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DEVELOPMENT AND EVALUATION OF VALUE-ADDED GUAVA-PAPAYA CHEESE

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Abstract–The present investigation was carried out during 2021 in Post-Harvest Lab of Department of Horticulture, SHUATS, Naini, Prayagraj. The experiment was conducted in Completely Randomized Design (CRD), with 9 treatment and three replications. The treatments were T_0 (Control), T_1 (100% Guava+ Ashwagandha powder (1.5%), T_2 (90% Guava :10% Papaya + Ashwagandha powder (1.5%), T_3 (80% Guava:20% Papaya + Ashwagandha powder (1.5%), T_4 (70% Guava:30%+ Papaya + Ashwagandha powder (1.5%), T_5 (100% Guava + Safed musli (1.5%), T_6 (90% Guava:10% Papaya +safed musli (1.5%), T_7 (80% Guava: 20% Papaya + Safed musli (1.5%), T_8 (70% Guava: 30% Papaya +Safed musli (1.5%). From the experiment it is found that the treatment T_8(70% Guava: 30% Papaya +Safed musli (1.5%) was found best in the terms of Moisture content, Total soluble solid, Ascorbic acid, Acidity %, pH, Color and Appearance, Flavor and Taste, Texture, overall acceptability, shelf life and Benefit Cost ratio.

INTRODUCTION

Fruits and vegetables are major source of vitamins and minerals. Even though India is the second largest producer of fruits with an annual production of about 45 million tonnes, the per capita availability of fruits even with this increase is lower at 107g/day than the recommended level of 120g. In spite of the India's strong hold on the production of fruits it is alarming to know that India processes just 2% of the total fruit production with an alarming loss of around 35% only 20% of the production of processed fruits is being exported. According to reports that post-harvest losses in fruits and vegetables in India is worth about Rs.4000 crores annually. In general physical terms, post-harvest losses in these commodities vary from 9 to 40%.

Value added food products are raw or pre-processed commodities whose value has been increased through the addition of ingredients or processes that make them more attractive to the buyer and more readily usable by the consumer. The fresh fruit has limited shelf life therefore, it is necessary to utilize the fruit for making different products to increase its availability over an extended period and to stabilize the price during the glut season. These products have good potential for internal as well as external trade. In the present review, information was provided on different value added products of guava and its multipurpose commercial value.

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 cheeseso as to ensure the presence of their benefits solely or in combination.

Fruit cheese usually contains a minimum TSS

68 ^{o}Brix and maximum 70 ^{o}Brix prepared fruit in final product. The most suitable value added products of guava cheese in terms of Physico-chemical 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.

MATERIALS AND METHODS

The Experiment was conducted in Completely Randomized Design (CRD) with 9 treatments and three replications in the Post Harvest Laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during December, 2021 to February, 2020. The treatments were T_0 (Control), T_1(100% Guava+ Ashwagandha powder (1.5%), T_2 (90% Guava :10% Papaya + Ashwagandha powder (1.5%), T_3 (80% Guava:20% Papaya + Ashwagandha powder (1.5%), T_4 (70% Guava: 30%+ Papaya + Ashwagandha powder (1.5%), T_5 (100% Guava +Safed musli (1.5%), T_6 (90% Guava: 10% Papaya +safed musli (1.5%), T_7 (80% Guava:20% Papaya +Safed musli (1.5%), T_8(70% Guava: 30% Papaya +Safed musli (1.5%).

Climatic condition it the experimental site

The area of Prayagraj district comes under subtropical belt in the south east of Utter Pradesh, which experience extremely hot summer and fairly cold winter. The maximum temperature of the location reaches up to 46 ^oC- 48 ^oC and seldom falls as low as 4 ^oC- 5 ^oC. 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

Moisture content was found to vary significantly with all the treatment concerned It is evident that the Moisture content was influenced by different treatments at all successive stage of storage. The percentage of Moisture content was found to decrease with increase in storage. There was significant differences between the treatments at Initial, 30, 60, and 90 days, among the treatment used T_8 (70 Guava: 30 Papaya +Safed musli (1.5%)) with (14.03, 13.87, 13.66 and 13.44) have minimum Moisture content mean value followed by T_7 (80 Guava:20 Papaya + Safed musli (1.5%) with (14.11, 13.97, 13.75 and 13.56) which were significantly superior than T_0 (Control) with (15.97, 15.87, 15.08 and 14.89).

The minimum Moisture content value in Guava-Papaya fruit Cheese was recorded in T_8 (70 Guava: 30 Papaya + Safed musli (1.5%)) with 13.44 % followed by T_7 (80 Guava: 20 Papaya + Safed musli (1.5%)) with 13.56 % and the maximum was recorded in T_0 (Control) with 14.89 %.

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, 30, 60, and 90 days, among the treatment used T_8 (70 Guava: 30 Papaya +Safed musli (1.5%)) with (68.46, 68.57, 68.68, 68.77) ^{0}B have highest TSS content followed by T_7 (80 Guava: 20 Papaya +Safed musli (1.5%)) with (68.11, 38.23, 38.34, and 68.46) ^{0}B of were significantly superior than T_0 (Control) with (67.43, 67.54, 67.67 and 67.72) ^{0}Brix.

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, 30, 60 and 90 days, among the treatment used T_8 (70 Guava: 30 Papaya +Safed musli (1.5%) with (0.21, 0.24, 0.26 and 0.29) have minimum acidity content followed by T_7 (80 Guava: 20 Papaya + Safed musli (1.5%) with (0.23, 0.25, 0.28, and 0.31) of were significantly superior than T_0 (Control) with (0.42, 0.43, 0.45 and 0.42)

It is evident that the ascorbic acid was influenced by different treatments at all successive stage of storage. There was significant differences between the treatments at Initial, 30, 60, and 90 days, among the treatment used T_8 (70 Guava: 30 Papaya + Safed musli (1.5%) with (83.08, 75.72, 72.64 and 71.25) mg/ 100g have optimum ascorbic acid content followed by T_7 (80 Guava: 20 Papaya +Safed musli (1.5%)) with (92.46, 88.45, 85.46 and 82.65) mg/100 g of were significantly superior than T_0 (Control) with (141.25, 139.56, 136.45 and 130.59) mg/100g.

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, 30, 60, and 90 days, among the treatment used T_8 (70 Guava:30 Papaya + Safed musli (1.5%) with (4.02, 3.96, 3.92 and 3.87) have highest pH content followed by T_7(80 Guava:20 Papaya + Safed musli (1.5%) with (3.94, 3.86, 3.77 and 3.71) of were significantly superior than T_0 (Control) with (3.62, 3.53, 3.42 and 3.34) .

Colour and 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

Table 1. Effects of Value addition of Guava, Papaya, Ashwagandha, Safed musliCheese on Total Soluble Solids (^{o}Brix), Acidity (%), p^{H}, Ascorbic Acid (mg/100 g).

Symbol	Treatment Details	Moisture Content				TSS (^{0}Brix)				Acidity (%)				Ascorbic Acid (mg/100 g)				pH			
		Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS
T_0	control	15.97	15.87	15.08	14.89	67.43	67.54	67.67	67.72	0.42	0.43	0.45	0.47	141.25	139.56	136.45	130.59	3.62	3.53	3.42	3.34
T_1	100% Guava Ashwagandha powder (1.5%)	15.86	15.67	14.96	14.76	67.49	67.53	67.64	67.72	0.28	0.30	0.32	0.35	140.25	138.46	135.64	130.46	3.75	3.67	3.57	3.49
T_2	90% Guava: 10% Papaya + Ashwagandha powder (1.5%)	14.63	14.25	14.03	13.86	67.52	67.61	67.72	67.82	0.38	0.41	0.43	0.44	139.89	135.64	131.59	127.89	3.78	3.69	3.61	3.53
T_3	80% Guava: 20% Papaya + Ashwagandha powder (1.5%)	14.64	14.44	14.23	14.09	67.68	67.76	67.82	67.91	0.37	0.39	0.42	0.45	136.25	130.56	127.65	124.65	3.86	3.80	3.69	3.63
T_4	70% Guava : 30 papaya + Ashwagandha (1.5%)	14.86	14.75	14.56	13.37	68.1	68.21	68.32	68.43	0.29	0.31	0.34	0.36	120.35	116.45	112.45	107.89	3.93	3.83	3.75	3.65
T_5	100% Guava + Safedmusli (1.5%)	14.97	14.86	14.66	14.51	68.02	68.107	68.18	68.41	0.35	0.38	0.41	0.43	105.64	101.25	97.56	96.59	3.86	3.72	3.68	3.60
T_6	90% Guava: 10% Papaya + Safed musli (1.5%)	14.09	13.89	13.68	13.49	67.86	67.957	68.04	68.163	0.27	0.29	0.31	0.34	98.64	89.65	87.59	83.46	3.76	3.73	3.62	3.53
T_7	80% Guava: 20% Papaya + Safed musli (1.5%)	14.11	13.97	13.75	13.56	68.11	68.23	68.34	68.46	0.23	0.25	0.28	0.31	92.46	88.45	85.46	82.65	3.94	3.86	3.77	3.72
T_8	70% Guava: 30% Papaya + Safedmusli (1.5%)	14.03	13.87	13.66	13.44	68.46	68.57	68.68	68.77	0.21	0.24	0.26	0.29	83.08	75.72	72.64	71.25	4.02	3.96	3.92	3.87
	F cal.	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	S(Ed)	0.21	0.24	0.23	0.24	0.15	0.15	0.16	0.24	0.06	0.07	0.07	0.06	3.56	3.26	3.71	3.21	0.21	0.27	0.25	0.24
	CD	0.45	0.49	0.47	0.49	0.31	0.31	0.33	0.49	0.13	0.15	0.16	0.13	7.25	6.42	7.38	6.25	0.43	0.55	0.51	0.49

Initial, 30, 60, and 90 days, among the treatment used T_8 (70 Guava: 30 Papaya +Safed musli (1.5%) with (9.00, 8.89, 8.76 and 8.61) have highest colour and appearance mean value followed by T_7 (80 Guava:20 Papaya +Safed musli (1.5%) with (8.88, 8.72, 8.61 and 8.51) which were significantly superior than T_0 (Control) with (5.67, 5.52, 5.42 and 5.31).

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, 30, 60, and 90 days, among the treatment used T_8 (70 Guava:30 Papaya +Safed musli (1.5%)) with (9.00, 8.79, 8.61 and 8.49) have highest Flavour and Taste mean value followed by T_7 (80 Guava:20 Papaya +Safed musli (1.5%)) with (8.56, 8.39, 8.21 and 8.05) which were significantly superior than T_0 (Control) with (6.34, 6.21, 6.11 and 5.89) .

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, 30, 60 and 90 days, among the treatment used T_8 (70 Guava:30 Papaya +Safed musli (1.5%) with (9.00, 8.85, 8.64 and 8.49) have highest Overall Acceptability mean value followed by T_7 (80 Guava:20 Papaya + Safed musli (1.5%) with (8.88, 8.72, 7.61 and 7.42) which were significantly superior than T_0 (Control) with (6.53, 6.42, 6.32 and 6.21).

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. There was significant differences between the treatments on shelf life, 149.80 among the treatment used T_8 (70 Guava: 30 Papaya + Safed musli (1.5%)) with 88.78 days have highest shelf life mean value followed by T_7 (80 Guava: 20 Papaya + safedmusli (1.5%)) with (147.20 days) which were significantly superior than T_0 (Control) with (138.00 days).

DISCUSSION

Deterioration in moisture content due to evaporation of enzymatic and non-enzymatic

Table 2. Effects of Value addition of Guava, Papaya, Ashwagandha, Safed musli Cheese on Score for Colour and Appearance, Score for Flavour and Taste, Score for Texture, Score for Overall acceptability.

Symbol	Treatment Details	Colour and Appearance				Flavour and Taste				Overall acceptability				Texture			
		Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS	Initial	30 DAS	60 DAS	90 DAS
T_0	control	5.67	5.52	5.42	5.31	6.34	6.21	6.11	5.89	6.53	6.42	6.32	6.21	6.65	6.52	6.41	6.21
T_1	100% Guava Ashwagandha powder (1.5%)	6.87	6.73	6.62	6.42	6.62	6.51	6.43	6.31	6.85	6.71	6.58	6.41	6.9	6.56	6.38	6.25
T_2	90% Guava:10% Papaya + Ashwagandha powder (1.5%)	6.66	6.57	6.43	6.31	6.8	6.75	6.66	6.55	6.84	6.75	6.59	6.41	7.02	6.89	6.72	6.61
T_3	80% Guava:20% Papaya + Ashwagandha powder (1.5%)	7.56	7.42	7.31	7.19	7.1	7.63	6.65	6.42	7.36	7.02	6.89	6.72	7.21	7.1	6.89	6.76
T_4	70% Guava :30 papaya +Ashwagandha (1.5%)	7.82	7.71	7.59	7.41	7.39	7.02	6.95	6.72	7.6	7.49	7.31	7.2	7.26	7.13	6.95	6.78
T_5	100% Guava +Safedmusli (1.5%)	8.06	7.92	7.83	6.45	7.51	7.35	7.05	6.89	7.38	7.28	7.09	6.89	8.02	7.89	7.72	7.53
T_6	90% Guava:10% Papaya +Safed musli (1.5%)	7.36	6.95	6.82	6.71	7.88	7.65	7.51	7.39	7.9	7.76	7.62	7.45	7.81	7.72	7.53	7.39
T_7	80% Guava:20% Papaya +Safed musli (1.5%)	8.88	8.72	8.61	8.51	8.56	8.39	8.21	8.05	8.88	8.72	7.61	7.42	8.92	8.78	7.61	8.49
T_8	70% Guava: 30% Papaya + safedmusli (1.5%)	**9**	**8.89**	**8.76**	**8.61**	**9**	**8.79**	**8.61**	**8.49**	**9**	**8.85**	**8.64**	**8.49**	**9.00**	**8.89**	**8.67**	**8.51**
	F cal.	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
	Sed.	0.13	0.13	0.13	0.13	0.25	0.25	0.24	0.23	0.14	0.14	0.14	0.14	0.35	0.35	0.41	0.42
	CD	0.27	0.27	0.27	0.27	0.52	0.51	0.50	0.47	0.29	0.29	0.29	0.29	0.71	0.72	0.83	0.85

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. A slight increase in total soluble solids during storage might be due to conversion of polysaccharides (present in fruits) into sugars during hydrolysis process. Jaiswal *et al*., (2008) reported that degradation of pectic substances into soluble solids might have contributed towards increase the level of acidity during storage period of aonla cheese. The decrease in ascorbic acid 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) reported similar finding with lime-aonla blended RTS.

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. The decreasing trend was observed for flavour, taste and texture with increase storage period. This might be due to degradation of volatile substance and flavour constituents. Similar result was reported by Nayak *et al*. (2011) in aonlasegments-in-syrup prepared from stored fruits. Jain *et al.* (2007) in aonla RTS beverage.

CONCLUSION

Based on above study with value added guava-papaya cheese, most of the treatments showed acceptable results. It was observed that **T0 (control)** showed minimum loss in physiological weight of storage, minimum pH and TSS. **T8(70%** Guava – 30% papaya + safedmusli @1.5%)showed a higher ascorbic acid during the storage period. T8 have all the desirable qualities and is having most overall acceptability throughout the storage period.

By far, it can be concluded that T8 (70% Guava - 30% papaya cheese + safedmusli @1.5%) is the best value added product as for the overall acceptability and physicochemical properties and it can be standardized in commercial scale.

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