

Original Research Article

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

Comment [U1]: Did you happen to evaluate the 'Economic Feasibility' for indication of added value!. And why quote only the expiry date if so many other attributes are important! Think of a better title

ABSTRACT

Comment [U2]: Absence of various information in the summary: describe the treatments, the variables analyzed, the specific results found and the conclusions. There is no need to repeat the title in the 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.

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

Comment [U3]: Words contained in the title should not be repeated. Recommend up to 5 keywords. Ex. Pulp, Chemical properties, Sensory analysis

1 Introduction

Tomatoes (*Lycopersicon esculentum*) 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 (Daminet *et al.*, 2013).

Comment [U4]: It's Damian

Tomato is considered as vegetable by consumption, but according to its botanical aspects tomato is classified as 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).

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; Provesiet 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.

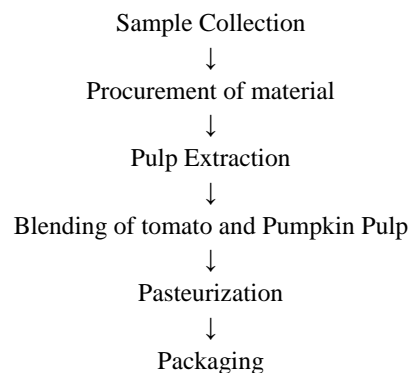
Also,it has the capability of reducing risky diseases such as diabetes, cancer, hypercholesterolemia, hypertension, atherosclerosis, arthritis, cataracts, cardiovascular and intestinal diseases. Its mesocarp tissue is rich in fiber and provides a basis for the development of functional foods (De EscaladaPlaet 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

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



Comment [U5]: Not in the references: serious error

Comment [U6]: Not in the references: serious error

Comment [U7]: In the references the year is 2011

Comment [U8]: Not in the references: serious error

Comment [U9]: It is necessary to mention what the evaluations were and how they were carried out. Not only does it expand the number of pages, but it enriches the manuscript. Pay attention to what is described in this item and what is commented in Results and Discussion.

Comment [U10]: Needs reference in the Introduction on the use of this product, as it presented variation in concentration, in this sense, it is necessary to cite results with this product

↓
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 Solids⁰ Brix: In tomato and pumpkin puree were found lowest TSS content of 8.60 °Brix was recorded in treatment T₀ whereas, treatment T₃ 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 (Adedejiet *et al.*, 2012),

Titrateable Acidity: The treatment T₅ the highest titrateable acidity content of 0.46 per cent and the lowest acidity content of 0.41 per cent was recorded in treatment T₂. The increase in titrateable acidity might be due to break down of amino acids and conversion into other acids. (Nasir *et al.*, 2015).

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/100g was recorded in treatment T₂ and followed by the treatment T₃(14.20) and the lowest ascorbic acid content of 12.34 mg/100g was recorded in treatment T₀. The decrease in ascorbic acid content of tomato puree might be due to oxidation at high temperature. The results

Comment [U11]: The discussion of the results could only be carried out with absolute values, taking into account that the average test was not carried out.

The author comments on Storage Time, but there is nothing related in Material and Methods

Comment [U12]: It is mandatory to mention in which tables the data are found

Comment [U13]: In absolute values. Due to the very close values, other treatments could certainly have been statistically equal to the one with the highest value. The recommendation is to perform the test of means, attaching superscript letters to the values to identify equality, inferiority or superiority between treatments.

Comment [U14]: What were the variable storage conditions used?

Comment [U15]: If you test for means, there is a high probability that most treatments are similar, statistically.

Comment [U16]: Where is 'Storage time' in Material and Methods!

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 T₂ at and followed by T₃ (4.38) and the lowest pH content % observed was 4.32 % for treatment T₄, 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 pureesamples. He observed that increase of acidity results in decrease of pH. Whereas the similar results found (Khan *et al.*, 2011).

Comment [U17]: What are these early samples!

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 T₃ (0.14), followed by T₆ (0.13) and the lowest value were found T₀ (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 (°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

Color: The colour scores were observed visually for tomato and pumpkin puree was judged the best for colour parameter by scoring. The treatment T₃ was found the highest score as 8.58 and lowest colour appearance T₀ 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.

Flavour: The highest flavor score of 8.44 was recorded by treatment T₃ and the lowest flavor score of 7.28 was recorded by treatment T₀. 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 T₀ and treatment the highest score of 8.48 was observed in treatment T₂. 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).

Overall acceptability: The highest acceptability score of 8.36 was recorded in treatment T₃ and the lowest texture score of 7.63 was observed in treatment T₀. 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).

Comment [U18]: In the references the year is 2014

Comment [U19]: There is no scientific article about flavor!

Comment [U20]: Not in the references: serious error

Table no.2Effect 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 %) T₃ 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 T₃ is the best.

Comment [U21]: This sentence is unnecessary

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Comment [U22]: What is the justification for so many references that do not appear in the manuscript!

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