Original Research Article

Development of Tomato and Pumpkin blended Puree for Value Addition and Shelf life with different levels of preservatives

ABSTRACT

The lab experiment **"Development of Tomato and Pumpkin blended Puree for Value Addition and Shelf life with different levels of preservatives"** was conducted in the year 2021-2022 at Post Harvest Lab, Department of Horticulture, Nani Agriculture Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, Uttar Pradesh to analyse the physico-chemical properties and shelf life of the puree during storage at refrigerated condition and overall acceptability with different treatment combinations of preservatives. The Experiment was laid out in Completely randomized design (CRD) with 9 treatments.

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Keywords: Tomato, Pumpkin, Sodium benzoate and Titrable Acidity.

1 Introduction

Tomatoes (*Lycopersicon escullentum*) are propagated and consumed globally both in raw and processed forms with providing an adequate amount of antioxidants in daily diet mainly carotenes and phenolic compounds. Carotenes contain group of phytochemicals promoting good health and protection from diseases. In epidemiological studies, research shows that tomatoes contain antioxidant which has many health benefit properties like avoidance from prostate cancer **(Damin *et al.*, 2013).**

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Tomato is considered as vegetable by consumption, but according to its botanical aspects ~~tomato~~ it is classified as a fruit. Watery portion is 93 to 95% contributing as a major constituent whereas, the solid content is 5.5 to 9.5% in which 1% of the solid content is seeds and peel. Cultivars, irrigation, environmental and soil conditions are the causes for this wide- range in solid content. The prime acid in tomato is citric acid. In tomatoes antioxidants are also present in appreciable amount which are vitamin C (160 to 240mg/1000g), vitamin A carotenes (6 to 9mg/1000g), lycopene (30 to 200mg/1000g) and phenolic compounds like flavonoids (5 to 50mg/kg). Vitamin E is also present (5 to 20mg/1000g). Minerals present in tomatoes are iron, zinc, copper and manganese **(Nasir *et al.*, 2015).**

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Puree is a form of concentrated juice which acts as convenience food and used in preparation of curries during shortage as well as costliest tomato accessible in the market. Nowadays, many

national and multinational companies are tomato is processed in the form of pulp, paste, juice, ketchup, sauce, puree .It has a limited storage life and cannot be stored over extended periods.

The pumpkin *(Cucurbita moschata*) is the predominant cucurbit in tropical areas of the Caribbean and Latin America **(Martínez, 2012).** This vegetable is an excellent source of ascorbic acid and carotenoids, which have antioxidant functions as vitamin C and vitamin A precursors, respectively **(Pandey *et al.*, 2003; Provesi *et al.*, 2012).** Its fat content is low as well as its energy intake. Many authors have reported the health benefits of pumpkin, as it has anti-inflammatory, antibacterial, antiparasitic, antitumoral and analgesic properties.

Also, it has the capability of reducing risky diseases such as diabetes, cancer, hypercholesterolemia, hypertension, atherosclerosis, arthritis, cataracts, cardiovascular and intestinal diseases. Its mesocarp tissue is rich in fiber and provides a basis for the development of functional foods **(De Escalada Pla *et al.*, 2009).** This vegetable can be consumed in various forms, either as a whole vegetable or as an ingredient of stews, sauces, desserts, jellies, jams, purees and other products, however, the primary form of commercialization is as a fresh vegetable. Nonetheless, pumpkin puree can be found on the market as canned food, ready to be eaten

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2. Material and Methods

Fresh tomato and pumpkin were purchased from local fruit sellers in Prayagraj, India. The tomato and pumpkin were then kept at refrigeration temperature until the time of conducting the experiment.

The spice was purchased from local general stores in Prayagraj, India. The Ripe pumpkin was then kept at refrigeration temperature until the time of conducting the experiment. Food grade Sodium benzoate was used as pre-treatment chemical during the experiment

Flow-chart for Tomato and Pumpkin Puree

Sample Collection
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Procurement of material
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Pulp Extraction
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Blending of tomato and Pumpkin Pulp
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Pasteurization
↓
Packaging

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Storage (refrigerated conditions)

Fig.no. 1 Schematic flow chart of Tomato and Pumpkin Puree

Treatment Combination

Treatment	Treatment Combination
T0	Tomato Pulp (100 %) (Control)
T1	Tomato Pulp (90 %) + Pumpkin Pulp (10%) + Sodium Benzoate (0.10 %)
T2	Tomato Pulp (80 %) + Pumpkin Pulp (20%) + Sodium Benzoate (0.10 %)
T3	Tomato Pulp (70 %) + Pumpkin Pulp (30%) + Sodium Benzoate (0.10 %)
T4	Tomato Pulp (60 %) + Pumpkin Pulp (40%) + Sodium Benzoate (0.10 %)
T5	Tomato Pulp (90 %) + Pumpkin Pulp (10%) + Sodium Benzoate (0.05 %)
T6	Tomato Pulp (80 %) + Pumpkin Pulp (20%) + Sodium Benzoate (0.05 %)
T7	Tomato Pulp (70 %) + Pumpkin Pulp (30%) + Sodium Benzoate (0.05 %)
T8	Tomato Pulp (60 %) + Pumpkin Pulp (40%) +Sodium Benzoate (0.05 %)

3 Results and Discussion

Chemical Analysis

Total soluble Solids(^{0} Brix): In tomato and pumpkin puree, ~~were found~~the lowest TSS content of 8.60 °Brix was recorded in treatment T_0 whereas, treatment T_3 recorded the highest TSS content of 9.16 °Brix. Significant differences were observed in TSS content with respect to storage. The decrease in total soluble solid content of tomato puree might be due to break down or sedimentation of some solid content. Similar result was produced by **(Adedeji *et al.*, 2012),**

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Titratable Acidity: The treatment T_5 recorded the highest titratable acidity content of 0.46 per cent and the lowest acidity content of 0.41 per cent was recorded in treatment T_2. The increase in titrable acidity might be due to break down of amino acids and conversion into other acids. **(Nasir *et al.*, 2015).**

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Ascorbic Acid (mg/100g): The ascorbic acid content in of tomato and pumpkin puree showed significant changes among treatments and storage durations. The highest ascorbic acid content of 14.46 mg/l00g was recorded in treatment T_2 and followed by the treatment T_3 (14.20) and the lowest ascorbic acid content of 12.34 mg/l00g was recorded in treatment T_0. The decrease in ascorbic acid content of tomato puree might be due to oxidation at high temperature. The results

are similar with **(Sarkar *et al.*, 2015),** who also found decrease in ascorbic acid content of tomato pulp at room temperature (25°C) due to oxidation which is greater at higher temperature.

pH: The pH (%) of different treatments are slightly decrease in initial samples. Highest pH content % observed was 4.46 % for treatment T_2 at and followed by T_3 (4.38) and the lowest pH content % observed was 4.32 % for treatment T_4, but in initial moisture content of product were high. The decrease in pH of tomato puree possibly due to high refrigerated condition and increase in acidity of the tomato puree samples. He observed that increase of acidity results in decrease of pH. Whereas the similar results found **(Khan *et al.*, 2011).**

Shelf life: The shelf life of tomato and pumpkin puree showed changes among treatments and storage durations. The highest shelf life were found in all the treatment T_3 (0.14), followed by T_6 (0.13) and the lowest value were found T_0 (0.03).

Table no. 1 Effect of different blending ratio of Tomato and pumpkin with various levels of preservatives on physiochemical analysis during storage

Treatment	Total Soluble Solids (^{0}Brix)	Titratable Acidity	Ascorbic Acid	pH	Shelf life
T_0	8.72	0.45	12.34	4.34	0.03
T_1	8.98	0.42	14.06	4.40	0.07
T_2	9.06	0.41	14.46	4.46	0.10
T_3	9.16	0.43	14.20	4.38	0.14
T_4	8.90	0.45	13.88	4.32	0.06
T_5	8.84	0.46	13.54	4.34	0.12
T_6	9.00	0.44	13.88	4.36	0.13
T_7	8.95	0.44	13.77	4.37	0.07
T_8	9.13	0.42	13.87	4.32	0.10
Mean	8.97	0.44	13.78	4.37	0.09
F Test	**S**	**S**	**S**	**S**	**S**
SE (m)	**0.041**	**0.013**	**0.004**	**0.178**	**0.010**
CD at 5%	**0.020**	**0.006**	**0.002**	**0.089**	**0.010**

Sensory Analysis

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Color: The colour scores were observed visually for tomato and pumpkin puree and was judged the best for colour parameter by scoring. The treatment T_3 was found the highest score as 8.58 and lowest colour appearance T_0 was found (7.52). The decrease in the colour of tomato puree might

be due to lycopene which is major pigment for red colour in tomato and different reactions i.e. Millard and Caramelization. The study of **(Siddiqui and Singh, 2015),** also reported that lycopene and beta carotene is highly sensitive to heat and time.

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Flavour: The highest flavor score of 8.44 was recorded by treatment T_3 and the lowest flavor score of 7.28 was recorded by treatment T_0. Flavour of puree was significantly influenced by storage period and the interaction between treatments and storage was found to be significant ($p < 0.05$).

Aroma: The lowest score of 7.88 was recorded in treatment T_0 and treatment the highest score of 8.48 was observed in treatment T_2. As the storage period advanced, the aroma score showed a decreasing trend. The decrease in aroma of tomato puree might be due to escape of some volatile compounds and storage temperature and time. According to **(Baldwin *et al.*, 2004).**

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Overall acceptability: The highest acceptability score of 8.36 was recorded in treatment T_3 and the lowest texture score of 7.63 was observed in treatment T_0. The decrease in overall acceptability is due to decrease in all other sensory attributes, studied in his research work with the passage of time and presence of temperature responsible in breakdown of quality which results in decline in overall acceptability similar study was found by **(Ayub *et al.*, 2005).**

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Table no.2 Effect of different blending ratio of Tomato and pumpkin with various levels of preservatives on sensory analysis during storage

Treatment	Colour	Flavour	Aroma	Overall acceptability
T_0	7.52	7.28	7.88	7.63
T_1	8.30	8.04	8.24	8.23
T_2	7.96	7.94	8.02	8.11
T_3	8.58	8.38	8.48	8.38
T_4	8.32	8.14	8.36	8.27
T_5	8.02	8.26	8.18	8.16
T_6	8.44	8.30	8.38	8.34

T_7	8.16	8.06	8.22	8.16
T_8	8.12	8.10	8.13	8.16
Mean	8.16	8.07	8.21	8.16
F Test	**S**	**S**	**S**	**S**
SE (m)	**0.09**	**0.10**	**0.06**	**0.07**
CD at 5%	**0.05**	**0.05**	**0.03**	**0.03**

CONCLUSION

Based on the current investigation, it was concluded that the treatment combination of (Tomato Pulp (70 %) + Pumpkin Pulp (30%) + Sodium Benzoate (0.10 %) T_3 was best in terms of physicochemical analysis and shelf life of products under refrigerated conditions and also in terms of overall acceptance in the sensory analysis: Aroma, Colour, flavour and Taste. All the formulations are acceptable but the formulation that is used in T_3 is the best.

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Comment [A18]: Rewrite the references as per journal format

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