



E-ISSN: 2278-4136  
P-ISSN: 2349-8234  
JPP 2017; 6(6): 856-859  
Received: 01-09-2017  
Accepted: 04-10-2017

**Mukta Sinha**  
Department of Horticulture,  
SHUATS, Allahabad, Uttar  
Pradesh, India

**Arghya Mani**  
Department of Pomology and  
Post-Harvest Technology,  
UBKV, Pundibari, West Bengal,  
India

**Prachi Sinha**  
Department of Food Technology  
and Quality Control, NIFTEM,  
Haryana, India

## Value addition of guava cheese cv. Allahabad safeda by medicinal herbs

**Mukta Sinha, Arghya Mani and Prachi Sinha**

### Abstract

Guava is one of the most important subtropical fruit crop with excellent taste and high vitamin-C. Among several other processed products, one important processed product is guava cheese. Guava cheese would ensure the consumer benefits of guava along with its delightful taste of cheese. In this study, the beneficial property of this fruit was enhanced to create a value added product along with ginger powder, lemon grass extract and ashwagandha powder (0.5%, 1.0% and 1.5% concentration). Physicochemical property like total soluble solid (TSS), acidity (%), reducing sugar (%), non-reducing sugar (%), total sugar (%) and vitamin C (ascorbic acid mg/100g) were analyzed from the different treatments at initial days after storage, 30<sup>th</sup> days after storage, 60<sup>th</sup> days after storage and 90<sup>th</sup> days after storage. Consumer acceptability is directly based on sensory evaluation of the product. The prepared product was also evaluated for the attributes like colour, flavour, taste, consistency and overall acceptability. It was observed that T<sub>0</sub> showed minimum loss in physiological weight of storage, minimum pH, TSS, high reducing and total sugar percentage. T<sub>1</sub> showed a highest ascorbic acid after T<sub>9</sub> during the storage period. T<sub>9</sub> have all the desirable qualities and it recorded most overall acceptability throughout the storage period. It can be concluded that T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) is the best value added product as far the overall acceptability and Physicochemical properties and it can be standardized in commercial scale.

**Keywords:** Guava cheese, ginger powder, lemon grass extract, ashwagandha powder, acceptability, Value addition

### 1. Introduction

Guava (*Psidium guajava* L.) also called "Apple of Tropics", originated in tropical America perhaps from Mexico to Peru. It belongs to the family Myrtaceae. The somatic chromosome number is diploid  $2n=22$  but its natural and artificial triploidy ( $2n=33$ ) and aneuploids also exist <sup>[1]</sup>. Guava is a chief and rich source of vitamin C and Pectin. It also contain fair amount of calcium, phosphorus and vitamin <sup>[2]</sup>. Guava is not only a delicious and nutritious table fruit but may also be utilized to make products like jelly and jam preparation. The variety Allahabad Safeda is mother of many clonal varieties and parent of many hybrids all over India. It is considered as the best and is most popular commercially due to its pleasing sugar-acid blend, aroma, texture and size, above all due to attractive colour and the appearance of the fruits. The variety Allahabad Safeda is selected in the above study because it is believed to have good processing quality. Guava fruit is normally consumed as dessert fruit or in processed forms like puree, juice, concentrate, jam, jelly, cheese, toffee, fruit flakes, squash, syrup, nectar, powder, wine and vinegar, ready to use snacks, drinks and dehydrated canned products. The processing of fruit into various products is one of the best ways to reduce the losses. Guava is not only an important table fruit but has also a great potential for processing industry. The excellent nutritive values of guava offer great potentiality for processing it into several quality products, which can attract national and international markets <sup>[3]</sup>. Guava is processed into few popular products like jam, preserve, chutney and cider. Guava cheese is one such product which is believed to have an excellent market reputation. The nutrient value of guava coupled with the taste of cheese can have an enormous demand in the market. Guava cheese is liked by people of all age because it not only provides nutrition but also add to the taste of the pulp.

Medicinal plants are actually a boon to mankind. They are not only used solely to cure any disease but their food additive quality can enormously improve the processed food quality. The incorporation of medicinal plants into processed foodstuffs has already been done, but the guava cheese supplemented with several medicinal plants has not yet been produced. In the study ginger, lemon grass and ashwagandha are used solely or in combination in the guava cheese so as to ensure the presence of their benefits solely or in combination.

### Correspondence

**Mukta Sinha**  
Department of Horticulture,  
SHUATS, Allahabad, Uttar  
Pradesh, India

Ginger (*Zingiber officinalis*), is the most commonly herb that is available all year long in two forms dried & fresh. It is an excellent remedy for the elimination of intestinal gas. It helps to relax and sooth the intestinal tract and is useful for motion sickness, nausea. Ginger is also very effective in treating chronic inflammation. It is also effective in curing osteoarthritis, rheumatism and cancer. Young ginger rhizomes are juicy and fleshy with a very mild taste. They are often pickled in vinegar or sherry as a snack or just cooked as an ingredient in many dishes. They can also bestrewed in boiling water to make ginger tea, to which honey is often added; sliced orange or lemon fruit may also be added. Mature ginger roots are fibrous and nearly dry [4].

Lemon grass (*Cymbopogon citratus*) is used for treating digestive tract spasms, stomach ache, high blood pressure, pain, vomiting, cough, achy joints (rheumatism), fever, the common cold and exhaustion. It is also used to kill germs and as a mild astringent. Health benefits of lemongrass include relief from stomach disorders, fever, aches, infections, rheumatism & edema. It is antibiotic & antifungal. It helps to defeat cancer.

Ashwagandha (*Withania somnifera*) is also known as winter cherry or Indian ginseng which is both a tonic and a sedative due to its adaptogenic properties [5]. Withania refers to the plants primary extract and somnifera literally means "sleep-inducing". Ashwagandha is also known to have a wide range of health benefits, including its ability to fight against cancer and diabetes, as well as reduce inflammation, arthritis, asthma, hypertension, stress and rheumatism. Furthermore, it boots the supply of antioxidants in human body and regulates the immune system. Ashwagandha is effective in recovering from urogenital, gastrointestinal and respiratory tract infections when consumed orally [6].

Fruit cheese has recently become very popular. It is a type at confectionery of Karachi Halva and is prepared from fruit like guava, apple, pear and plum fruit cheese have a long shelf life. Fruit cheese usually contains a minimum TSS 68<sup>0</sup>Brix and maximum 70<sup>0</sup>Brix prepared fruit in final product [7]. The most suitable value added products of guava cheese in terms of Physicochemical properties, to find out suitable value added products of guava cheese based on sensory properties and shelf life, to work out the economics of various treatments and to evaluate the beneficial effects of added medicinal and aromatic plants in processed guava cheese.

## 2. Materials and Methods

**Table 1:** Recipes of guava cheese

Ingredients	Quantity
Sugar	750 g/kg of pulp
Butter	90 g/kg of pulp
Citric acid	2g/kg of pulp
Value additive product for guava cheese	Ratio of 0.5, 1.0, 1.5 % of medicinal herbs (ginger, lemon grass & ashwagandha)

**2.5 Treatment combinations:** Treatment combination are T<sub>0</sub> (Control), T<sub>1</sub> (Guava cheese + Ginger powder @ 0.5%), T<sub>2</sub> (Guava cheese + Ginger powder @1.0%), T<sub>3</sub> (Guava cheese + Ginger powder @1.5%), T<sub>4</sub> Guava cheese + Lemon grass extract @ 0.5%), T<sub>5</sub> Guava cheese + Lemon grass extract @1.0%), T<sub>6</sub> (Guava cheese + Lemon grass extract @1.5%), T<sub>7</sub> (Guava cheese + Ashwagandha powder @ 0.5%), T<sub>8</sub> (Guava cheese + Ashwagandha powder @1.0%), T<sub>9</sub> (Guava cheese + Ashwagandha powder @1.5%).

**2.1. Site of experiment:** The present study was undertaken during the winter season of the year 2016-2017, at Research Laboratory, Department of Horticulture, Sam Higginbottom University of Agricultural, Technology and Sciences (SHUATS), Allahabad, India.

**2.2. Design of experiment:** The value added guava cheese was prepared with 9 different combinations of ginger powder, lemon grass extract and ashwagandha powder. So there were 9 treatments and 3 replications and the prepared product was stored for 90 days under ambient temperature. The design used was Completely Randomized Design (CRD). The guava cheese was value added with ginger powder, lemon grass extract and ashwagandha powder with the percentage of 0.5, 1.0 and 1.5.

**2.3. Parameters studied:** Physiological weight loss (g), pH of guava cheese, TSS of guava cheese, Acidity (%), Total sugar (%) and Ascorbic acid (mg/100g) content were determined following the methods suggested by Association of Analytical chemists [8]. Sensory evaluation was done by point hedonic scale in which 1 means dislike extremely, 2 means dislike very much, 3 means dislike moderately, 4 means dislike slightly, 5 means neither like nor dislike, 6 means like slightly, 7 means like moderately, 8 means like very much and 9 means like extremely. The mean hedonic score for the 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> day were taken [9]. The total cost of production (INR) was recoded along with the selling price. The gross income is actually the selling price. The Net Income (INR) is determined by subtracting the selling price (INR) with the total cost of production.

**2.4. Recipes method of guava cheese:** Fresh guava fruits were washed, cut into pieces and boil with equal quantity of water. Scum and pomace was removed by sieving and added sugar (700g/Kg of pulp), butter ( 90g/Kg of pulp), citric acid (2g/Kg of pulp) and value additives (0.5g,1.0g and 1.5g/Kg Ginger powder, Lemon grass extract and Ashwagandha powder) per Kg guava pulp cooked till, until mixture become sufficiently thick, and then after removed from fire when mixture starts leaving side of the pan evenly distributed over butter coated tray and left for 3 hours to set cut into pieces, with a sharp knife pre-packed with butter paper and then packed in polythene stored at ambient temperature [10].

## 3. Result and discussion

### 3.1 Physicochemical property of guava cheese

After 30, 60 and 90 days of storage, among the different additive the maximum score (14.77%) was observed with the treatment T<sub>9</sub> (Guava cheese+Ashwagandha 1.5%), and minimum score (10.05%) was observed with the treatment T<sub>0</sub> (Guava cheese + control). In general, the physiological loss in weight (%) of Guava cheese increased with the storage period. This can be due to the general loss of water i.e. partial desiccation of the cheese during storage. The result is in close

conformity with the findings of Chen and Zhang (2001) [11]. Similarly pH, after 30, 60 and 90 days of storage, among the different additive and the maximum score is (5.10) was observed with the treatment T<sub>9</sub> (Guava cheese + Ashwagandha 15%) and minimum score (3.78) was observed with the untreated cheese (control). There was a negligible change in the pH content of the cheese which shows a decreasing pattern with increasing days of storage. Similar results were reported by in case of guava juice by Shanker *et al* (1967) [12].

Similarly, TSS after 30, 60 and 90 days of storage, among the different additive, and the maximum score (70.0 °Brix) was observed with the treatment T<sub>9</sub> (Guava cheese + Ashwagandha 15 °Brix) and minimum score (68.07 °Brix) was observed with T<sub>0</sub> (control).

The increase in TSS of guava cheese is attributed to the hydrolysis of starch into sugars and the decrease in TSS might be due to faster utilization in oxidation process. The result is in close conformity with the findings of Sethi *et al.* (2007) [13]. After 30, 60 and 90 days of storage, among the different additive and the maximum score of acidity (0.55%) was observed with the treatment T<sub>9</sub> (Guava cheese+ Lemongrass @ 0.5%) and minimum score (0.42%) was observed in the control. Titratable acidity is directly related to the

concentration of organic acids present in the fruit, which are an important factor for quality of fruit, suggested that acidity decreases due to fermentation or break up of acids to sugars in fruit during respiration. After 30, 60 and 90 days of storage, among the different additive and the maximum value of total sugar percent is (9.76%) was observed with the treatment T<sub>9</sub> (Guava cheese+ Ashwagandha @1.5%) and minimum score (8.74%) was observed with the treatment T<sub>0</sub> (Guava cheese + control). The increase in total sugar percentage might be due to hydrolysis of polysaccharides like starch, pectin etc. and their conversion into simple sugar. This finding is similar to Ball, (1997) [14] and Pathak, (1990) [15].

After 30, 60 and 90 days of storage, among the different additive the maximum score of ascorbic acid was (150 mg/100g) in treatment T<sub>9</sub> (Guava cheese+ Ashwagandha @1.5%) and minimum score (118mg/100g) was observed in the untreated guava cheese.

Results indicated that the ascorbic acid content of cheese decreased continuously during the entire period of storage. This reduction may be due to the oxidation of ascorbic acid into dehydro-ascorbic acid by oxygen. Results are in accordance recorded by Roy and Singh (1979) [16] and Hayat *et al.* (2005) [17].

**Table 2:** Mean value of physio-chemical property of guava cheese at 30, 60 & 90 days

Treatment	Physiological weight loss (g)	pH	TSS (°Brix)	Acidity (%)	Total sugar (%)	Ascorbic acid (mg/100g)
T <sub>0</sub> Control	10.05	3.78	68.07	0.42	8.74	118.00
T <sub>1</sub> Ginger powder (0.5%)	14.11	4.67	69.07	0.44	9.10	136.00
T <sub>2</sub> Ginger powder (1.0%)	11.30	4.42	69.55	0.51	8.76	122.00
T <sub>3</sub> Ginger powder (1.5%)	10.36	4.04	68.93	0.48	9.20	120.00
T <sub>4</sub> Lemon grass (0.5%)	14.35	4.75	69.93	0.55	8.96	122.00
T <sub>5</sub> Lemon grass (1.0%)	11.60	4.52	69.67	0.50	9.30	124.00
T <sub>6</sub> Lemon grass (1.5%)	10.85	4.19	68.77	0.53	9.24	119.00
T <sub>7</sub> Ashwagandha (0.5%)	11.91	4.58	69.44	0.50	9.21	130.00
T <sub>8</sub> Ashwagandha (1.0%)	11.19	4.31	69.27	0.53	9.59	126.00
T <sub>9</sub> Ashwagandha (1.5%)	14.77	5.10	70.00	0.54	9.76	150.00
F-test	S	S	S	S	S	S
S. Ed.(±)	0.647	0.274	2.410	0.017	0.116	3.190
C.D (P=0.05)	1.372	0.581	2.870	0.036	0.246	6.762

### 3.2 Sensory evaluation of guava cheese

As far the individual perception, colour of the guava cheese was recorded best in T<sub>9</sub> (Guava cheese+ Ashwagandha @1.5%) was (8.50) while minimum score is in control i.e. (6.43). Colour appearance was probably due to the setting abilities of different guava cheese samples, prepared with the addition of different value added products. These findings were in confirmative with the reports of Dinesh and Kumar (1998) [18].

Flavour an important organoleptic property was found best in T<sub>9</sub> (Guava cheese +Ashwagandha @1.5%) is (8.20) and minimum in control i.e. (6.00), this findings is similar to Cruess (1943) [19]. Taste is mainly due to sugar-acid ratio most

appear to chemical sensations, sweet, sour, bitter and salty by and maximum score found in T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) which was (8.20) and minimum in control which was (6.20).

Consistency setting of the product is the result of good pectin content. T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) was (8.40) was judged best for consistency. The organoleptic characters showed over all acceptability with gradual increase, during the storage period upto 90 days with maximum score is (8.28) with treatment T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%), similarly results were also reported by Bhardwaj and Pandey (2011) [20].

**Table 3:** Mean value of Sensory evaluation at 30, 60 and 90 days

Treatment	Colour	Flavour	Taste	Consistency	Overall acceptability
T <sub>0</sub> Control	6.43	6.00	6.20	6.00	6.09
T <sub>1</sub> Ginger powder (0.5%)	8.17	7.70	8.00	8.00	7.93
T <sub>2</sub> Ginger powder (1.0%)	7.17	7.00	7.30	7.20	7.17
T <sub>3</sub> Ginger powder (1.5%)	7.00	6.80	7.10	7.10	7.00
T <sub>4</sub> Lemon grass (0.5%)	6.60	6.60	7.40	7.60	6.67
T <sub>5</sub> Lemon grass (1.0%)	6.77	7.20	6.80	6.60	7.56
T <sub>6</sub> Lemon grass (1.5%)	7.43	6.20	8.00	7.40	7.37
T <sub>7</sub> Ashwagandha (0.5%)	7.80	7.60	7.50	6.20	7.74

T <sub>8</sub>	Ashwagandha (1.0%)	7.60	7.50	7.60	7.80	6.67
T <sub>9</sub>	Guava cheese + Ashwagandha (1.5%)	8.50	8.20	8.20	8.40	8.28
F-test		S	S	S	S	S
S. Ed.(±)		0.137	0.117	0.303	0.486	0.535
C.D (P=0.05)		0.291	0.248	0.643	1.030	1.134

### 3.3 Economics of production

Since control (T<sub>0</sub>) involved minimum value addition using medicinal products hence the cost of production was minimum (137.25 INR) and maximum in the case of T<sub>6</sub> (lemon grass @1.5%) which is (150.29INR). Gross Income

(INR) was maximum in T<sub>9</sub> (ashwagandha @1.5%) which were (250INR) and minimum in T<sub>0</sub> (control) which is (170INR). Cost benefit ratio was maximum in T<sub>9</sub> (ashwagandha @1.5%) which is (1.76INR) and minimum in T<sub>5</sub> (lemon grass @10%) which is 1.21INR.

**Table 4:** Economics of guava cheese

Treatment	Total cost	Guava cheese Output (kg)	Selling rate (Rs/Kg.)	Gross Income (Rs.)	Net income / loss (Rs.)	Cost benefit ratio
T <sub>0</sub>	Control	1	170	170	32.75	1.23
T <sub>1</sub>	Ginger @ 0.5%	1	180	180	41.47	1.29
T <sub>2</sub>	ginger @1.0%	1	200	200	60.47	1.43
T <sub>3</sub>	ginger @1.5%	1	240	240	99.71	1.71
T <sub>4</sub>	lemon grass @ 0.5%	1	210	210	63.29	1.43
T <sub>5</sub>	lemon grass @1.0%	1	180	180	31.09	1.21
T <sub>6</sub>	lemon grass @1.5%	1	200	200	49.71	1.33
T <sub>7</sub>	Ashwagandha @ 0.5%	1	220	220	79.71	1.57
T <sub>8</sub>	Ashwagandha @1.0%	1	240	240	98.69	1.69
T <sub>9</sub>	Ashwagandha @1.5%	1	250	250	107.69	1.76

### 4. Conclusion

Based on above study with value added guava cheese, most of the treatments showed acceptable results. It was observed that T<sub>0</sub> showed minimum loss in physiological weight of storage, minimum pH, TSS, high reducing and total sugar percentage. T<sub>9</sub> showed a higher ascorbic acid during the storage period. T<sub>9</sub> have all the desirable qualities and is having most overall acceptability throughout the storage period. By far, it can be concluded that T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) is the best value added product as for the overall acceptability and physicochemical properties and it can be standardized in commercial scale. Moreover, the cost benefit ratio of T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) was also found maximum. Hence, it could be suggested that T<sub>9</sub> (Guava cheese + Ashwagandha @1.5%) can be commercialized.

### 5. References

- Kumar LSS, Ranade SG. Autotriploidy in guava (*Psidium guajava*, Linn.). *Curr. Sci.* 1952; 21:75-76.
- Pandey DK, Pathak RA, Pathak RK. Studies on the foliar application of plant growth regulators in sardar guava (*Psidium guajava* L.). I. Effect on yield and fruit quality. *Indian Journal Hort.* 1988; 45(3-4):197-202.
- Bhat FM, Singh R. Preparation, Quality Evaluation and Shelf Life Studies of Whey-Guava Beverage. *World Journal of Agricultural Sciences.* 2014; 10(3):141-145.
- Alizai MN. Studies on the preparation & composition of guava (*Psidium guajava*L.) toffee and slab bars. *Pk. J. Sci. & Ind. Res.* 2007; 50(4):288-29.
- Sharma CG. Ashwagandha rishta – Rastantra Sar Evam Sidhyaprayog Sangrah, Krishna-Gopal Ayurveda Bhawan (Dharmarth Trust) Nagpur, 1938, 743-744.
- Aapte W. Sanskrit Hindi Shabd Kosha, Anil Prakashan, Delhi, Caraka Samhita, 2007; 815(XXX):502.
- Kuchi VS, Gupta R, Tamang S. Standardization of recipe for preparation of guava jelly bar, Dept. of Postharvest Management, College of Horticulture, RVSKVV, Mandasaur. *Journal of Crop and Weed.* 2014; 10(2):77-81.
- AOAC. Official methods of analysis of AOAC

international, 16th edition. Association of Official Analytical Chemist. Washington, USA. 1995, 1141.

- Rangana S. Sensory evaluation handbook of analysis and quality control for fruit and vegetables product. Tata margay hill Publication Company limited. New Delhi. 2001, 94.
- Mehto A, Mehto PK. Guava cheese preparation and chemical composition during storage of cheese, *International Journal of Food Science and Nutrition.* 2017; 2(1)1-3.
- Chen W, Zhang F. The formed and physiological changes of guava fruit juice during post-harvest storage. *Plant Physiology, Communications,* 2001; 37(1):25-26.
- Shanker G, Srivastava KK, Das CO. Physio-chemical studies of paper varieties of uttar Pradesh, Allahabad farmer. 1967; 41:9-12.
- Sethi V, Vasudeva KR, Singh G. Diversified use of guava to combat malnutrition. *Acta Hort.* 2007, 455-461.
- Ball JA. Evaluation of two lipid based edible coating for their ability to preserve post harvest quality of green bell papers. Masters Thesis. Faculty of the Virginia Polytechnic Institute and State University, Blacksburg, Virginia, USA, 1997.
- Pathak S. Post harvest technology of anola fruits. *PHD. Thesis*, N.D. University of Agriculture and technology, Faizabad, UP, 1990.
- Roy KS, Singh RN. Studies on utilization on bael fruit for processing Indian Food Packer. 1979; 33(6):3-9.
- Hayat I, Masud T, Rathore HA. Effect of coating and wrapping materials on the shelf life of apple (*Malus domestica* cv. Borkh), *Int. J. food safety.* 2005; 5:24-34.
- Dinesh K, Kumar D. Effect of post harvest treatment on shelf life and quality of mango. *Indian J. Hort.* 1998; 55(2):134-138.
- Cruess WV. Dehydration of fruits and vegetables *Ind. Eng. Chem.* 1943, 35-53.
- Bhardwaj RL, Pandey S. Juice blends-A Way of utilization of underutilized fruits, vegetables and spices. *Critical Reviews in Food Sci. And Nutrition,* 2011; 51(6):563-570.