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Effect of Value Addition on Guava Cheese with Medicinal Herbs under Ambient Storage Condition (*Psidium gujava* L.) cv. "Allahabad Safeda"

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ABSTRACT

Guava is one of the most important subtropical fruit crop that is grown widely in India. Guava is excellent in taste and rich in vitamin C (299 mg/100g). Various processed products are made of guava like as jelly bar, juice, jam and toffees etc . One such important processed product of guava is guava cheese. Guava cheese would ensure the consumer benefits of guava along with its delightful taste of cheese. Medicinal value is very high in guava fruit. The beneficial properties of this fruit was utilized in this study to create a value addition of guava cheese along with ginger powder, lemon grass extract and ashwagandha powder at the amount of 5%, 10% and 15% concentration. Physio-chemical properties 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, 30th days after storage, 60th days after storage and 90th days after storage. Consumer acceptability related properties based on sensory evaluation. It was also evaluated on attributes like colour, flavour, taste, consistency and overall acceptability. It was observed that control (T_0) showed minimum loss in physiological weight of storage, minimum pH, TSS, high reducing and total sugar percentage. Guava cheese + Ginger (T_1) showed a highest ascorbic acid after guava cheese + ashwagandha 15% (T_9) during the storage period. T_9 have all the desirable qualities and is having most overall acceptability throughout the storage period. It can be concluded that T_9 (Guava cheese + Ashwagandha 15%) is the best value added product as far the overall acceptability and physiochemical properties and it can be standardized in commercial scale.

Key words: *Guava cheese, Ginger powder, Lemon grass extract, Ashwagandha powder quality.*

INTRODUCTION

Guava (*Psidium guajava* L.) also called "Apple of Tropics", originated in tropical America perhaps from Mexico to Peru belongs to family Myrtaceae, it is considered to be the poor man's (Total horticulture production of fruit is 86.602 million tonnes in 2014-15[1]. 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. Guava is a chief and rich source of vitamin C and Pectin. It is also contain fair amount of calcium, phosphorus and vitamin[2].

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Guava is not only a delicious and nutritious table fruit but may also be utilized to make products like jelly and jam preparation. Allahabad has the reputation of growing the best quality guava in the country. Allahabad is believed to be the home of "Allahabad Safeda" and "Allahabad Surkha" variety. 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. Besides that, it has a considerable good structure that ensures proper intercultural operations. The variety "Allahabad Safeda" is selected in the above course of study because of the fact that it believed to have good processing quality. Guava fruit is normally consumed as fresh as a dessert fruit or in processed form as 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 [3]. 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.

Medicinal plants are actually a boon to mankind. They are not only used solely to cure any disease but their food additive quality if can be harnessed can enormously improve the processed food quality. Incorporation of medicinal plants in processed food products started way back but guava cheese supplemented with quality of medicinal plants are yet to be harnessed. 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.

Ginger (*Zingiber officinalis*), is the most commonly herb which 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 for the motion sickness and nausea. Ginger is very in treating chronic inflammation. It is suggested to be effective against 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].

Lemongrass (*Cymbopogon citrates*) 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 and edema. It is antibiotic and antifungal. It helps to defeat cancer.

Ashwagandha is also known as Indian ginseng (*Withania somnifera*), has 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 your supply of antioxidants and regulates the immune system. Ashwagandha was effective in urinogenital, gastrointestinal and respiratory tract infections when consumed orally.

Fruit cheese has recently become very popular. It is a type at confectionery of " Karachi Halva" and it has prepared from fruit like guava, apple, pear and plum fruit cheese have a long shelf- life. Fruit cheese contains a minimum TSS 68^0Brix and maximum 70^0Brix prepared fruit in final product. The most

suitable value added products of guava cheese in terms of physio- chemical properties, to find out suitable value added products of guava cheese based on sensory properties & 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.

Nutritional value of guava fruit:

The fruit is considered as an excellent source of vitamins like vitamins C (299 mg/100 g), niacin (1.084mg), thiamine (0.067), riboflavin (0.040mg), folate (49 micro gram) and vitamin A (624 IU) and pectin (102.42mg). The fruit has an appreciable amount of minerals such as phosphorus (23 - 37 mg/100 g), calcium (14 - 30 mg/100 g), iron (0.6 - 1.4 mg/100 g) as well as found. It also contains (74-84%) moisture, (13-26%) dry matter, (0.8-1.5%) protein, (0.4-0.7%) fat and (0.5-1.0%)[5] . Cold pulping of the material is a more convenient and for better than hot pulping in several respect. The pulp imbedding the seeds and the seeds themselves are not as useful for the preparation of guava cheese as the peel and the main pulpy portion of the fruit. Guava is usually eaten as a fresh fruit. However, large quantities are canned or made into jams, jellies, cheese and preserves. The fruit has pectin content and it therefore lends itself to many preparations according to the product[6]. The purpose of this research is, to evaluate the value added product qualities and shelf life of guava cheese during storage.

MATERIALS AND METHODS

The present studies was carried on the **"Effect of value addition on guava cheese with medicinal herbs (ginger powder, lemon grass and ashwagandha) under ambient storage condition cv. Allahabad Safeda "** during the winter season of the year 2016-2017 at Pomology Research Laboratory, Department of Horticulture, Sam Higginbottom university of Agricultural, Technology and Sciences formerly Known as (Naini Agriculture Institute).

The value added guava cheese has prepared 9 treatments with 3 replications and stored for 30, 60 and 90 days under ambient temperature. Guava cheese cv. "Allahabad Safeda" has prepared for value addition in the season of winter (12th January to 17th January 2017) . The guava cheese was prepared in the department of horticulture in post harvest laboratory with 9 treatments, per 3 replications with Completely Raindomized Design (CRD) . The guava cheese was value added with ginger powder, lemon grass extract and ashwagandha powder with the percentage of 5,10 and 15. The data was recorded with indifferent quality of parameters.

Recipes method of guava cheese:

Firstly washed fresh guava fruits, cut into pieces and boil with equal quantity of water. Removed pomace by sieving and added sugar (750g/Kg of pulp), butter (100g/Kg of pulp), citric acid (2g/Kg of pulp) and value additives (5g,10g and 15g/Kg Ginger powder, Lemon grass extract and Ashwagandha powder) per Kg guava pulp cooked till, until mixture become sufficiently thick ,and then added salt (2g) 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 and stored at ambient temperature.

Table 1: Recipes of guava cheese

Ingridients	Quantity
Sugar	750 g/kg of pulp
Butter	100 g/kg of pulp
citric acid	2g/kg of pulp
Salt	2g/kg of pulp
Value additive product for guava cheese	Concentration of 5,10,15 % of medicinal herbs (ginger,lemongrass& ashwagandha)

The data recorded on each character were analysed by the ANOVA technique. The critical difference values were calculated at 0.05 per cent level of significance.

Table 2: Treatment Combination

Notation	Treatment combination
T_0	Control
T_1	Guava cheese + Ginger powder (5%)
T_2	Guava cheese + Ginger powder (10%)
T_3	Guava cheese + Ginger powder (15%)
T_4	Guava cheese + Lemon grass extract(5%)
T_5	Guava cheese + Lemon grass extract (10%)
T_6	Guava cheese + Lemon grass extract (15%)
T_7	Guava cheese + Ashwagandha powder (5%)
T_8	Guava cheese + Ashwagandha powder (10%)
T_9	Guava cheese + Ashwagandha powder (15%)

RESULT AND DISCUSSION

A-Physiological chemical 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_9 (Guava cheese+ Ashwagandha 15%), and minimum score (10.05%) was observed with the treatment T_0 (Guava cheese + control). In general ,the physiological loss weight (%) of Guava cheese increased with the storage period .This is attributed 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 *et al*[7].

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_9 (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[8] in case of guava juice.

Similarly TSS after 30,60 and 90 days of storage, among the different additive, and the maximum score (70.00^0Brix) was observed with the treatment T_9 (Guava cheese + Ashwagandha 15%) and minimum score (68.07^0Brix) was observed with the treatment T_0 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*[9].

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_9 (Guava cheese + Lemongrass 5%) and minimum score (0.42%) was observed in the control. Tritatable acidity is directly related to the concentration of organic acids present in the fruit ,which are an important factor for quality of fruit[10], 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 score of total sugar percent is (9.76%) was observed with the treatment T_9 (Guava cheese + Ashwagandha 15%) and minimum score (8.74%) was observed with the treatment T_0 (Guava cheese + control).The increase in total sugar percentage might be due to hydrolysis of polysachrides like starch, pectin etc and their conversion into simple sugar. This is supported by[11] and[12].

30,60 and 90 days of storage ,among the different additive the maximum score of ascorbic acid is (150 mg/100g) was observed with the treatment T_9 (Guava cheese+ Ashwagandha15%) 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 Hayat *et al* .[13] and Dinesh *et al* [14].

B-Sensory evaluation of guava cheese:

Colour was maximum in T_9 (Guava cheese+ Ashwagandha 15%) is (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 Cruess[15].

Flavour is the important organoleptic taste of guava cheese and maximum score found in T_9 (Guava cheese +Ashwagandha 15%) is (8.20%) and minimum in control i.e (6.00%), this findings consider to Bhardwaj *et al* [16].

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_9 (Guava cheese + Ashwagandha 15%) is (8.20%) and minimum is in control is (6.20%).

Consistency setting of the product is the result of good pectin content, T_9 (Guava cheese + Ashwagandha 15%) is (8.40 %) was maximum and judged best for consistency and minimum in control i.e (6.00%) **.** 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_9 (Guava cheese + Ashwagandha 15%) and minimum in untreated cheese is (6.09 %), similarly results were also reported[17].

"Results of physio-chemical and sensory evaluation property of guava cheese"

Table 1.1: Mean value of physio-chemical property of guava cheese at 30, 60& 90 days

Treatment	Physiological weight loss in days	pH of guava cheese	TSS of guava cheese	Acidity	Total sugar %	Ascorbic acid
T_0 Control	10.05	3.78	68.07	0.42	8.74	118.00
T_1 Guava cheese + Ginger powder (5%)	14.11	4.67	69.07	0.44	9.10	136.00
T_2 Guava cheese + Ginger powder (10%)	11.30	4.42	69.55	0.51	8.76	122.00
T_3 Guava cheese + Ginger powder (15%)	10.36	4.04	68.93	0.48	9.20	120.00
T_4 Guava cheese + Lemon grass (5%)	14.35	4.75	69.93	0.55	8.96	122.00
T_5 Guava cheese + Lemon grass (10%)	11.60	4.52	69.67	0.50	9.30	124.00
T_6 Guava cheese + Lemon grass (15%)	10.85	4.19	68.77	0.53	9.24	119.00
T_7 Guava cheese + Ashwagandha (5%)	11.91	4.58	69.44	0.50	9.21	130.00
T_8 Guava cheese + Ashwagandha (10%)	11.19	4.31	69.27	0.53	9.59	126.00
T_9 Guava cheese + Ashwagandha (15%)	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**

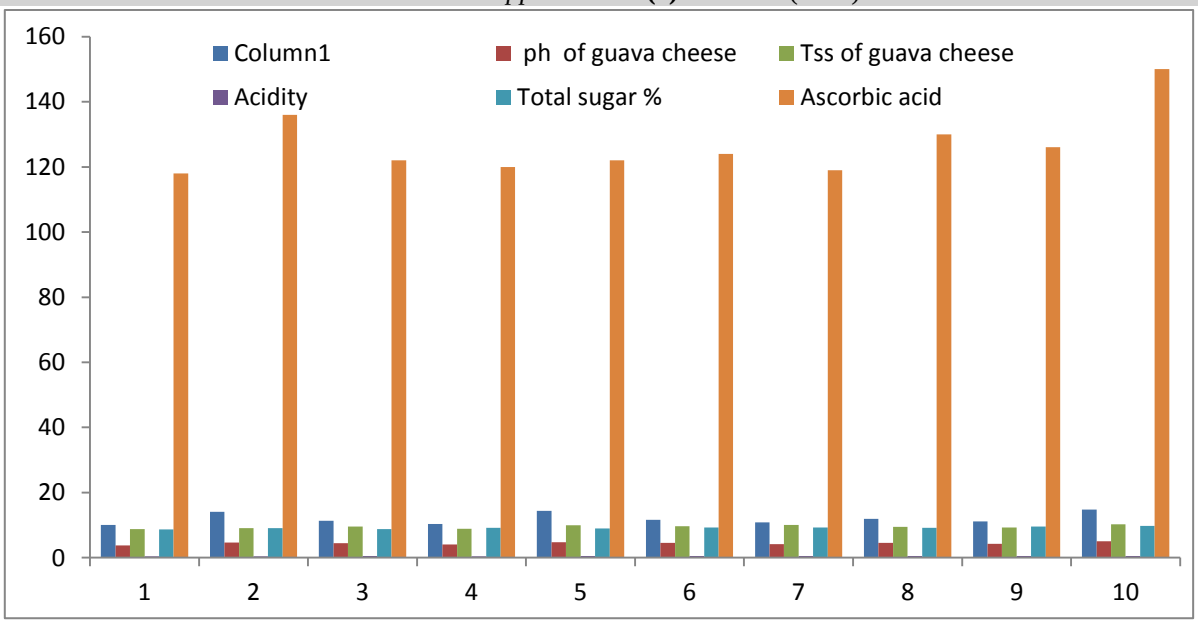

Fig. 1.1 Effect of value addition on physio-chemical property of guava cheese

Table 1.2 – Mean value of Sensory evaluation at 30, 60 & 90 days

Treatment	Colour	Flavour	Taste	Consistency	Overall acceptability
T_0 Control	6.43	6.00	6.20	6.00	6.09
T_1 Guava cheese + Ginger powder (5%)	8.17	7.70	8.00	8.00	7.93
T_2 Guava cheese + Ginger powder (10%)	7.17	7.00	7.30	7.20	7.17
T_3 Guava cheese + Ginger powder (15%)	7.00	6.80	7.10	7.10	7.00
T_4 Guava cheese + Lemon grass (5%)	6.60	6.60	7.40	7.60	6.67
T_5 Guava cheese + Lemon grass (10%)	6.77	7.20	6.80	6.60	7.56
T_6 Guava cheese + Lemon grass (15%)	7.43	6.20	8.00	7.40	7.37
T_7 Guava cheese + Ashwagandha (5%)	7.80	7.60	7.50	6.20	7.74
T_8 Guava cheese + Ashwagandha (10%)	7.60	7.50	7.60	7.80	6.67
T_9 Guava cheese + Ashwagandha (15%)	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**

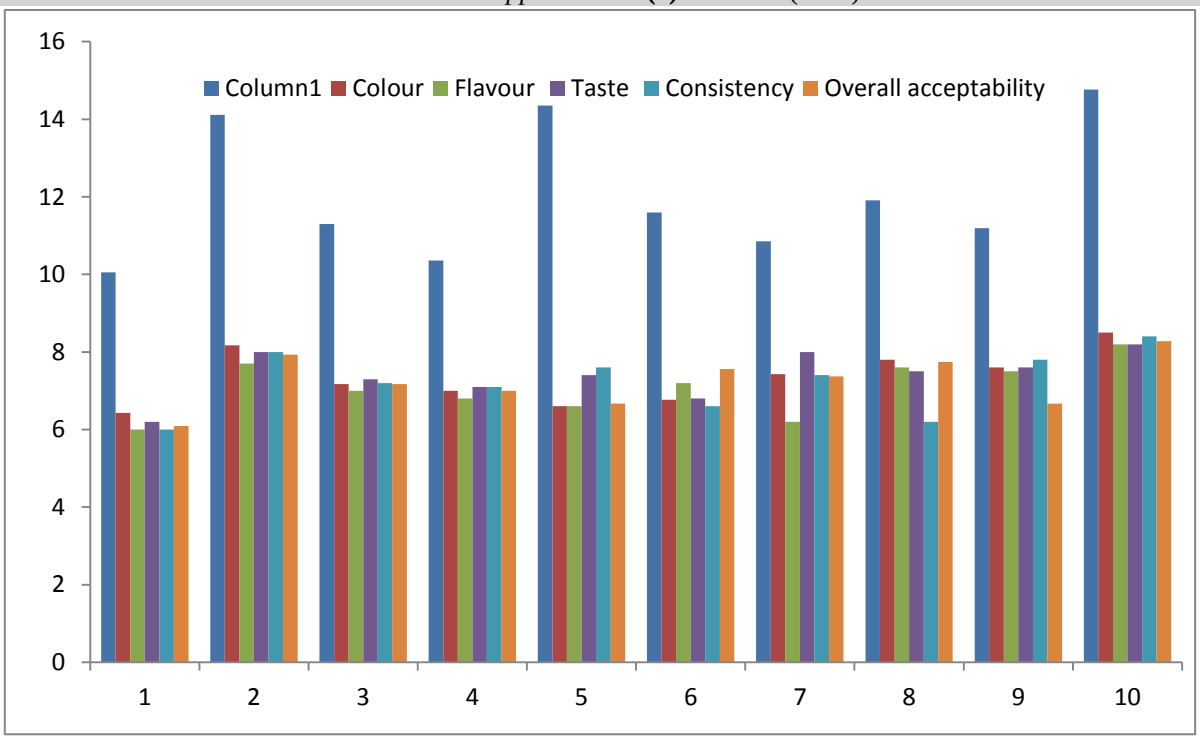

Fig. 1.2 Effect of value addition on sensory evaluation of guava cheese

CONCLUSION

Based on above study with value added guava cheese, most of the treatments showed acceptable results. It was observed that T_0 showed minimum loss in physiological weight of storage, minimum pH, TSS, high reducing and total sugar percentage.T_9 showed a higher ascorbic acid during the storage period while T_4 shows maximum acidity in guava cheese + Lemon grass (5%). T_9 have all the desirable qualities and is having most overall acceptability throughout the storage period. By far, it can be concluded that T_9, guava cheese + ashwagandha (15%) is the best value added product as for the overall acceptability and physiochemical properties and it can be standardized in commercial scale.

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