

## Short communication

# Whole tomato concentrate - A value-added tomato product for small scale entrepreneur

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### ABSTRACT

A protocol for preparation of whole tomato concentrate was standardized in cvs. Vaibhav Ananya and Allround. Hundred kg fruit gave 32 kg concentrate in open pan. The concentrate had 20 mg/100g ascorbic acid content in Vaibhav while lycopene (6.43 mg/100 g) was estimated in Allround. There was slight decrease in acidity after 3 month storage.

**Key words:** Tomato, whole concentrate, value-addition.

Tomato (*Solanum lycopersicon*) is an important commercial vegetable crop. It is widely used for culinary purposes, which not only adds to the taste and colour of the vegetable preparations but also enhances their vitamin and mineral status. Its use is very common in almost all vegetable curries. Tomato products such as ketchup, puree, paste etc. are commercially available processed products. But whole tomato concentrate (also called crushed tomato or tomato crush) is an intermediate product where inclusion of seed and skin adds to the consistency and colour of the product. The demand for processed food particularly tomato products are constantly on the rise. This ready-to-use whole tomato concentrate is an important intermediate product which could be used as a substitute to the whole tomato for various curry preparation. In the present study, small scale processing of whole tomato concentrate was studied.

Firm ripe tomatoes of F<sub>1</sub> hybrids Vaibhav, Allround, Arka Ananya each 100 kg grown at IIHR, Bangalore, research field were taken for making the whole tomato concentrate. The product was prepared and packaged as shown in the flow chart Fig. 1. Tomatoes were sorted, washed and cut into pieces. Concentration was carried out in stainless steel open pan until the final concentrate had 1/3<sup>rd</sup> of its initial weight. After the addition of calculated quantity of potassium metabisulphite (0.4 g/kg of product), sodium benzoate (0.2 g/kg of product) and glacial acetic acid (5 ml/kg of product), the concentrate was hot filled in 500 g capacity heat sterilized glass container and stored at room temperature (25-30°C) as per the procedure followed by Rao and Shantha (3). The analysis of whole tomato concentrate was carried out for TSS, acidity and ascorbic acid (Ranganna,

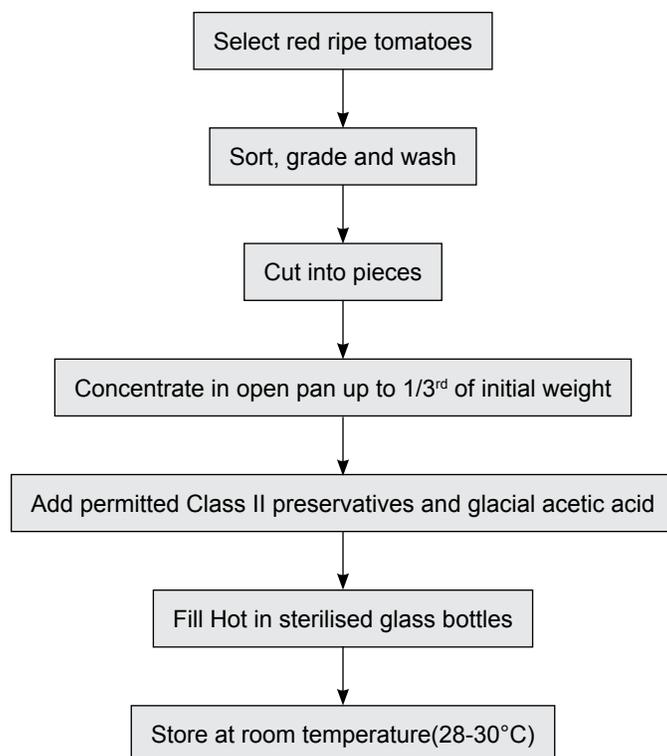
5). Cost of production was calculated by taking into consideration various input costs such as cost of raw material, labour, fuel consumption, processing cost, packaging and other charges. For calculating the sale price of the product 20% profit margin was added to the cost of each product (Dev raj *et al.*, 2).

It was found that 32 kg whole tomato concentrate could be obtained from 100 kg of fruits. Duration of concentration in open pan was around 4 h for a batch of 25 kg fruits. The data on chemical composition of whole tomato concentrate is presented in Table 1. Whole tomato concentrate made from Vaibhav had high ascorbic acid content (20 mg/100 g), whereas, it was lowest in Arka Ananya (17.55 mg/100 g). These findings are similar with the studies of Saini *et al.* (6) for varieties of tomato. Acidity (%) was highest in Allround (0.96%) and was lowest in Vaibhav (0.84%). Whole tomato concentrate prepared from Allround had higher lycopene content compared to Arka Ananya and Vaibhav. This indicates increased redness of the concentrate prepared from Allround. The processed tomato product had a shelf-life of 6 months without deterioration in quality at room temperature (28-30°C).

Storage studies conducted at room temperature (28-30°C) for three months showed that there was slight increase in TSS and acidity whereas there is decrease in pH, ascorbic acid content and lycopene content during storage (Table 2). These results are similar to the oxidation of lycopene in bottled tomato ketchup (Taoukis *et al.*, 8) and decrease in ascorbic acid content of tomato paste during storage (Safdar *et al.*, 7) and similar findings on pH decrease was reported by Ahmed (1) on the study of tomato concentrate.

Any enterprise to be economically viable must have benefit-cost ratio (BCR) more than one (Pawan Dahiya *et al.*, 4). In this process, the BCR was found to

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**Fig. 1.** Flow chart for the preparation of whole tomato concentrate.

**Table 1.** Chemical composition of the tomato concentrate from different F<sub>1</sub> tomato hybrids.

Hybrid	TSS (°Brix)	Acidity (%)	Ascorbic acid (mg/100 g)	Lycopene (mg/100 g)	Moisture (%)	pH
Vaibhav	15	0.84	20.00	5.65	77.10	4.3
Ananya	15	0.90	17.55	5.65	77.22	4.5
Allround	15	0.96	18.00	6.43	77.30	4.7
CD at 5%	NS	0.034	NS	0.026	NS	0.346

**Table 2.** Changes in nutritional composition of whole tomato concentrate during three month storage period at ambient temperature.

Hybrid	TSS (°Brix)		Acidity (%)		Ascorbic acid (mg/100 g)		Lycopene (mg/100 g)		pH	
	Initial	After 3 months	Initial	After 3 months	Initial	After 3 months	Initial	After 3 months	Initial	After 3 months
Vaibhav	15	16	0.84	1.024	20.00	18	5.65	4.96	4.3	3.96
Ananya	15	16	0.90	1.024	17.55	16.4	5.65	4.96	4.5	4.00
Allround	15	15	0.96	1.052	18.00	17.5	6.43	5.38	4.7	4.02

be 1.88 (Table 3). Hence from the entrepreneur's point of view it is obvious that whole tomato concentrate processing is a profitable business.

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**Table 3.** Cost economics for the whole tomato concentrate preparation.

Raw material (tomato)100 kg @ 2/kg	Rs. 200.00/-
Labour charges (2 person) @ Rs. 120/ manday	Rs. 240.00/-
Fuel consumption16 h @ Rs. 4.16/h	Rs. 67.50/-
Glass Bottles with closure (500 g cap) 64 No. @ Rs. 5.00/ piece	Rs. 320.00/-
Chemicals (permitted class II preservatives)	Rs. 50.00/-
Total cost of production	Rs. 877.50/-
Output (Whole tomato concentrate)	32 kg
Cost of production per kg	Rs. 27.42/-
Selling price	Rs. 60.00/kg
Profit	Rs. 32.58/kg
Benefit: cost ratio (BCR)	1.88

Cost economics was worked out based on actual expenditure incurred during production in the laboratory.

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## REFERENCES

- Ahmed, A. 1997. Chemical preservation of tomato concentrate prepared by cold break method. M.Sc. thesis, Dept. of Food Technol. Univ. Agric., Faisalabad.
- Dev Raj, Lal, B.B., Sharma, P.C. and Amlawat, O.P. 2007. Utilisation of unmarketable potatoes for preparation of ready-to-use (Instant) *Tikki* powder. *Indian Fd. Packer*, **61**: 82-88.
- Pawan, Dahiya, Singh, I.J. and Rai, K.N. 2002. Cost-Benefit analysis of *ber* cultivation in Rohtak district of Haryana. *Indian J. Agril. Mktg.* **16**: 48-52.
- Ranganna, S. 1986. *Manual of Analysis and Quality Control for Fruit and Vegetable Products*. (2<sup>nd</sup> Edn.), Tata McGraw Hill, New Delhi.
- Rao, K.P.G. and Shantha, K. 1982. Preservation of tomato as crush and juice concentrate. *Indian Fd. Packer*, **36**: 55-60.
- Saini, S.P.S., Goyal, A., Harinder, K., Singh, T., Bhupinder, K., Cheema, D.S. and Singh, S. 2002. Processing and storage quality of tomato crush concentrate of new varieties. *Indian Fd. Packer*, **56**: 72-78.
- Safdar M.N., Amer, M., Siddiqui, M.A.N. and Hameed, T. 2010. Development and quality characteristics studies of tomato paste stored at different temperatures. *Pakistan J. Nutr.* **9**: 265-68.
- Taoukis, P.S., Bournakis, A. and Giannakourou, M.C. 2001. Shelf-life study of bottled tomato ketchup as a function of packaging and storage conditions. In: *IFT Annual Meeting*, June 23-June 27; 2001, New Orleans, LA.

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