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Standardization of recipe for preparation of guava jelly bar

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ABSTRACT

Firm ripe guava fruits of Lucknow-49 harvested from college farm were used for the study. Jelly bar of 2 cm x 7 cm pieces were made and packed in LDPE and laminated aluminium foil pouches. Storage study was conducted in ambient and refrigerated conditions for two months. Among different treatment combinations, the recipe with 50 % sugar, 0.3% citric acid and 0.5 % pectin added to pulp extract recorded highest organoleptic score. Physico-chemical characteristics like total sugars and TSS increased while acidity, pectin content, ascorbic acid, and organoleptic scores decreased in the jelly bar stored in ambient condition while the changes are negligible for the jelly bar in refrigerated storage. Jelly bar packed in laminated aluminium foil and stored in refrigerated condition has better quality till consumption.

***Key words*:** Ascorbic acid, guava, jelly bar, pectin content

Guava (*Psidium guajava* L.) belongs to the family Myrtaceae. Though it is native to tropical America (Neotropics), it is cultivated in all tropical and subtropical countries and thus especially important fruit crop of India (Chopda and Barrett, 2001; Ghosh *et al.,* 2013). It is also known as 'Poor man's apple of tropics' (Kamath *et al.*, 2008). Guava has been in cultivation in India since 17th century and gradually became the crop of commercial significance. It is also common fruit tree in the backyard of houses in India. Guava is a fair source of vitamins and minerals like vitamin A (about 250 IU per 100g of pulp), ascorbic acid (75-265 mg per 100g of pulp), thiamin, riboflavin and niacin and phosphorus (17.8–30 mg per 100g of pulp) (Ghosh and Chattopadhyay, 1996; Das *et al.*, 1995).

Harvesting of guava is done from mid October to the end of January in the Malwa region of Madhya Pradesh. Guava is a seasonal fruit and is highly perishable. It is normally consumed fresh as dessert fruit that is pleasantly sweet and refreshing in flavour. Short storage life (6-8 days) limits strategic selling of fresh guava fruit. Under these conditions guava growers fail to get attractive returns and nearly 20-25% of produce goes as ravage (Nidhi and Prasad 2006). Various processed products are made from guava viz. jam, jelly, cheese, canned fruit segments, Ready to serve drink, nectar, squash, dried powder, ice cream, highly concentrated puree, candy, toffees, syrup, juice and concentrate (Jain and Asati, 2004). It minimizes post harvest losses, enhances its economic and nutritive value by fortification. Guava is universally known for its jelly as it is very rich in pectin (1-2.2%); good quality jelly bar can be prepared from it. The innovative idea of making jelly bar from guava is that people especially children can relish it as the sticky nature is minimized. Guava jelly bar is attracting the increased interest of food processors on account of its high vitamin C content, fresh flavour and delicacy. Pink fleshed cultivars are poorer in vitamin C content than the white fleshed ones, so it is sensible to take white fleshed cultivars for preparing guava jelly bar. Citric acid as a preservative increases the storage life of guava jelly bar (Srivastava and kumar, 2007). Thus processing of guava into guava jelly bar will reduce post harvest losses and add value to it. The shelf life of guava jelly bar can be further increased by using suitable packaging material. It will also fetch much better price when the bar is crammed in eye-catching packing material.

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MATERIALS AND METHODS

Firm ripe guava fruits of cv. L-49 were harvested from the research farm of College of Horticulture, Mandsaur, RVSKVV, Gwalior during 2009-10. The process of preparation of guava jelly bar was given in fig 1. For standardization of recipe, sugar (cane sugar) and pectin (food grade) was added to fruit extract (FE) in different combinations viz., T_1 (FE+ 30% sugar + 0.5% pectin + 0.3% citric acid), T_2 (FE+ 30% sugar + 1 % pectin + 0.3% citric acid), T_3 (FE+ 40% sugar + 0.5% pectin + 0.3% citric acid), T_4 (FE+ 40% sugar + 1% pectin + 0.3% citric acid), T_5 (FE+ 50% sugar + 0.5% pectin + 0.3% citric acid), T_6 (FE+ 50% sugar + 1% pectin + 0.3% citric acid), T_7 (FE+ 60% sugar + 0.5% pectin + 0.3% citric acid), T_8 (FE+ 60% sugar + 1% pectin + 0.3% citric acid). After the preparation, the best combination was selected based on oraganoleptic analysis on 9 point hedonic scale for colour, texture, flavor and overall acceptability by a panel of 25 judges (Amerine *et al.*, 1965). The jelly bar of 2 x 7 cm pieces were made and packed in LDPE (P_1)

and laminated aluminium foil pouches (P_2). Storage studies were conducted at room temperature (25±3 °C) and refrigerated conditions (6±1 °C). The physico-chemical characteristics like total sugars, TSS, titrable acidity, pectin content, ascorbic acid, moisture content and sensory quality were estimated by methods suggested by Ranganna, 1997. Factorial CRD was used to analyze the data statistically.

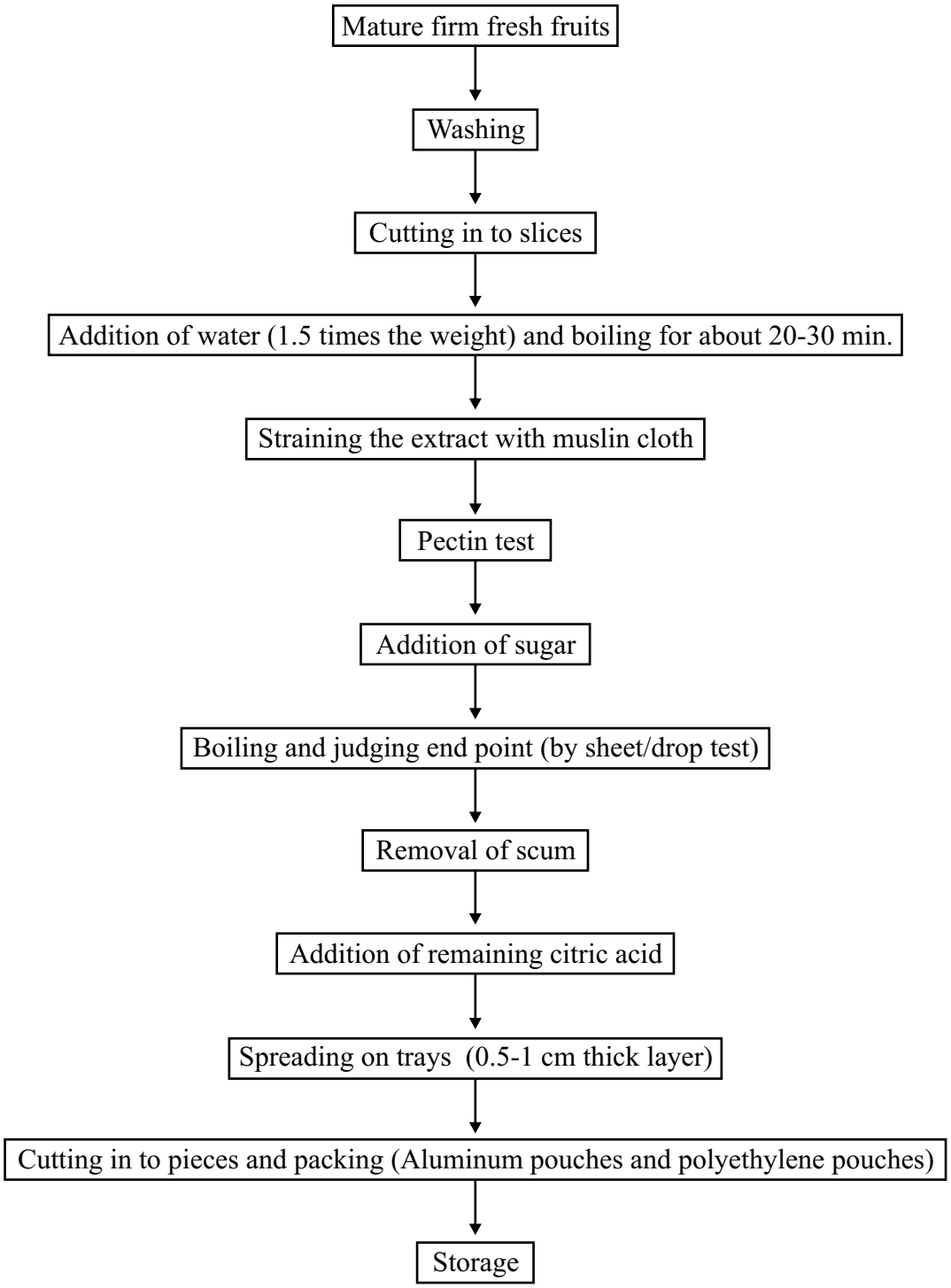

Fig. 1: Flow chart for the preparation guava jelly bar

RESULTS AND DISCUSSION

Standardization of recipe

The sensory scores for different treatments were graphically presented in fig. 2 on 9 point hedonic scale. The score for colour, flavor, texture and overall acceptability was maximum for T_5 (FE+ 50% sugar + 0.5% pectin + 0.3% citric acid) and it was 8.56 while minimum score was recorded in T_1 (FE+ 30% sugar + 0.5% pectin + 0.3% citric acid). The minimum scores for the recipe blends T_1, T_2, T_3 and T_4 might be due to the amount of sugar added may not be sufficient to give fine texture and flavor. The treatments T_6, T_7 and T_8 were not liked by the panel of judges due to presence of higher quantity of sugar and poor setting of jelly in to bar. On the other hand, treatment T_5 gave sharp edges when cut with a stainless steel knife and best mouth feel (easily melted in mouth when pressed against palate) with good colour (orange colour). So, the treatment combination T_5 was used for storage studies.

TSS

Data on total soluble solids revealed that there was a significant increase on 60 days after storage fig. 3. The increase was linear and initially it recorded 69.38 ° brix. The minimum decrease was found in the jelly bar stored in refrigerated and packed in aluminum foil. The increase in TSS may be due to conversion of insoluble to soluble fraction. Similar findings were reported by Aradhita *et al*., 1996, Paul *et al*., 2007 while working on guava jelly.

Titrable acidity

There observed a decrease in titrable acidity during the storage of jelly bar. Storage under refrigerated condition and packing in aluminum foil had minimum decrease in acidity (i.e 0.752 to 0.600 %). The retention of acid content by aluminum foil is due to low water vapour transmission rate (WVTR) than compared to polyethylene pouches. The decrease in acidity might be due to salt formation i.e, due to acid base reactions. Similar results were recorded by Sharma *et al*., 2013, while working on apricot fruit bar.

Pectin content

The pectin content decreased as the period of storage increased. The losses in pectin content of jelly had been reported earlier by Aradhita *et al*. (1996) and Paul *et al*. (2007). With respect to packing material, bar kept in P_1 (1.35%) recorded the maximum pectin content during refrigerated storage and minimum was observed when kept in P_2 (0.96%) at room temperature. Similar results were observed by Kumar *et al*. (2007) and Krishnaveni *et al*. (1999) in processed products of guava. The decrease in pectin content might be due to oxidation of pectin to pectic acids and further in to uronic acids.

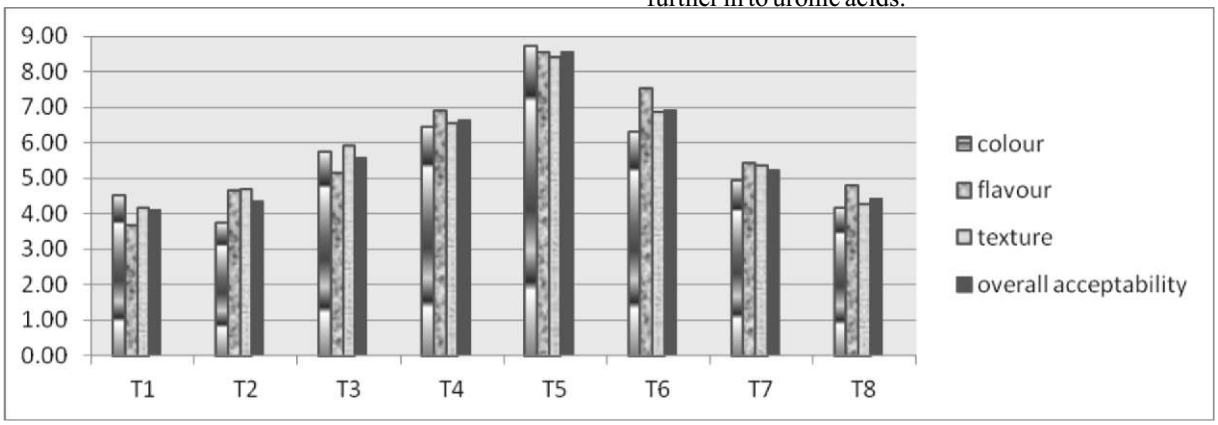

Fig. 2: Standardization of reciepe for guava jelly bar

Table 1: Effect of packing materials and storage atmosphere on quality attributes of guava jelly bar during storage

Attribute	Packing material			Storage atmosphere		
	P_1	P_2	$LSD_{0.05}$	LT	RT	$LSD_{0.05}$
Total Soluble Solids (TSS) °B	70.71	70.28	NS	73.37	72.85	NS
Titrable acidity (%)	0.662	0.641	NS	0.584	0.560	NS
Total sugars	52.63	50.61	NS	53.79	49.60	0.2
Pectin content	1.52	1.39	NS	1.59	1.30	0.06
Ascorbic acid	65.71	55.92	0.24	67.50	53.89	0.1
Overall acceptability	7.54	6.91	0.47	6.43	5.79	0.38

P_1- Aluminum foil P_2- Polyethylene film LT- refrigerated storage RT- room temperature storage

Ascorbic acid

Loss of ascorbic acid in jelly bar samples packed in aluminum and polyethylene pouches from initial value of 86.34 mg/100g to 50.17 and 30.14 mg/100g respectively during storage of 60 days. This might be due to oxidation of ascorbic acid to dehydroascorbic acid followed by further degradation to 2,3-diketogulonic acid and finally to furfural compounds. Higher level of retention was observed in the samples stored in refrigerated storage. Similar results were reported in mango leather by Rao and Roy (1980) and Sreemathi *et al*., 2008 in sapota-papaya bar.

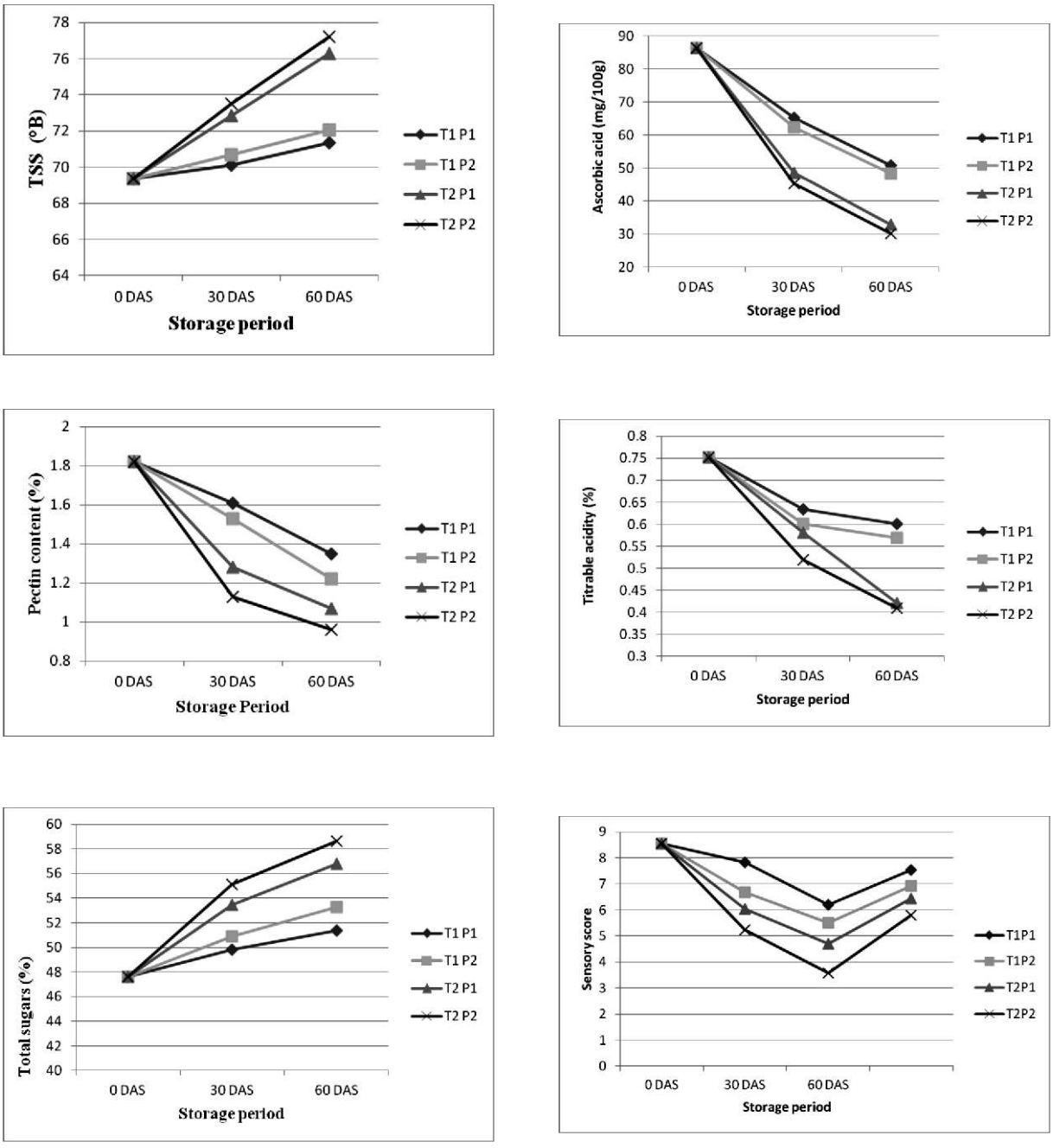

Fig. 3: Changes in quality of guava jelly bar during 60 days storage as influenced by packing materials and storage conditions (number of replications 5, CD values given in tables 1)

T1P1- Low temperature and Aluminum foil, T1P2- Low temperature and Polyethylene film
T2P1- Room temperature and Aluminum foil T2P2- Room temperature and Polyethylene film

Total sugars

As the period of storage increased, the total sugars increased. Maximum increase was observed in jelly bar packed in polythene pouches and stored at room temperature (47.62% to 58.61%). Similar results were reported by Aradhita *et al.* (1996) and Paul *et al.* (2007) while working on guava jelly and Sharma *et al.,* 2013 during evaluation of apricot fruit bar. The slight increase in total sugars during storage could be due to conversion of insoluble polysaccharides and other carbohydrate polymers to soluble sugars.

Sensory analysis

Overall acceptability score decreased from initial score of 8.56 to 6.21 and 3.57 for products packed in aluminum foil and stored in refrigerated condition and polyethylene pouches at room temperature respectively after 60 days. Vijayanand *et al*., (2000) reported similar results while working on guava fruit bar. The lower scores for polyethylene pouches at room temperature may be due to higher moisture absorption and gas permeability characteristics of the polyethylene.

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