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(3) Chemical composition of tomato paste

Of the twenty four varieties studied, the fruits in bulk quantities (120-150 kg) were made available only in the case of fifteen varieties. Hence tomato paste was prepared from the Juice of only these varieties. The prepared paste samples were analysed for their important chemical constituents and the data obtained are summarised and presented in Table 3.

Yield of tomato paste from these varieties was found to range from 9.5% to 19.5%. Acidity and pH varied between 1.97 to 3.42% and 4.0 to 4.2 respectively. Ascorbic acid content was lowest in the paste prepared from *Ogasta* variety and maximum in EC135501/JM4107, when compared to ascorbic acid levels in the Juice of these varieties, losses in ascorbic acid in prepared paste ranged from 10-20% during concentration. Lycopene content ranged from 10.1 to 33.8mg% losses in Lycopene content during concentration was found to be marginal as indicated by the data.

Based on colour, appearance lycopene content, acidity level and the yield of paste the varieties EC129604/75/122, EC129606 (ARND) and Selection-4 can be considered to be best suited for manufacture of paste. Next preference can go to EC154894/E6972 (based on Juice characteristics only), EC130038/SANTA, EC135501/JM4107 and EC126757/BONES-D_1 in that order.

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QUALITY CHARACTERISTICS OF HYBRID TOMATOES FOR PUREE PREPARATION

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ABSTRACT

Eight hybrids of tomatoes have been evaluated for the physico-chemical characteristics. The varieties with higher fruit weight had the bigger fruit size also. Hybrid **Shutal** *was found to be better with respect to ascorbic acid.* **Indoprocess** *III had high lycopene and carotenoids content. The average value of per cent total solids, T.S.S. and acidity varied from 4.10 to 6.42, 3 80 to 4 62 and 0.33 to 0.48 respectively* **Indoprocess** *II cultivar was the top ranking variety for purpose of puree preparation. Next in order of performance were* **Indoprocess** *III and* **Rupali.**

Introduction

Tomatoes, (*lycopersicon esculentum* Mill), popular as the 'poor man's apple' constitute one of the chief vegetable crops of our country. Its products rank first among all processed vegetables. Tomatoes are consumed as such or canned or processed into ketchup, paste, puree, sauce and chutney. Quality and flavour of the processed products depend on chemical composition of the raw material which has been reported to vary greatly with variety, soil condition and environment[1,3]. Extensive research work is being carried out in order to develop newer varieties with disease resistance and high yield. However, so far very little attempt has been made in our country to improve its nutritional value from the point of view of processing. Lycopene is the predorminant carotenoid of tomato responsible for its colour[4]. Other carotenoids also contribute to the flavour of tomatoes. The most desirable qualities for processing of tomatoes have been considered as high total solids, acidity between 0.3 to 0.4%, uniform deep red colour, smooth surface, free from wrinkles, small core, firm flesh and uniform ripening[5]. Chemical characteristics of different varieties of tomatoes[6] and varietal suitability for canning[7,8], ketchup[9,10] and

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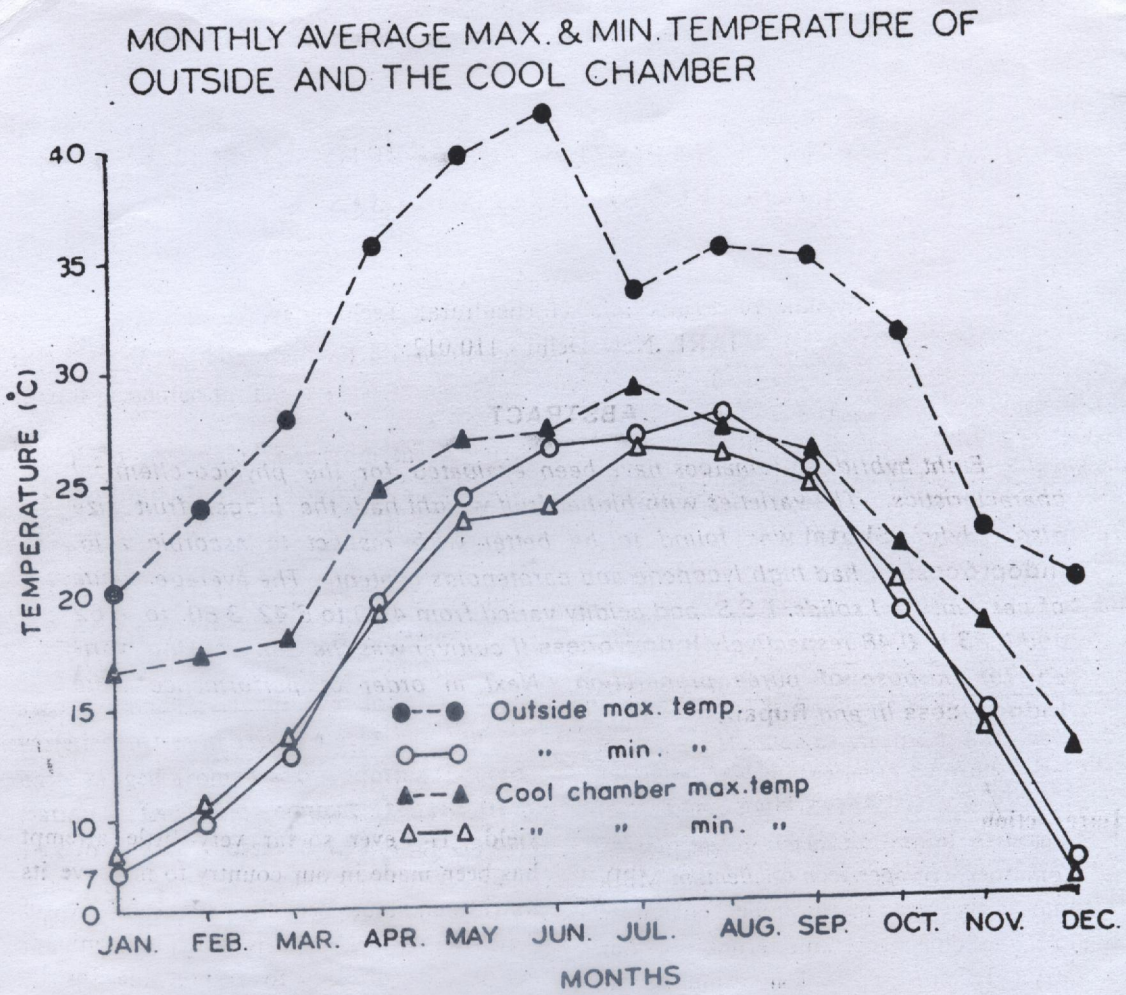


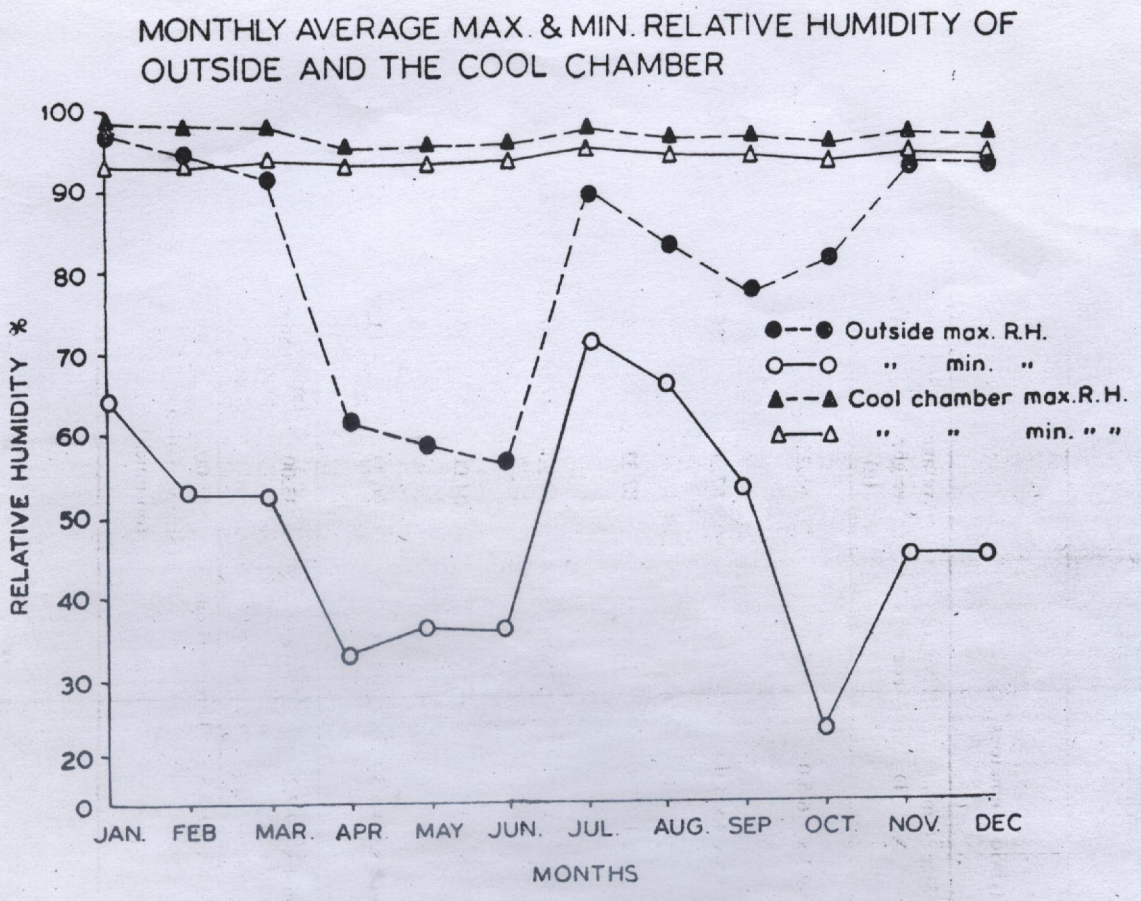
whole tomatoe concentrate[11] have been reported by few workers.

Experiments were conducted here at IARI to determine the quality of F_1 hybrids of tomato for puree preparation.

Materials and Methods

(I) *Raw materials :* Ripe, firm, uniform and healthy tomatoes of different F_1 hybrids viz. *Indoprocess* I,II,III, *Indeterminate*, *Mangla*, *Rupali*, *Shutal Vaishali* were obtained from Mahroli Indo US Firm. Six round, one oval and one oblong hybrids of tomato were used in the present study.

(ii) *Analysis of Fruits :* One kilogram fruits at random were picked up from each cultiver for studying the physical characters. Later they were crushed and juice was extracted by grinding in pestle and mortar and was strained through muslin cloth.



The T.S.S. was measured by hand refrectometer and corrected to 20°C. The analysis of the juice for total solids, sugars, acidity, ascorbic acid was carried out as per A.O.A.C.[12] method. Total carotenoids were estimated according to the method given by MC Collum[13]. Estimation of lycopene was carried out as per spectrophotometric methods[14] of Adsule & Dan.

Results and Discussion

Physical characteristics : Most of the F_1 hybrids were round in shape wherein the diameter was greater than the length except *Indoprocess* I. The colour of *Indoprocess* I and II was bright red and *Indoprocess* III was deep red in colour. Rest of the hybrids were yellowish red in colour. The fruit weight was maximum in *Indoprocess* II. In most of the hybrids, the fruits have 2-4 locules. The hybrids of higher fruit weight had the fruits of bigger size also. The percentage juice varied from 73.33 (*Indoprocess* I) to 93.33 (*Indoprocess* III, *Rupali* and *Vaishali* as Shown in Table 1.

TABLE 1 : Physical Characteristics of Hybrid Tomatoes.

F_1 Hybrid	Shape	Size (cm) L X D	No. of coculles	Average weight (g)	Juice (%)	Colour on full maturity
Indoprocess I	Oblong	7.9-9.3 x 4.6-5.0	Two	65.25	73.33	Bright Red
Indoprocess II	Round	4.8-5.8 x 4.8-4.9	Two	57.20	80.00	Bright Red
Indoprocess III	Round	5.6-5.9 x 4.9-5.5	Two	82.33	93.30	Deep Red
Indeterminate	Almost round	5.4-5.5 x 5.3-5.5	Two	60.50	90.00	Yellowish Red
Mangla	Round	7.1-7.4 x 8.0-8.2	Four	204.00	90.00	Yellowish Red
Rupali	Oval to round	5.5-6.2 x 5.4-5.5	Four	90.33	93.33	Yellowish Red
Shutal	Round	6.1-6 4 x 6.9-7.2	Five	133.00	86.66	Yellowish Red
Vaishali	Round	4.3-5.8 x 5.1-6.8	Three to Four	85.00 (Size variation too much)	93.33	Yellowish Red

TABLE 2 : Chemical Composition of HybridTomatoes.

F1 - Hybrid	Total solids (%)	T. S. S. (at 20°C)	Total sugar (%) as invert	Titratable acidity (%)	Ascorbic acid (mg/100 ml)	Sugar acid ratio	B-carotene (mg/100 ml)	Lycopene (O.D. at 470 mu)
Indoprocess I	4.97	4.62	2.38	0.42	14.95	5.65	5.50	0.1938
Indoprocess II	6.16	4.62	2.16	0.42	17.05	5.14	4.44	0.1679
Indoprocess III	5.84	4.12	2.32	0.42	13.50	5.52	6.00	0.2076
Indeterminate	6.42	4.62	2.91	0.45	15.61	6.46	2.22	0.0835
Mangla	4.10	4.62	2.60	0.48	19.66	5.41	2.44	0.1024
Rupali	5.26	4.42	2.40	0.45	16.03	5.33	4.00	0.1427
Shutal	4.89	3.80	2.88	0.33	21.20	8.72	2.00	0.0783
Vaishali	5.41	4.62	2.70	0.48	15.44	5.62	1.50	0.0506

Chemical Constituents

The hybrids differed with each other for their chemical characteristics (Table 2). The average values for per cent total solids ranged from 4.10 (*Mangla*) to 6.16 (*Indoprocess* II). T.S.S. varied from 3.80 to 4.62. Total invert sugar was highest in *Indeterminate* (2.91 per cent) and lowest in *Indoprocess* II (2.16 per cent). *Shutal* had the lowest acidity value (0.33 per cent) while *Vaishali* and *Mangla* had the highest values (0.48 per cent). Ascorbic acid content was maximum in *Shutal* (21.20 mg/100 ml) and minimum in *Indoprocess* III (13.50 mg/100 ml).

Sugar to acid ratio should be narrow for better flavours of the fruits *Indoprocess* II and *Rupali* had 5.14 to 5.33 sugar acid ratio while in rest of the hybrids this ratio was higher. Hence these hybrids will be superior in flavour than other cultivars. Hybrids having dry matter and lycopene content are preferred for tomato paste production. In the present study cultivar *Indoprocess* II had maximum dry matter content and *Indoprocess* III had maximum lycopene. Taking various characteristics into consideration for processing the present study indicated the possibility of commercial production of puree. These hybrids were used for puree preparation having 12° Brix, 1.0 to 1.2% acidity. *Indoprocess* II, *Indoprocess* III and *Rupali* performed well. All of these cultivars had good amount of dry matter, moderate acidity and high lycopene content.

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