



ISSN (E): 2277- 7695
 ISSN (P): 2349-8242
 NAAS Rating: 5.23
 TPI 2021; 10(12): 542-545
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www.thepharmajournal.com
 Received: 14-09-2021
 Accepted: 27-10-2021

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Tree tomato value-added products and their sensory evaluation

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DOI: <https://doi.org/10.22271/tpi.2021.v10.i12h.9358>

Abstract

Tree tomato commonly known as tamarillo around the world. It has a lot of medicinal properties but the fruit remains neglected and hence there is a need to concentrate on diversification and popularization of such an un-exploited fruit. Tree tomato fruit is used as pulp and further formulated into different forms like toffee, chutney and butter. Sensory evaluation was conducted on all the products and the results indicate that out of three other value-added products tree tomato chutney was highly acceptable (7.30) among all other tree tomato products followed by tree tomato toffee and then tree tomato butter with good acceptability scores. Value addition of tree tomato fruits will improve the consumption by different communities, which will increase the demand of unexploited fruit and also reduce the postharvest losses.

Keywords: *Cyphomandra betaceae*, tree tomato pulp, value added products, sensory evaluation

Introduction

Underutilized fruit crops can be defined as fruit crops which have value but are not widely grown, rarely found in the market and not cultivated commercially (Agent, 1994) ^[1]. The underutilized foods can also be defined as-the foods which are less available, less utilized or rarely used or region specific (William and Haq, 2002) ^[2]. According to Dansi *et al.*, (2012) ^[3]. many neglected and underutilized species are nutritionally rich and adapted to low input agriculture). Tree tomato (*Cyphomandra betaceae*) commonly known as tamarillo which belongs to Solanaceae family and is native to Andes of Peru and Argentina. The fruit tamarillo is considered to be an undervalued fruit in Himachal Pradesh, India. Tamarillos are egg-shaped, with a diameter of about 9–12 cm, with reddish brown skin and orange flesh depending on the stage of maturity. Its seeds are coated with purple or dark red mucilage. The seed of the fruit is consumed together with flesh. Tamarillo is rich in anthocyanin and carotenoids, which are responsible for their colour. The presence of anthocyanins and carotenoids shows its biological, therapeutic, and preventative properties. Maisarah *et al.* (2017) ^[10]. The fruit is mostly used to make sauces and chutneys. Value addition of tree tomato fruits will improve the consumption by different communities and also reduce the postharvest losses of the unexploited fruit, apart from promoting several health benefits.

Material and Methods**Procurement of raw material**

The un-exploited fruit tree tomato was procured from different agro- climatic zones of Himachal Pradesh as illustrated in Table 1. The fruit tree tomato preparation/formulation of value-added products was purchased from the local vendors and local people of Himachal Pradesh. The other ingredients namely; sugar, spices etc. for the preparation/ formulation of value added products were also purchased from the local market.

Table 1: Distribution of tree tomato procured from different agro - climatic zones of Himachal Pradesh

Fruit	Botanical name	Availability areas	Procurement area
Tree tomato	<i>Cyphomandra betaceae</i>	Kangra, Palampur, Nagri	Palampur

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The tree tomato fruits were procured and washed thoroughly in fresh tap water, drained completely. Tree tomato fruit is grounded after carefully removing seeds. The tree tomato pulp was sieved, pasteurized and stored in sterilized bottles at room temperature for further product development such as toffee, chutney and butter.

Development of value-added tree tomato products

The tree tomato pulp was used for formulating and standardizing 3 value added products like tree tomato toffee (TT), tree tomato chutney (TC) and tree tomato butter (TB).

The sensory assessments were conducted in which the panel

of 5 members consisted of random people. All the products prepared were coded and served in transparent bowls. Panelists were provided with a glass of water and instructed to sip in between samples. They were given written instructions and asked to evaluate the products for acceptability based on its colour, flavor, texture, taste and overall acceptability using nine-point hedonic scale (0=Dislike extremely to 9=Like extremely) (Ramya and Anitha., 2020) [6]. The data obtained from sensory evaluation was subjected to analysis of variance (ANOVA).

Results and Discussion

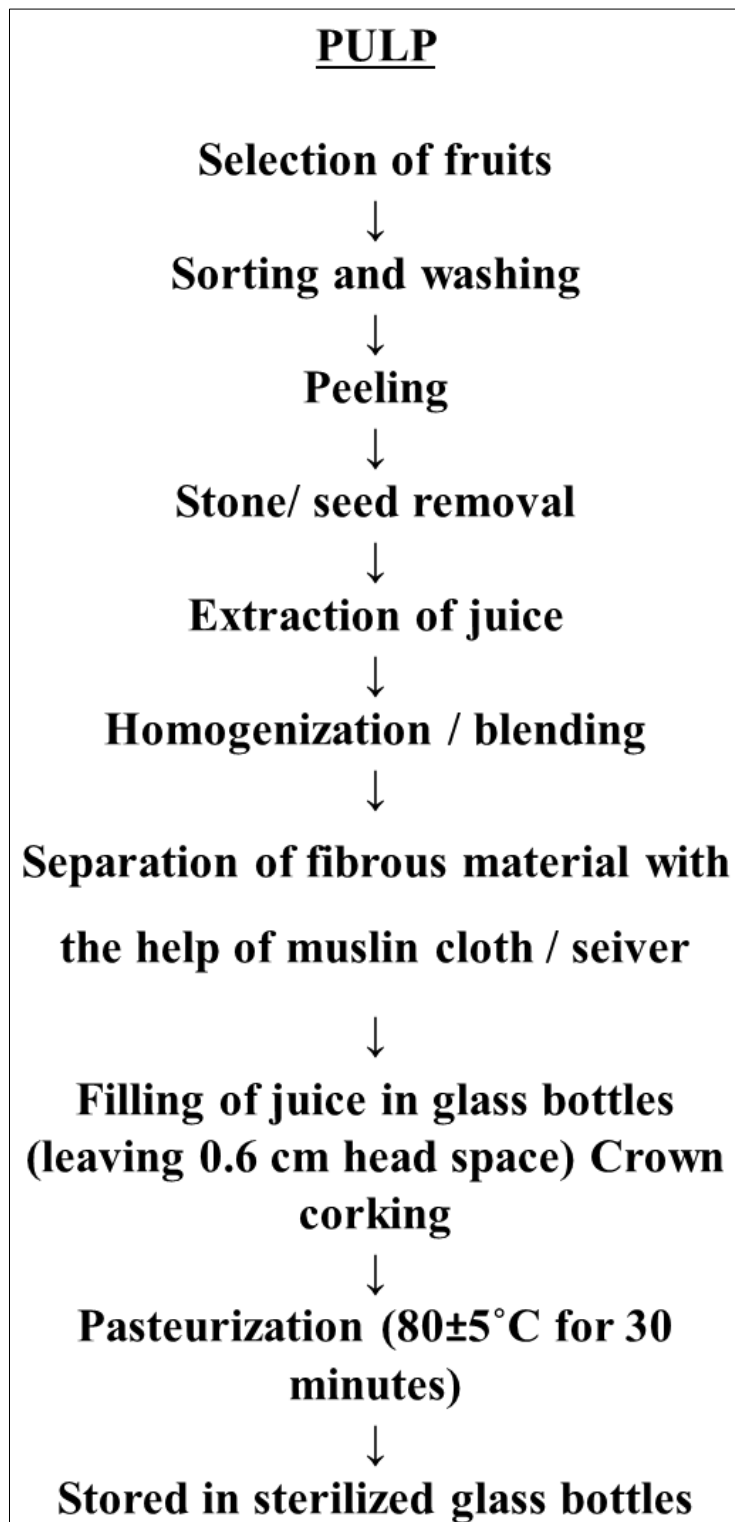


Fig 1: Flow chart of Pulp from tree tomato

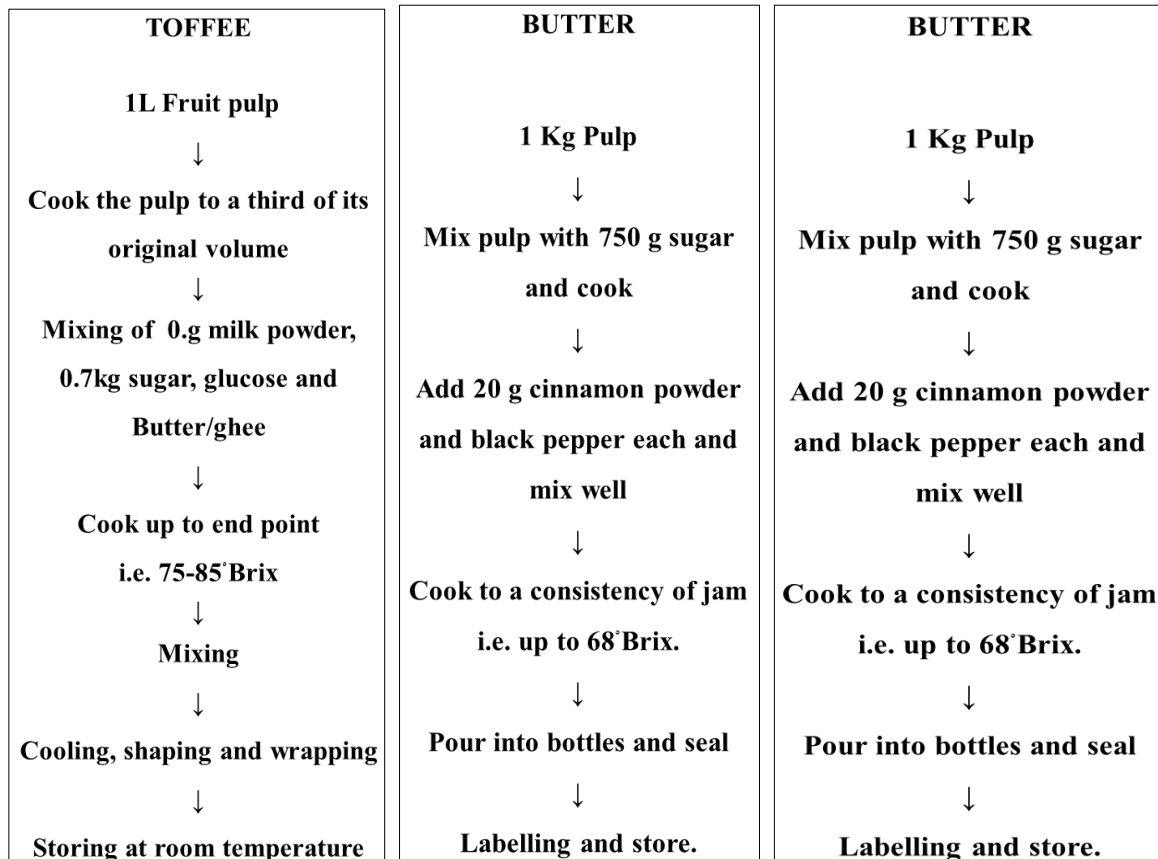


Fig 2B: Flow chart of six different value added products from Tree tomato



Fig 3: Value added products from tree tomato

Table 2: Sensory evaluation of products developed with tree tomato fruit

S. No.	Tree tomato Products	Sensory Parameters	0 months	2 Months	4 months	6 Months	Mean
1.	Toffee	Colour	7.56	7.42	7.46	7.21	7.41
		Taste	7.34	7.33	7.21	7.07	7.23
		Flavour	7.48	7.44	7.33	7.11	7.34
		Consistency	7.71	7.42	7.18	6.14	7.11
		Overall Acceptability	7.49	7.32	7.20	7.10	7.27
2.	Chutney	Colour	7.46	7.42	7.29	7.01	7.29
		Taste	7.46	7.39	7.35	7.17	7.34
		Flavour	7.63	7.56	7.21	7.35	7.43
		Consistency	7.71	7.31	7.38	6.14	7.13
		Overall Acceptability	7.55	7.34	7.26	7.07	7.30
3.	Butter	Colour	7.31	7.37	7.32	7.12	7.28
		Taste	7.41	7.59	7.48	7.11	7.39
		Flavour	7.18	7.71	7.44	6.14	7.11
		Consistency	7.33	7.3	7.21	7.07	7.22
		Overall Acceptability	7.44	7.3	7.25	7.05	7.26

Table 2 describes organoleptic scores for the colour, taste, flavor, consistency and overall acceptability of all six value added products developed from tree tomato fruit.

The sensory scores of tree tomato toffee decreased with the increase in storage period. The values for colour, taste and overall acceptability decreased non-significantly ($p \leq 0.05$) except consistency which decreased significantly ($p \leq 0.05$) from 7.71 to 6.14. The sensory score for colour ranged from 7.56 to 7.21 from initial day of storage to 6 months of storage. The mean values of colour, taste, flavour, consistency and overall acceptability were 7.41, 7.24, 7.34, 7.11 and 7.28, respectively. Decrease in colour scores might be due to certain chemical reactions which might have taken place during storage whereas decrease in taste and flavor scores could be due to degradation of volatile flavoring compounds during storage. Kotecha and Kadam (2003)^[11] also reported similar observations for taramrind based toffee.

Sensory scores of tree tomato chutney reveal effect of storage on its sensory attributes. The scores for colour, taste, flavour and overall acceptability varied non-significantly except for consistency. The mean scores for colour, taste, flavour, consistency and overall acceptability was 0.53, 0.48, 0.40, 0.46 and 0.53, respectively. The sensory attributes decreased as the storage period increased. Kotecha and Kadam (2003)^[11] and Rao *et al.* (2009)^[6, 9] found almost similar values for tamarind chutney and grape spread, respectively. The product had a good acceptability during storage.

Data presented in Table 2 reveal the effect of storage on sensory attributes for tree tomato butter. The scores for colour changed non-significantly ($p \leq 0.05$). The scores for colour at fresh was 7.31 which increased to 7.31 after 2 months of storage but thereafter scores were decreased to 7.32 and 7.12 for 4 and 6 months, respectively. The scores for taste and flavour varied significantly ($p \leq 0.05$). The mean scores for taste, flavor, consistency and overall acceptability were observed as 0.39, 0.42, 0.39 and 0.39 from the initial day of storage to 6 months of storage. Kotecha and Kadam (2003)^[11] reported almost similar observation and Rao *et al.* (2009)^[6, 9] found that sensory scores decreased from 8.50 to 7.54 after storage of 6 months in grape spread. The product had a good acceptability during storage.

Conclusion

Tree tomato also known as Tamarillo, the fruit is believed that it may have originated from south America, Argentina but has been cultivated in the Indian Subcontinent and Southeast Asia for hundreds of years. The fruit tree tomato was found to be of elliptical shape. The fruit is about 5 to 7 centimeters in length and 3-4 centimeters in width. They are rich in antioxidants, potassium, and vitamin C; and low in sugar and sodium. Value addition of Tree tomato fruit into processed products will enhance the health benefits of consumers due to many bioactive components present. Also the product formulations and process optimization of Tree tomato value added products can help find the unexplored qualities of unexploited tree tomato fruit of Himachal Pradesh. Color, taste, flavor, consistency and overall acceptability of all three products were evaluated by sensory evaluation. Rigorous efforts as well as awareness about benefits of tree tomato fruits are needed to be advertised for the commercial plantations. Tree tomato should be extensively promoted for development of various value added products etc. for economic growth as well as to reduce post-harvest losses.

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