



P-ISSN: 2349-8528

E-ISSN: 2321-4902

www.chemijournal.com

IJCS 2020; 8(6): 530-534

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Received: 03-09-2020

Accepted: 15-10-2020

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Standardization and value addition in herbal guava jam

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DOI: <https://doi.org/10.22271/chemi.2020.v8.i6h.10829>

Abstract

The present experiment was carried out during 2019 in Post-Harvest Laboratory of Department of Horticulture, SHUATS, Prayagraj. The experiment was conducted in Completely Randomized Design (CRD), with 9 treatments, replicated thrice. the treatments were T₀ (Control), T₁ (Guava pulp + Tulsi (1%)), T₂ (Guava pulp + Tulsi (1.5%)), T₃ (Guava pulp + Mint (1%)), T₄ (Guava pulp + Mint (1.5%)), T₅ (Guava pulp + Lemon grass (1%)), T₆ (Guava pulp + Lemon grass (1.5%)), T₇ (Guava pulp + Ginger (1%)) and T₈ (Guava pulp + Ginger (1%)) From the present investigation it is found that treatment T₈ (Guava pulp + Ginger (1%)) was found superior in respect of the parameters Total Soluble Solids, Acidity, pH, Ascorbic acid mg/100g, Reducing Sugar, Non Reducing Sugar, Total Sugar, Colour and Appearance, Flavour and Taste, Texture and Overall Acceptability.

Keywords: Guava, tulsi, mint, ginger, lemon grass

Introduction

Guava (*Psidiumguajava* L.) belongs to family Myrtaceae. It is the fourth most important fruit crop after Mango, Banana and Citrus. It has been cultivated in India since early 17th century and gradually became a crop of commercial significance. It is believed that guava originated in tropical America and from there it spread to rest of the world. At present in India it occupies nearly 1.5 lakh ha of land and in Uttar Pradesh 17.10 thousand ha land. Total production of guava in Uttar Pradesh is 136.10 thousand tonnes and productivity 7.90tonnes/ha fruits per year.

Guava has earned the popularity as "Poor man's apple" available in plenty to very person at a low price during the season. It is no key inferior to apple in its nutritional values. The fruit (berry) is an excellent source of ascorbic acid and pectin but has low energy (66 cal/100 g), protein content (1%) about 17% dry matter and 83% moisture. The fruit is also rich in minerals like phosphorus (23.37 mg/100 g), calcium (14-30 mg/100 g), iron (0.6-1.4/100 g) as well as vitamin like Niacin, Pantothenic acid, Thiamine, Riboflavin, Vitamin 'A' (Bose *et al.*, 1999) [4].

Guava is normally consumed as desert fruit. It emits a sweet aroma which is pleasantly sweet and refreshing acidic in flavor. The whole fruit is edible along with skin. It is considered as one of the most delicious and luscious fruit. Excellent salad, pudding, jam, jelly, cheese, canned fruit, RTS, Nectar, squash, ice cream and toffees can be made from guava fruit. In Uttar Pradesh guava is grown on large scale and often it causes glut in the local market.

Tulsi, an Ayurvedic herb widely used in therapeutic herbal tea/tisane and true tea blends, may be called tulsi, holy basil, "The Incomparable One," "Elixir of Life," or "Queen of the Herbs." Native to India and cultivated throughout Southeast Asia, It is considered a foundational herb that, combined with other adaptogenic herbs, can help the body withstand many forms of stress. Regular consumption of tulsi may lower blood pressure and cholesterol by regulating cortisol levels, reducing the risk of stroke, heart attack, and other related diseases. It can also help relieve headaches and may lessen anxiety and depression for some. Regular consumption may lead to better sleep.

Ginger (*Zingiberofficinale*) is a flowering plant whose rhizome, ginger root or ginger, is widely used as a spice and a folk medicine. It is a herbaceous perennial which grows annual pseudo stems (false stems made of the rolled bases of leaves) about one meter tall bearing narrow leaf blades.

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Gingerol is the main bioactive compound in ginger, responsible for much of its medicinal properties. It has powerful anti-inflammatory and antioxidant effects. Ginger Can Treat Many Forms of Nausea, Especially Morning Sickness, reduce muscle pain and soreness, drastically lower blood sugars and improve heart disease risk factors, lower cholesterol levels, improve brain function and protect against alzheimer's disease

Mint leaves are a tender herb with gentle stems. It is best to add them raw or at the end of the cooking process. This helps them maintain their delicate flavor and texture. Mint is relatively easy to grow, and people can cultivate it at home, making it a sustainable way to add flavor to meals. Just under 1/3 cup or half an ounce (14 grams) of spearmint contains Calories: 6 gram Fibre: 1 gram Vitamin A: 12% of the RDI Iron: 9% of the RDI Manganese: 8% of the RDI Folate: 4% of the RDI. Improve Irritable Bowel Syndrome (IBS) is a common digestive tract disorder. It is characterized by digestive symptoms like stomach pain, gas, bloating and changes in bowel habits.

Lemongrass offers multiple health benefits. Some health benefits can help fight against free radicals, thus reducing the incidence of inflammation in the body. Lemongrass contains the inflammation-fighting compounds chlorogenic acid, isoorientin, and swertiajaponin. Some other benefits are like Relieving anxiety, lowering cholesterol, preventing infection, boosting oral health and red blood cell levels, relieving bloating.

Materials and Methods

The Experimental was conducted in Completely Randomized Design (CRD) with 7 treatments of Apple and Custard Apple Pulp with three replications in the Post Harvest Laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2019. Total number of treatments were nine viz. T₀ (Control), T₁ (Guava pulp + Tulsi (1%)), T₂ (Guava pulp + Tulsi (1.5%)), T₃ (Guava pulp + Mint (1%)), T₄ (Guava pulp + Mint (1.5%)), T₅ (Guava pulp + Lemon grass (1%)), T₆ (Guava pulp + Lemon grass (1.5%)), T₇ (Guava pulp + Ginger (1%)) and T₈ (Guava pulp + Ginger (1%)).

Climatic condition in the experimental site

The area of Prayagraj district comes under subtropical belt in the south east of Uttar Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46°C- 48°C and seldom falls as low as 4°C- 5°C. The relative humidity ranges between 20 to 94 %. The average rainfall in this area is around 1013.4 mm annually. However, occasional precipitation is also not uncommon during winter months.

Results and Discussion

The present investigation entitled "Standardization and value addition in herbal guava jam." was carried out during 2019 in Post Harvest Laboratory of Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) India. The results of the present investigation, regarding the Standardization of value-added herbal guava jam, have been discussed and interpreted in the light of previous research work done in India and abroad. The experiment was conducted in Completely Randomized design with 9 treatments, and three replications.

The results of the experiment are summarized below.

It is evident that the TSS was influenced by different treatments at all successive stage of storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (68.247, 68.323, 68.423, 68.583) °B have highest TSS content followed by T₇ (Guava pulp + Ginger (1%)) with (68.133, 68.247, 68.343, 68.56) °B of were significantly superior than T₀ (Control) with (67.34, 67.417, 67.527, 67.627) °B. The maximum Total soluble solid content in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 68.247 °B followed by T₇ (Guava pulp + Ginger (1%)) with 68.133 °B and the minimum was recorded in T₀ (Control) with 67.34 °B. A slight increase in total soluble solids during storage might be due to conversion of polysaccharides (present in fruits) into sugars during hydrolysis process. This finding agreed with the finding of Vikram and Prasad (2014) compositional changes in value-added Kinnow-Aonla RTS revealed that there was increase in the level of TSS during the storage period (six months) and (Jain *et al.*, 2007) [9] in aonla RTS beverage.

It is evident that the acidity was influenced by different treatments at all successive stage of storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (20.4, 20.633, 21.033, 21.4) have minimum acidity content followed by T₇ (Guava pulp + Ginger (1%)) with (20.7, 20.9, 21.267, 21.50) of were significantly superior than T₀ (Control) with (32.60, 32.767, 33.00, 33.33). The minimum acidity content in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 21.4 followed by T₇ (Guava pulp + Ginger (1%)) with 21.50 and the maximum was recorded in T₀ (Control) with 33.33. Jaiswal *et al.*, (2008) reported that degradation of pectin substances into soluble solids might have contributed towards increase the level of acidity in the during storage period of aonla jam.

It is evident that the Reducing sugar was influenced by different treatments at all successive stage of storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (68.247, 68.323, 68.423, 68.583) °B have highest Reducing sugar content followed by T₇ (Guava pulp + Ginger (1%)) with (68.133, 68.247, 68.343, 68.56) °B of were significantly superior than T₀ (Control) with (67.34, 67.417, 67.527, 67.627) °B.

The maximum Reducing sugar content in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 68.247 °B followed by T₇ (Guava pulp + Ginger (1%)) with 68.133 °B and the minimum was recorded in T₀ (Control) with 67.34 °B. The increase in reducing sugar was slightly higher in storage condition that could be attributed to more rapid hydrolysis of polysaccharides and their subsequent conversion into sugars. Nath and Yadav, (2005) and Deka *et al.*, (2004) [15, 5] reported similar finding with lime-aonla blended RTS.

Non-Reducing Sugar was found to vary significantly with all the treatment concerned. It is evident that the Non-Reducing Sugar was influenced by different treatments at all successive stage of storage. The percentage was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (9.35, 9.237, 9.123, 9.013) have highest Non Reducing Sugar mean value followed by T₇ (Guava pulp + Ginger (1%)) with (8.787, 8.68, 7.567, 6.713) which were significantly superior than T₀ (Control) with (5.853, 5.75, 5.617, 5.50). The Non-Reducing Sugar value in fruit jam was recorded in T₈ (Guava pulp +

Ginger (1.5%)) with 9.013 followed by T₇ (Guava pulp + Ginger (1%)) with 6.713 and the minimum was recorded in T₀ (Control) with 5.50. The non-reducing sugar of guava jam show increasing trend in all treatment during storage and it may be due to increase in time interval and temperature, similar reading was recorded by Bajaj and Mehta (2007) [13] in citrus juice.

It is evident that the pH was influenced by different treatments at all successive stage of storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (3.850, 3.917, 3.983, 4.090) have highest pH content followed by T₇ (Guava pulp + Ginger (1%)) with (3.703, 3.787, 3.870, 3.953) of were significantly superior than T₀ (Control) with (3.337, 3.417, 3.517, 3.617). The maximum pH content in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 4.090 followed by T₇ (Guava pulp + Ginger (1%)) with 3.953 and the minimum was recorded in T₀ (Control) with 3.617. Variations in pH during storage may be due to change in chemical properties which are affected by storage conditions. This finding agreed with the finding of Vikram and Prasad (2014), & Rayguru *et al.*, (2008) [21] also reported similar trend in apple jam.

Colour / Appearance was found to vary significantly with all the treatment concerned. It is evident that the colour and appearance was influenced by different treatments at all successive stage of storage. The percentage was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (9.35, 9.237, 9.123, 9.013) have highest colour and appearance mean value followed by T₇ (Guava pulp + Ginger (1%)) with (8.787, 8.68, 7.567, 6.713) which were significantly superior than T₀ (Control) with (5.853, 5.75, 5.617, 5.50). The maximum colour and appearance value in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 9.013 followed by T₇ (Guava pulp + Ginger (1%)) with 6.713 and the minimum was recorded in T₀ (Control) with 5.50. Deterioration of colour due to enzymatic and non-enzymatic reactions on pigment during storage of fruit products impair the quality of the products. It could be attributed to non-enzymatic reactions, which occur between nitrogenous compounds and sugars or organic acid and organic acids with sugars. Similar results were reported by Syed *et al.* (2011) in sweet orange based products.

Flavour and Taste was found to vary significantly with all the treatment concerned. It is evident that the Flavour and Taste was influenced by different treatments at all successive stage of storage. The percentage was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (9.333, 9.237, 9.077, 8.97) have highest Flavour and Taste mean

value followed by T₇ (Guava pulp + Ginger (1%)) with (8.787, 8.68, 8.577, 8.46) which were significantly superior than T₀ (Control) with (6.333, 6.233, 6.133, 6.03). The maximum Flavour and Taste value in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 8.97 followed by T₇ (Guava pulp + Ginger (1%)) with 8.46 and the minimum was recorded in T₀ (Control) with 6.03. The decreasing trend was observed for flavour, taste and texture with increase storage period. This might be due to degradation of volatile substance and flavor constituents. Similar result was reported by Nayak *et al.*, (2011) [16] in aonla segments-in-syrup prepared from stored fruits. Jain *et al.* (2007) [9] in aonla RTS beverages.

Overall Acceptability was found to vary significantly with all the treatment concerned. It is evident that the Overall Acceptability was influenced by different treatments at all successive stage of storage. The percentage was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (9.187, 9.087, 8.987, 8.887) have highest Overall Acceptability mean value followed by T₇ (Guava pulp + Ginger (1%)) with (8.887, 8.77, 8.667, 8.553) which were significantly superior than T₀ (Control) with (6.517, 6.417, 6.317, 6.207). The maximum Overall Acceptability value in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 8.887 followed by T₇ (Guava pulp + Ginger (1%)) with 8.553 and the minimum was recorded in T₀ (Control) with 6.207. Overall acceptability scores were decreased in all the treatments during storage due to decline in colour, consistency and flavour scores. Similar results were reported by Sogi and Singh (2001), Jadhav *et al.* (2006) and Vikram and Prasad, (2014) in aonla beverages.

Texture was found to vary significantly with all the treatment concerned. It is evident that the texture was influenced by different treatments at all successive stage of storage. The percentage was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 15, 30, and 45 days, among the treatment used T₈ (Guava pulp + Ginger (1.5%)) with (9.303, 9.203, 9.113, 9.007) have highest texture mean value followed by T₇ (Guava pulp + Ginger (1%)) with (8.917, 8.82, 8.70, 8.587) which were significantly superior than T₀ (Control) with (6.637, 6.537, 6.417, 6.283). The maximum texture value in fruit jam was recorded in T₈ (Guava pulp + Ginger (1.5%)) with 9.007 followed by T₇ (Guava pulp + Ginger (1%)) with 8.587 and the minimum was recorded in T₀ (Control) with 6.283. The decreasing trend was observed for flavour, taste and texture with increase storage period. This might be due to degradation of volatile substance and flavor constituents. Similar result was reported by Nayak *et al.* (2011) [16] in aonla segments-in-syrup prepared from stored fruits. Jain *et al.* (2007) [9] in aonla RTS beverage.

Table 1: Standardization on guava herbal jam on Total Soluble Solids (°Brix), Acidity (%), pH, Reducing Sugar (%) and Non Reducing Sugar (%)

Notion	Treatment Details	Total Soluble Solids (°Brix)				Acidity (%)				Reducing Sugar (%)				Non - Reducing Sugar (%)				pH			
		Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS
T ₀	Control	67.34	67.417	67.527	67.627	32.610	32.767	33.001	33.333	12.801	15.467	18.502	21.033	35.633	31.801	29.102	26.304	3.337	3.417	3.517	3.617
T ₁	Guava pulp + Tulsi (1%)	67.42	67.503	67.603	67.807	25.202	25.403	25.667	26.033	13.767	16.433	19.333	22.203	36.202	33.267	31.033	27.901	3.483	3.563	3.663	3.747
T ₂	Guava pulp + Tulsi (1.5%)	67.50	67.593	67.663	67.762	30.904	31.067	31.333	31.633	13.633	16.833	20.067	22.904	36.833	33.633	30.902	27.204	3.517	3.593	3.693	3.780
T ₃	Guava pulp + Mint (1%)	67.60	67.724	67.825	67.923	22.967	23.167	23.567	23.867	14.367	17.203	20.102	23.001	37.433	34.267	31.302	27.467	3.613	3.697	3.797	3.877

T ₄	Guava pulp + Mint (1.5%)	68.02	68.123	68.203	68.001	23.867	24.067	24.400	24.733	15.667	18.501	21.504	24.433	34.967	31.401	28.402	24.603	3.663	3.743	3.843	3.927
T ₅	Guava pulp + Lemon grass (1%)	68.02	68.107	68.183	68.410	26.333	26.533	26.833	27.167	14.133	17.533	20.601	23.567	33.467	30.201	27.667	24.233	3.593	3.693	3.790	3.883
T ₆	Guava pulp + Lemon grass (1.5%)	67.86	67.957	68.040	68.163	24.233	24.467	24.767	25.101	13.367	16.967	19.967	23.133	39.504	36.602	33.967	30.733	3.523	3.603	3.703	3.787
T ₇	Guava pulp + Ginger (1%)	68.13	68.247	68.343	68.561	20.702	20.903	21.267	21.504	16.767	19.567	22.202	25.767	43.267	40.401	37.802	34.967	3.703	3.787	3.870	3.953
T ₈	Guava pulp + Ginger (1.5%)	68.24	68.323	68.423	68.583	20.405	20.633	21.033	21.400	17.567	20.901	24.202	27.806	45.133	42.104	39.200	35.933	3.851	3.917	3.983	4.091
C.D. at 5%		0.314	0.312	0.322	0.475	4.202	4.165	4.131	4.128	1.278	1.397	1.457	1.754	2.334	2.203	2.474	2.602	0.174	0.175	0.167	0.155
SE(d)		0.148	0.147	0.152	0.224	1.985	1.967	1.951	1.95	0.603	0.66	0.688	0.829	35.633	31.8	29.1	26.3	0.082	0.082	0.072	0.073
F Test		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Table 2: Standardization on guava herbal jam on Score for Colour and Appearance, Score for Flavour and Taste, Score for Texture, Score for Overall acceptability

Notion	Treatment Details	Color and appearance				Flavour and Taste				Overall Acceptability				Texture			
		Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS	Initial	15 DAS	30 DAS	45 DAS
T ₀	Control	5.853	5.750	5.617	5.501	6.333	6.233	6.133	6.030	6.517	6.417	6.317	6.207	6.637	6.537	6.417	6.283
T ₁	Guava pulp + Tulsi (1%)	6.857	6.742	6.637	6.513	6.617	6.520	6.427	6.321	6.717	6.611	6.512	6.407	6.911	6.467	6.327	6.227
T ₂	Guava pulp + Tulsi (1.5%)	6.657	6.555	6.423	6.327	6.893	6.771	6.672	6.563	6.947	6.833	6.723	6.933	7.002	6.904	6.751	6.643
T ₃	Guava pulp + Mint (1%)	7.553	7.123	7.013	6.917	7.207	6.737	6.634	6.513	7.267	6.837	6.723	6.591	7.203	7.093	6.951	6.807
T ₄	Guava pulp + Mint (1.5%)	7.821	7.383	7.272	7.163	7.493	6.927	6.821	6.707	7.523	7.087	6.983	6.803	7.233	7.117	6.982	7.183
T ₅	Guava pulp + Lemon grass (1%)	8.053	6.943	6.817	6.722	7.412	7.287	7.173	7.043	7.427	7.323	7.173	7.062	7.903	7.811	7.684	7.557
T ₆	Guava pulp + Lemon grass (1.5%)	7.373	7.243	7.110	7.017	7.987	7.881	7.742	7.581	7.891	7.792	7.683	7.571	7.793	7.661	7.523	7.423
T ₇	Guava pulp + Ginger (1%)	8.787	8.68	7.567	6.713	8.787	8.680	8.577	8.461	8.877	8.771	8.667	8.553	8.917	8.821	8.704	8.587
T ₈	Guava pulp + Ginger (1.5%)	9.350	9.237	9.123	9.013	9.333	9.237	9.077	8.971	9.187	9.087	8.987	8.887	9.303	9.203	9.113	9.007
C.D. at 5%		0.528	1.180	1.554	1.498	0.653	0.714	0.730	0.702	0.789	0.765	0.778	0.875	0.701	0.694	0.675	0.692
SE(d)		0.249	0.557	0.734	0.708	0.308	0.337	0.341	0.332	0.372	0.361	0.367	0.413	0.331	0.328	0.319	0.327
F Test		S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S

Conclusion

From the present study, it was concluded that the addition of 1.5% ginger extracts could be gainfully utilized for enhancing the value of guava Jam preparation in the terms of TSS, Acidity, pH, Reducing and Non-reducing sugar, colour and appearance, flavour and taste, texture and overall acceptability. This herbal combination improved the nutraceutical value.

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