × Punjab Chhuhara LE-62 × Punjab Chhuhara and LE-56 × Pusa Gaurav are best suited for processing having moderate acidity and high lycopene)^[6], Ereifej *et al.* (1997)^[7] and Bengal *et al.* (2005)^[8].

content and these hybrids scored maximum for overall acceptability of the products. Results are in agreement with the findings of Gowda *et al.* (1993)^[4], Khandekar *et al.* (1994)

Table 1: Chemical constituents of freshly prepared puree

S.No	Characters	Ascorbic acid content (mg/100 g)	Total carotenoid content (mg/100 g)	Lycopene content (mg/100 g)	Overall acceptability
1	EC -165749 x Punjab Chhuhara	38.50	14.03	12.75	4.53
2	EC -165749 x Pant T-3	31.32	14.28	12.48	4.47
3	EC -165749 x Pusa Gaurav	34.92	12.70	11.94	4.37
4	LE-56 x Punjab Chhuhara	54.42	17.96	16.80	4.68
5	LE-56 x Pant T-3	57.24	12.00	10.63	4.20
6	LE-56 x Pusa Gaurav	58.64	16.08	13.78	4.67
7	LE-62 x Punjab Chhuhara	36.20	16.36	14.98	4.73
8	LE-62 x Pant T-3	30.96	14.42	12.46	4.50
9	LE-62 x Pusa Gaurav	46.62	11.98	9.68	3.80
10	LE-64 x Punjab Chhuhara	55.36	17.41	15.40	4.70
11	LE-64 x Pant T-3	41.40	11.84	10.12	4.00
12	LE-64 x Pusa Gaurav	33.80	15.73	14.54	4.63
13	LE-65 x Punjab Chhuhara	33.18	12.40	10.61	3.90
14	LE-65 x Pant T-3	34.36	14.70	13.03	4.43
15	LE-65 x Pusa Gaurav	32.38	16.65	14.60	4.63
16	LE-67 x Punjab Chhuhara	34.84	12.70	10.65	4.30
17	LE-67 x Pant T-3	31.74	11.94	9.46	4.03
18	LE-67 x Pusa Gaurav	52.54	13.15	11.18	4.40
19	EC -165749	39.47	11.48	9.94	3.70
20	LE-56	49.40	11.34	9.26	4.15
21	LE-62	32.90	13.41	12.20	4.33
22	LE-64	33.92	16.03	14.50	4.60
23	LE-65	42.85	15.38	13.24	4.57
24	LE-67	43.28	12.62	10.64	4.53
25	Punjab Chhuhara	44.20	15.44	13.20	4.57
26	Pant T-3	36.58	14.59	13.12	4.55
27	Pusa Gaurav	37.60	12.78	11.02	4.23
28	Lakshmi	40.39	13.84	12.10	4.20
29	US-618	48.30	12.89	10.70	4.10
30	Arka Vikas	35.72	13.46	11.67	4.40
	CD @ 5%	3.21	1.07	1.04	0.15
	SE(m) ±	1.13	0.38	0.37	0.05

Table 2: Chemical constituents of freshly prepared paste

S.No	Characters	Ascorbic acid content (mg/100 g)	Total carotenoid content (mg/100 g)	Lycopene content (mg/100 g)	Overall acceptability
1	EC -165749 x Punjab Chhuhara	60.34	19.91	18.24	4.45
2	EC -165749 x Pant T-3	43.65	18.98	17.90	4.40
3	EC -165749 x Pusa Gaurav	52.49	17.43	15.38	4.32
4	LE-56 x Punjab Chhuhara	80.54	26.95	25.86	4.79
5	LE-56 x Pant T-3	82.32	16.98	15.50	4.13
6	LE-56 x Pusa Gaurav	84.40	23.86	21.43	4.75
7	LE-62 x Punjab Chhuhara	62.85	24.84	23.20	4.73
8	LE-62 x Pant T-3	40.67	19.95	18.58	4.46
9	LE-62 x Pusa Gaurav	69.48	14.40	13.34	3.85
10	LE-64 x Punjab Chhuhara	88.45	24.95	23.70	4.82
11	LE-64 x Pant T-3	78.54	13.43	12.38	4.00
12	LE-64 x Pusa Gaurav	56.42	23.86	22.06	4.57
13	LE-65 x Punjab Chhuhara	41.20	12.18	11.06	4.03
14	LE-65 x Pant T-3	54.60	17.90	16.64	4.41
15	LE-65 x Pusa Gaurav	46.61	24.26	22.43	4.70
16	LE-67 x Punjab Chhuhara	52.40	17.80	16.46	4.23
17	LE-67 x Pant T-3	50.46	13.65	12.50	4.12
18	LE-67 x Pusa Gaurav	80.92	18.60	17.08	4.33
19	EC -165749	68.95	15.74	14.66	3.90
20	LE-56	76.20	15.53	13.75	4.14
21	LE-62	48.75	17.48	16.35	4.26
22	LE-64	40.20	22.40	21.79	4.63
23	LE-65	70.53	22.46	20.68	4.59
24	LE-67	58.10	20.10	19.39	4.47
25	Punjab Chhuhara	74.62	21.86	20.90	4.57
26	Pant T-3	54.60	20.67	19.57	4.53
27	Pusa Gaurav	56.42	15.19	14.40	4.23
28	Lakshmi	65.80	18.76	17.52	4.27
29	US-618	67.42	16.37	15.07	4.03
30	Arka Vikas	64.36	20.36	18.72	4.39
	CD @ 5%	4.44	1.57	1.36	0.12
	SE(m) ±	1.57	0.55	0.48	0.04

Conclusion

In an evaluation of nine parents, eighteen hybrids and three checks of tomato for quality of puree and paste, The hybrids LE-56 × Punjab Chhuhara, LE-64 × Punjab Chhuhara LE-62 × Punjab Chhuhara and LE-56 × Pusa Gaurav are best suited for processing having moderate acidity and high lycopene content and these hybrids scored maximum for overall acceptability of the products.

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. Gowda DIN, Ramanjaneya KH, Anand N, Sadashiva AT, Tikoo SK. Studies on the physico-chemical characteristics and processing quality of two IIHR tomato varieties in relation to commercial cultivars. *J Food Sci Technol*. 1994;31(2):126-129.
5. Jawaharlal M, Ramadas S, Veeraragavathatham D. Evaluation of parents and hybrids of tomato (*Lycopersicon esculentum* Mill.) for their suitability to prepare ketchup and paste. *South Indian Hortic*. 1999;47(1-6):38-41.
6. Khandekar RG, Joshi GD, Salvi MJ, Sapkal BB. A comparative study on processing of different tomato (*Lycopersicon esculentum* Mill.) varieties in the Konkan region. *Veg Sci*. 1994;21(1):59-64.
7. Ereifej KI, Shibli RA, Ajlouni MM, Hussain. Physico-chemical characteristics and processing quality of seven newly introduced tomato cultivars in Jordan in comparison with a local variety. *J Food Sci Technol*. 1997;34(2):171-174.
8. Bengal BP, Madalageri MB, Rokhade AK. Physico-chemical qualities of fruits of commercial tomato hybrids and varieties in Ghataprabha Left Bank Command (GLBC) area for processing into puree. *J Food Sci Technol*. 2005;42(1):8-11.