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Evaluation of physico-chemical characters and processing quality of some tomato hybrids

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SUMMARY :

Nine new hybrids of tomato namely NBH-Shakti-2005, NBH-666, NBH-Deshi number-1, NBH-Tripti-2010, NBH-3355, NBH-333, SNTH–1, SNTH–2 and SNTH–3 were evaluated for various physico-chemical characteristics and its suitability for processing into puree. The changes in quality characteristics of puree were studied in storage in ambient condition (Max. temp. 22.1°C to 38.9°C; Min. temp. 14.3°C to 26.7°C and R.H. 31 to 93 %). Average length, diameter and weight ranged from 4.29 to 7.07cm, 4.89 to 5.56 cm and 71.15 to 104.36g, respectively. Higher fruit weight of NBH-666 (104.36g) and NBH-3355 (101.66g) is accompanied by large fruit size (5.05cm length, 5.56cm diameter and 7.07cm length, 4.89cm diameter, respectively) compared to other varieties. Among the 9 hybrid varieties studies the variety SNTH-3 and NBH-Shakti-2005 were significantly less in weight and size. Locule number varied from 2.16 (in NBH-333) to 4.41 (in SNTH-1). In general, firmness of the hybrid varieties NBH-Tripti-2010, NBH-3355, NBH-333 and NBH-666 were high (>1kg/cm^2) while that of NBH-Shakti-2005 and SNTH-3 were low compared to other varieties. Juice yield was high in SNTH-3, SNTH-2, SNTH-1, NBH-3355, NBH-Tripti-2010 and NBH-Deshi number-1 (above 80%). TSS content was high in NBH-Deshi number-1, SNTH–3 and SNTH–2 (>4 °Brix). Acidity and pH ranged from 0.26 (in NBH-333) to 0.53 (in SNTH-2) and 4.07 (in SNTH-2) to 4.43 (in NBH-333). Among the hybrids lycopene content was high in NBH-666 (2.56mg/100g), NBH-3355 (2.38mg/100g) and NBH-Shakti-2005 (2.02mg/100g) while lycopene content of NBH-Deshi number-1 was least (0.95mg/100g). After preparation of puree, quality analysis and sensory evaluation revealed that NBH-666 and SNTH-1 were superior for processing, since these varieties possess higher chemical composition and scored high value for colour, flavour, consistency and overall acceptability score. Next preference can go to NBH-333 and SNTH-2. In storage however, the quality of puree deteriorated and after four months only the variety NBH-666 and NBH-333 retained the maximum colour, consistency, flavour and overall acceptability (total) as revealed from sensory score.

KEY WORDS : Physico-chemical characters, Processing quality of tomato

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Tomato (*Solanum lycopersicum* L.) of the nightshade family (Solanaceae) is an important vegetable crop grown throughout the world under field and glass house conditions and possess diverse physical properties and chemical composition. There is immense range of variation in pH (Shibli and Suwwan, 1987; Saimbhi *et al.*, 1995), total soluble solids (Saimbhi *et al.*, 1995), number of locules per fruit (Bhowmick *et al.*, 2004) and pericarp thickness (Saimbhi *et al.*, 2001; Rai *et al.*, 2012). There are also differences in their lycopene content depending upon the colour of tomatoes, which is one of the important factor for selection of tomatoes for processing along with other characteristics (Kumari *et al.*, 1998).

The most desirable qualities for processing of tomatoes have been considered as high total solids, acidity between 0.3 and 0.4 per cent, uniform red colour, smooth surface free from wrinkles, small core, firm texture and uniform ripening (Premchandra *et al.*, 1976 and Adsule *et al.*, 1980). Physico-chemical characteristics of different varieties of tomatoes (Sethi and Anand, 1986; Saimbhi *et al.*, 1995) varietal suitability for canning (Pathak and Mahajan, 1978), ketchup (Pruthi *et al.*, 1980), juice (Rao and Krishnamurthy, 1982) and puree (Sethi and Anand, 1986; Gowda *et al.*, 1994; Ereifej *et al.*, 1997) preparation has been reported earlier.

As the release of new cultivar is a continuous process, their physico-chemical characteristics must be tested to identify their post harvest quality. In this investigation, nine newly developed hybrids cultivars whose physico-chemical composition and processing quality were not well documented were studied and test the suitability for processing into puree.

EXPERIMENTAL METHODS

Nine hybrid varieties *viz.*, NBH-Shakti-2005, NBH-Tripti-2010, NBH- Deshi number-1, NBH-666, NBH-3355, NBH-333, SNTH-1, SNTH-2, SNTH-3, were grown at the Central Research Farm, Bidhan Chandra Krishi Viswavidyalaya, during autumn-winter season (Oct.-Feb., 2011-12) for the present investigation. Standard agronomical practices were followed and plant protection measures were taken as and when necessary. The fresh fruits at turning stage were harvested and following physical observation were recorded: Fruit weight (g), Fruit length (Polar diameter) (cm), Fruit diameter (Equatorial diameter) (cm), Ratio of length / diameter, Fruit firmness (kg/cm^2), Locules number, Pericarp thickness (mm), Juice content (%), Pomace content (%), Number of days to ripen, Shape of fruit. Chemical quality of fruits *viz.*, Total soluble solids (TSS) (°Brix), pH, Titratable acidity (%), TSS : Acid ratio, Total sugar (%), Reducing sugar (%), Lycopene content (mg/100 g) were estimated at fully ripe stage.

Puree was prepared from the ripe fruits of all nine hybrid varieties. Selected fully ripe, red tomatoes were sorted, trimmed, washed and then cut and chopped into 4-6 pieces. Boiled for extraction of juice, strained and cooked to desired consistency of 12°Brix. Puree was filled hot into 200 ml sterilize bottles (at 82-88°C) then cooled and stored on a rack in a cool dry place at ambient condition for 4 months. Yield of puree was estimated and total soluble solids (TSS) (°Brix), pH, titratable acidity (%), reducing sugar (%), total sugar (%) and lycopene content (mg/100 g) were analysed at the time of preparation and during storage of puree. The sensory quality of the puree was assessed by a panel of 10 judges using Hedonic scale having 30, 30 and 40 marks for colour, consistency and flavour, respectively (Gowda *et al.*, 1994). All the observation recorded were replicated thrice and statistically analyzed using Completely Randomized Design procedure (Gomez and Gomez, 1984).

Statistical analysis:

The obtained data was analyzed by statistical significant at $P<0.05$ level, S.E. and C.D. at 5 per cent level by the procedure given by (Panse and Sukhatame, 1962).

EXPERIMENTAL FINDINGS AND ANALYSIS

Physical characteristic of different varieties is presented in Table 1. Fruit weight, length and diameter of fruits varied significantly (5%) among the varieties. High fruit weight of NBH-666 (104.36g) and NBH-3355 (101.66g) is accompanied by large fruit size (5.05cm length, 5.56cm diameter and 7.07cm length, 4.89cm diameter, respectively) compare to other varieties. The fruit weight of NBH-666 and NBH-3355 were significantly (5%) higher than NBH-333, NBH-Tripti-2010, SNTH-2, SNTH-1, NBH-Deshi number-1, SNTH-3 and NBH-Shakti-2005. The fruit weight and size of

NBH-333, NBH-Tripti-2010, SNTH-2, SNTH-1 and NBH-Deshi number-1 were medium while SNTH-3 and NBH-Shakti-2005 were comparatively less in weight and size *i.e.* length and diameter.

The ratio of polar to equatorial diameter is an index of shape of the fruit. Fruits with a ratio of less than 1 are generally compressed round, those having a ratio of 1 are round, a ratio of 1.1 to 1.2 indicates an oval shape and a ratio of more than 1-4 gives pear shaped fruit. Most of the hybrid varieties examined here was compressed round to round shape *viz.*, SNTH-2, SNTH-3, NBH-Deshi number-1, NBH-shakti-2005, NBH-666 and NBH-Tripti-2010. NBH-3355 was pear shape while NBH-333 was oval to pear shaped.

There was significant variation of number of locules among the varieties ranging from 2.16 (in NBH-333) to 4.41 (in SNTH-1). Number of locules of SNTH-1 (4.41), SNTH-2(4.25), NBH-Shakti-2005 (4.08), NBH-Deshi number-1 (3.91), SNTH-3 (3.75) and NBH-Tripti-2010 (3.67) was significantly (5%) higher than NBH-666 (3.16), NBH-3355 (2.25) and NBH-333 (2.16).

Pericarp thickness varied from 3.01cm (in NBH-Tripti-2010) to 7.21cm (in NBH-3355). Thickness of NBH-3355 and NBH-333 was significantly higher than NBH-666, NBH-Deshi number-1, SNTH-2, NBH-Shakti-2005, SNTH-1, SNTH-3 and NBH-Tripti-2010.

NBH-333 recorded highest fruit firmness (1.5 kg/ cm^2) followed by NBH-666, NBH-3355, NBH-Tripti-2010, SNTH-2, NBH-Deshi number-1 and SNTH-1 while fruits of SNTH-3 and NBH-Shakti-2005 were softer as indicated by comparatively low firmness.

Pomace per cent was high in NBH-Shakti-2005 (12.11%), NBH-Tripti-2010 (10.39%), NBH-666 (9.82%) and medium in NBH-3355 (7.26%), NBH-333 (7.08%), and NBH-Deshi number-1 (7.04%) and low in SNTH-3 (6.59%), SNTH-2 (5.49%) and SNTH-1 (3.97%). Juice per cent varied from 72.08 per cent (in NBH-666) to 87.97 per cent (in SNTH-3). In general it was observed that varieties SNTH-3, SNTH-2 and SNTH-1 having low pomace content produced high juice yield of 87.97 per cent, 87.71 per cent and 85.21 per cent, respectively.

It has been reported earlier that hybrid of higher fruit weight had the fruit of bigger size also (Pruthi *et al.*, 1980; Madaiah *et al.*, 1986; Sethi and Anand, 1986 and Siddiqui *et al.*, 1989). Most of the hybrids has been reported to be larger in size and higher in weight (>90g) while open pollinated varieties were of smaller in size and lower in weight (<62g) (Bhowmick *et al.*, 2004). High polar diameter which gives oblong / elongated shape is a desired processing quality with more pulp content of the fruit (Tiwari, 1996). The locule number of hybrid tomato has been reported vary from 2 to 5 (Padda *et al.*, 1970 and Sethi and Anand, 1986) which is in conformity with the present findings. Bhowmick *et al.* (2004) however recorded locules number to the extent of 6.66 in hybrids and Gowda *et al.* (1994) observed lower juice recovery per cent (60-71%) compared to the present result which might be due to genotype of parents of hybrids materials.

Round fruited cultivars have a higher locule number (Padda *et al.*, 1970; Raina *et al.*, 1980) while oval and

Table 1 : Physical characteristics of fruit of different tomato varieties

Varieties	Weight (g)	Length (P.D.) (cm)	Diameter (E. D.) (cm)	Ratio of length / diameter	Firmness (Kg/cm^2)	Locules number	Pericarp thickness (mm)	Juice content (%)	Pomace content (%)	Days required to ripen	Shape of fruit
NBH-Shakti- 2005	71.15	4.46	5.08	0.87	0.57	4.08	4.97	77.97	12.11	11	Round
NBH- 666	104.36	5.05	5.56	0.90	1.37	3.16	5.97	72.08	9.82	15	Round
NBH-Deshi no. 1	82.06	4.55	5.34	0.85	0.83	3.91	5.42	82.77	7.04	13	Round
NBH-Tripti 2010	87.88	4.78	5.38	0.88	1.25	3.67	3.01	81.76	10.39	12	Round
NBH- 3355	101.66	7.07	4.89	1.45	1.30	2.25	7.21	83.61	7.26	15	Pear
NBH- 333	93.76	6.45	4.89	1.31	1.50	2.16	6.73	77.89	7.08	10	Oval
SNTH – 1	86.35	4.8	5.19	0.92	0.80	4.41	4.90	85.21	3.97	7	Round
SNTH – 2	86.85	4.52	5.25	0.86	0.95	4.25	5.15	87.71	5.49	9	Round
SNTH – 3	72.25	4.29	4.97	0.86	0.58	3.75	4.22	87.97	6.59	8	Round
S.E. ±	3.98	0.07	0.10	---	0.09	0.17	0.21	2.67	0.78	---	---
C.D. (P=0.05 %)	11.63	0.21	0.3	---	0.27	0.5	0.63	7.8	2.29	---	---

P.D. - Polar diameter, E.D. - Equatorial diameter

pear shaped cultivars have less number of locules (Sharma *et al.,* 2000; Saimbhi *et al.,* 2001) which is in accordance to present findings. Oval to pear shaped hybrids NBH-333 and NBH-3355 possess low locule number of 2.16 and 2.25, respectively. Cultivars with higher locules number are more juicy (Padda *et al.,* 1970; Saimbhi *et al.,* 1987; Pakowski and Majumdar, 1995; Saimbhi *et al.,* 2001), but this trend was not noticeable in this result as because only hybrid materials with diverse parents were included in the present study. Hybrid NBH-3355 with low locules number (2.25) possess high juice content whereas, NBH-Shakti-2005 with high locules number (4.08) possess comparatively low juice content (77.97%). Firmness of most of the hybrids was high in the experiment which corroborated to the earlier report (Raina *et al.,* 1980). Thickness of pericarp generally related to firmness of fruit. Higher is the pericarp thickness better is the firmness of fruit (Shin and Bhowmik, 1994; Saimbhi *et al.,* 2001). Similar to the present result of high pericarp thickness of hybrids has also been reported by (Saimbhi *et al.,* 1995).

Chemical composition of fresh fruit *i.e.* TSS, pH, acidity, TSS : acid ratio of tomato juice and lycopene content are presented in Table 2. TSS, acidity, lycopene content were significantly different (5%) while pH was non significant (5%). TSS content was maximum in NBH-Deshi number-1 (4.6°Brix) and it was significantly higher than other varieties *viz.*, SNTH-3, SNTH-2, NBH-666, SNTH-1, NBH-3355, NBH-333, NBH-Tripti-2010 and NBH-Shakti-2005. pH varied from 4.07 (in SNTH-2) to 4.43 (in NBH-333). Acidity on the other hand was estimated to be maximum *i.e.* 0.53 per cent in SNTH-2 while it was minimum *i.e.* 0.26 per cent in NBH-333. TSS : Acid ratio varied from 7.00 (in NBH-Shakti-2005) to 13.22 (SNTH-3). Lycopene content of varieties at ripe stage indicated significant (5%) variation and it ranged from 0.952mg/100g (in NBH-Deshi number-1) to 2.559 mg/100g (in NBH-666). Lycopene content of NBH-666 and NBH-3355 was significantly higher than the lycopene content of other varieties.

Physico-chemical characters analysis of different tomato varieties / hybrids previously by Pruthi *et al.* (1980); Sethi and Anand, (1986); Saimbhi *et al.* (1987); Bajaj *et al.* (1990); Gowda *et al.* (1994) and Saimbhi *et al.* (1995) also recorded similar TSS, pH and acidity with present findings. High acidity (>1) recorded by Bhowmick *et al.* (2004). TSS recorded by Chakraborty *et al.* (2007) was high was high compared to the present result due to genetic differences of the material. Lycopene content as observed in different hybrids corroborated to the earlier report by Pruthi *et al.* (1980), Madaiah *et al.* (1986), Gowda *et al.* (1994) and Chakraborty *et al.* (2007). However, Bhowmick *et al.* (2004) reported of higher lycopene content in hybrid materials (>9.0mg/100g) indicating the existence of genotypic differences in lycopene content.

Data on chemical composition and yield of puree prepared from different varieties indicated that puree yield was maximum (31.52%) in NBH-Deshi number-1 followed by NBH-333, SNTH-3, NBH-666, SNTH-1, NBH-3355, NBH-Shakti-2005, NBH-Tripti-2010 and minimum (23.81%) in SNTH-2 (Table 3). Significant differences was observed in TSS, acidity, pH, total sugar and reducing sugar of different varieties after preparation of puree. Although the TSS of puree was adjusted to

Table 2 : Chemical characteristics of fruit of different tomato varieties

Varieties	TSS (°Brix)	pH	Acidity (%)	TSS : Acid ratio	Lycopene (mg/100g)
NBH-Shakti- 2005	3.43	4.21	0.49	7.00	2.02
NBH- 666	3.98	4.10	0.39	10.20	2.56
NBH-Deshi no. 1	4.60	4.14	0.44	10.45	0.95
NBH-Tripti -2010	3.50	4.38	0.33	10.60	1.50
NBH- 3355	3.80	4.14	0.30	12.67	2.38
NBH- 333	3.80	4.43	0.26	14.61	1.80
SNTH - 1	3.90	4.31	0.43	9.06	1.78
SNTH - 2	4.00	4.07	0.53	7.54	1.80
SNTH - 3	4.10	4.33	0.31	13.22	1.33
S.E. ±	0.18	0.35	0.03	.....	0.13
C.D. (P=0.05)	0.53	NS	0.09	.....	0.38

NS=Non-significant

12°Brix during preparation of puree it varied from 11.60 to 12°Brix. pH of puree varied from 4.08 (in NBH-666) to 4.29 (in NBH-3355). It was noted that pH of the puree were less than pH of juice of fresh fruit for all the varieties except SNTH-2. Acidity of puree of different varieties was significantly different (5%) and it varied from 0.74 per cent (in NBH-3355) to 1.49 per cent (SNTH-3). Total sugar and reducing sugar was significantly different (5%) and it ranged from 6.84 per cent (in NBH-333) to 9.10 per cent (in NBH-Shakti-2005) and 6.18 per cent (in

Table 3 : Chemical quality after preparation of puree from different varieties

Varieties	Puree yield (%)	TSS (°Brix)	Acidity (%)	Total sugar (%)	Reducing sugar (%)	pH	Lycopene (mg/100g)
NBH-Shakti- 2005	25.54	12.00	1.36	9.10	8.05	4.19	3.79
NBH- 666	26.70	12.00	1.42	8.82	7.49	4.08	4.61
NBH-Deshi no. 1	31.52	12.00	1.20	7.96	6.18	4.10	2.99
NBH-Tripti 2010	23.91	12.00	1.39	8.63	7.09	4.17	3.57
NBH- 3355	26.07	11.60	0.74	8.21	7.74	4.29	4.05
NBH- 333	30.57	12.00	0.91	6.84	6.26	4.24	3.59
SNTH - 1	26.21	11.90	1.15	8.10	7.05	4.10	4.23
SNTH - 2	23.81	11.90	1.47	8.05	6.73	4.27	4.08
SNTH - 3	28.67	11.93	1.49	8.82	7.84	4.25	3.85
S.E. ±	.....	0.07	0.03	0.10	0.05	.....	.....
C.D. (P=0.05)	.....	0.19	0.07	0.30	0.14	.....	.....

Table 4 : TSS, Acidity, total sugar, reducing sugar at different month of storage of tomato puree

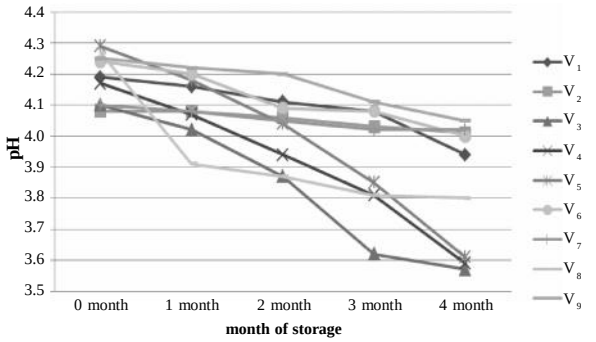
Varieties	TSS (°Brix)			Acidity (%)			Total sugar (%)			Reducing sugar (%)		
	Months			Months			Months			Months		
	0	2	4	0	2	4	0	2	4	0	2	4
NBH-Shakti- 2005	12.00	10.97	10.80	1.36	1.44	1.56	9.10	9.84	10.34	8.05	8.89	9.16
NBH- 666	12.00	11.33	11.17	1.42	1.48	1.54	8.82	9.37	9.59	7.49	8.10	8.63
NBH-Deshi no. 1	12.00	11.27	10.83	1.20	1.49	1.56	7.96	8.10	8.69	6.18	6.41	6.51
NBH-Tripti 2010	12.00	10.50	9.7	1.39	1.46	1.51	8.63	9.37	9.67	7.09	7.54	7.79
NBH- 3355	11.60	11.00	10.76	0.74	1.42	1.44	8.21	9.53	9.75	7.74	8.22	8.81
NBH- 333	12.00	11.17	10.73	0.91	1.16	1.19	6.84	7.49	7.74	6.26	6.69	6.85
SNTH - 1	11.90	11.50	11.2	1.15	1.20	1.27	8.10	9.02	9.23	7.05	7.59	7.95
SNTH - 2	11.90	10.43	10.3	1.47	1.66	1.68	8.05	8.81	9.16	6.73	7.40	7.64
SNTH - 3	11.93	11.63	11.3	1.49	1.50	1.53	8.82	9.59	9.75	7.84	8.33	8.75
S.E. ±	0.07	0.05	0.05	0.03	0.02	0.03	0.10	0.12	0.13	0.05	0.08	0.10
C.D. (P=0.05)	0.19	0.14	0.14	0.07	0.05	0.08	0.30	0.34	0.37	0.14	0.23	0.28

Table 5 : Sensory quality of tomato puree at different month of storage

Varieties	Colour (30)			Consistency (30)			Flavour (40)			Total (100)		
	Months			Months			Months			Months		
	0	2	4	0	2	4	0	2	4	0	2	4
NBH-Shakti–2005	20.00	19.67	19.00	21.00	20.33	20.00	30.00	29.67	29.00	71.00	69.67	68.00
NBH- 666	25.00	24.33	24.00	25.67	25.33	24.67	34.33	34.00	34.00	85.00	83.66	82.67
NBH-Deshi no. 1	21.00	20.33	20.00	20.67	20.00	19.67	32.00	31.67	30.67	73.67	72.00	70.34
NBH-Tripti 2010	23.00	22.67	21.00	20.33	18.33	17.00	32.67	32.00	31.00	76.00	73.00	69.00
NBH- 3355	22.00	21.00	20.00	23.67	22.67	21.00	31.00	30.67	30.67	76.67	74.34	71.67
NBH- 333	22.00	22.00	22.00	24.00	23.33	23.00	33.67	30.33	28.00	79.67	75.66	73.00
SNTH - 1	24.00	23.67	23.00	23.67	23.00	22.67	34.33	33.33	26.00	82.00	80.00	71.67
SNTH - 2	23.33	23.00	22.00	22.00	21.67	18.00	33.00	31.00	27.00	78.33	75.67	67.00
SNTH - 3	23.00	22.33	22.33	21.00	17.67	16.67	32.00	32.00	27.00	76.00	72.00	66.00
S.E. ±	0.56	0.58	0.56	0.50	0.44	0.48	0.52	0.53	0.53	0.52	0.51	0.52
C.D. (P=0.05)	1.60	1.67	1.60	1.44	1.28	1.40	1.51	1.54	1.54	1.51	1.49	1.51

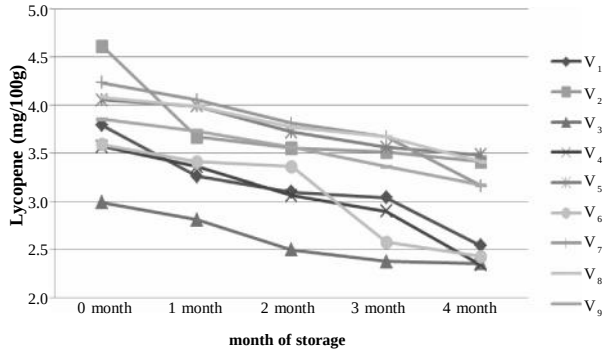
NBH-Deshi number-1) to 8.05 (in NBH-Shakti-2005), respectively. Lycopene content of puree of all the varieties was estimated to be higher than fresh fruits. Lycopene content of puree NBH-666, SNTH-1, SNTH-2 and NBH-3355 appreciably higher than NBH-Shakti-2005, NBH-Deshi number-1, NBH-Tripti-2010, NBH-333 and SNTH-3. Considering all the chemical parameters the hybrids NBH-666, NBH-3355, SNTH-1, SNTH-2 and NBH-Shakti-2005 were superior in quality.

The chemical analysis of puree of each variety in storage at the end of 2nd and 4th month, respectively is presented in Table 4 and 5. Throughout the period of storage TSS, acidity, total sugar, reducing sugar was significant (at 5%). The pattern of pH and lycopene content is shown graphically in Fig. 1 and 2. TSS, pH and lycopene decreased gradually after preparation of puree during storage while acidity, total sugar, reducing sugar increased during storage up to 4 months. After 4 months in general the TSS content decreased significantly in all varieties from initial observation and it ranged from 9.7°Brix (in NBH-Tripti-2010) to 11.30°Brix (in SNTH-3). Acidity per cent variation was also recorded to be significant with maximum in SNTH-2 (1.68%) and minimum in NBH-333 (1.19%). Total sugar and reducing sugar increased in storage and it varied from 7.74 per cent (in NBH-333) to 10.34 per cent (in NBH-Shakti-2005) and 6.51 per cent (in NBH-Deshi number-1) to 9.16 per cent (in NBH-Shakti-2005). After 4th month of storage the pH content decreased in all the varieties. Lycopene content (mg/100g) also decreased gradually throughout the period of storage and it remained high in NBH-3355 (3.48 mg/100g), NBH-666 (in 3.41 mg/100g), SNTH-2 (in3.41 mg/100g) compared to other varieties. The overall chemical qualities remained high even after 4th months in varieties *i.e.*, NBH-666, NBH-3355, SNTH-2 and SNTH-1. Except lycopene, the chemical parameters of NBH-Shakti-2005 were good after 4 months. The retention of colour *i.e.* less loss of lycopene (%) has been noticed in these varieties after 4 months.



V_1-NBH-Shakti-2005, V_2-NBH-666, V_3-NBH- Deshi Number1, V_4-NBH-Tripti-2010 V_5-NBH-3355, V_6-NBH-333, V_7-SNTH-1, V_8-SNTH-2, V_9-SNTH-3

Fig. 1 : Changes in pH of tomato puree during storage



V_1-NBH-Shakti-2005, V_2-NBH-666, V_3-NBH- Deshi Number1, V_4-NBH-Tripti-2010 V_5-NBH-3355, V_6-NBH-333, V_7-SNTH-1, V_8-SNTH-2, V_9-SNTH-3

Fig. 2 : Changes in lycopene of tomato puree during

Sensory evaluation studies of puree at monthly interval of storage up to 4 months indicated that the varieties NBH-666 and SNTH-1 were best suited for processing, since these varieties scored high value for colour, flavour, consistency and overall acceptability score (Table 5). Next preference can go to NBH-3355 and SNTH-2. In storage, however, the quality of puree deteriorate and after four months only the variety NBH-666 and NBH-333 retained the maximum colour, consistency, flavour and overall acceptability (total) as revealed from sensory score.

Pruthi *et al.* (1980) and Gowda *et al.* (1994) also reported that the TSS, acidity and lycopene content increased while pH decreased after preparation of puree. In storage of puree (for 6 months) for all the varieties there was trend for increasing acidity, total sugar and reducing sugar (Gowda *et al.*, 1994; Ereifej *et al.*, 1997 and Chakraborty *et al.*, 2007).

Thus, it can be concluded that considering overall physico-chemical characters of the hybrid varieties, NBH-666, SNTH-1, SNTH-2 and NBH-3355 was better for fresh consumption and also considered suitable for preparation of tomato puree because the fruits were medium to large, uniform red and possess overall superior chemical characteristics. After preparation of puree, quality analysis and sensory evaluation revealed that

NBH-666 and SNTH-1 were superior for processing, since these varieties possess higher chemical composition and scored high value for colour, flavour, consistency and overall acceptability score. Next preference can go to NBH-333 and SNTH-2. In storage however the quality of puree deteriorated and after four months only the variety NBH-666 and NBH-333 retained the maximum colour, consistency, flavour and overall acceptability (total) as revealed from sensory score.

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