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Standardization of Recipe for Value Added Herbal Kinnow and Guava Jelly for its Better Quality and Shelf Life

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

During the years 2022-2023, a field experiment was carried out at the Post Harvest Laboratory of Horticulture Department, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj to investigate "Standardization of recipe for value-added Herbal Kinnow and Guava jelly for better quality and shelf life." The experiment was carried out using a Completely Randomized Design (CRD), with ten treatments replicated thrice. Total number of treatments were ten viz. (T0 Control + 50% Sugar), (T1 50% Sugar + 2.0 g Ginger Extract), (T2 50% Sugar + 4.0 g Ginger Extract), (T3 50% Sugar + 6.0 g Ginger Extract), (T4 50% Sugar + 2.0 g Cardamom), (T5 50% Sugar + 4.0 g Cardamom), (T6 50% Sugar + 6.0 g Cardamom), (T7 50% Sugar + 2.0 g Mint Extract), (T8 50% Sugar + 4.0 g Mint Extract), (T9 50% Sugar + 6.0 g Mint Extract). The treatment (T6 50% Sugar + 6.0 g Cardamom) was found superior in respect of

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parameters like TSS(0Brix), pH, acidity(%), ascorbic acid (mg/100g), reducing sugar(%), non-reducing sugar(%), Colour score, texture, flavour, taste, overall acceptability.The benefit-cost ratio was found to be the highest (1:2.20) in the treatment (T6 50% Sugar + 6.0 g Cardamom). Maximum Mean shelf life of 41.66 days was found in (T6 50% Sugar + 6.0 g Cardamom).

Keywords: Herbal; kinnow -guava jelly; sugar; ginger; cardamom; mint.

1. INTRODUCTION

In India, citrus ranks third in terms of output and acreage after mango and banana. Mandarin occupies a prominent position and makes up more than 50% of the area covered by citrus fruits [1]. The most desirable among the new exotic cultivars cultivated in India is beyond any doubt Kinnow, a cross between "King" and "Willow leaf mandarins." It has developed significantly and is currently commonly cultivated in Northern India's irrigated regions [2]. Numerous producers have started cultivating it on a commercial basis since it yields fruit with high dessert quality, is less prone to citrus decline, and has a low incidence of granulation [3]. Additionally, it possesses a broad range of paedoclimatic adaptation and early bearing. A fruit high in nutrients, kinnow has total soluble solids of 14%, acidity of 0.79%, reducing sugar of 4.83%, pectin of 0.97%, and ascorbic acid of 26.50 mg/l 00 ml [4]. The fruits have a distinctively attractive fragrance and generally juicy with a pleasant flavor.

Guava (*Psidium guajava* Linn.) is well-known for its culinary and dietary benefits all over the world. Quercetin, Guaijaverin, Isoflavonoids, Gallic Acid, Catechin, Epicatechin, Rutin, Naringenin, Kaempferol Flavonoids, and Galactose-Specific Lecithins are only a few of the plant-derived compounds that have demonstrated potential efficacy. studies investigating the effects of various leaf, seed, pulp, skin, and fruit extracts in varying concentrations on the prevention of cancer, management of blood pressure, and treatment of diarrhea in mice and other animal models as well as in controlled human research. Scientific research has verified several of the traditional applications. The plant's principal constituents have been thoroughly investigated for their pharmacological action, and the results demonstrate antioxidant, antipyretic, antifungal, antibacterial, hypotensive, analgesic & anti-inflammatory effects [5,6].

Ginger is a spice that may be used both in cooking and as a delicacy or medication. It is the subterranean stem of the Zingiber officinale plant, which produces ginger. Zingerone, shogaols, and gingerols are a combination of volatile oils that make up one to three percent of the weight of the freshly harvested ginger root and give it its distinctive flavor and aroma. The digestive tract's motility is enhanced in experimental mice by gingerols, which also have analgesic, sedative, antipyretic, and antibacterial activities. The nonvolatile phenylpropanoid-derived substances, notably gingerols, and shogaols, which are formed from gingerols when ginger is dried or cooked, are what give ginger its pungent flavor. During this process, gingerols are also converted into gingerone, a less fragrant substance with a spicy sweet aroma taste [7,8].

Mint has delicate stems and soft leaves. It is better to add them either uncooked or just before serving. They retain their delicate flavour and texture thanks to this. Mint is a sustainable approach to flavour food since it is reasonably simple to grow and can be grown at home. A little under a third of a cup, about 14 grams, of spearmint Calories: 6 grams Fibre: one gram. 12% of the RDI for vitamin A 9% of the RDI is iron. 8% of the RDI for manganese 4% of the RDI for folate. Irritable bowel syndrome (IBS) is a prevalent condition that affects the digestive system. Digestion-related symptoms such as gas, bloating, stomach discomfort, and changes in bowel habits are its hallmarks [9].

In South Asia, green cardamom is frequently used to treat digestive disorders and to prevent infections of the teeth and gums, as well as to prevent and cure throat problems, lung congestion, pulmonary tuberculosis, inflammation of the eyelids, and infections of the teeth and gums. It was reputedly used as an antidote for both snake and scorpion venom, as well as to dissolve kidney and gall stones. In systems such as traditional Chinese medicine in China, Ayurveda in India, Japan, Korea, and Vietnam, amomum is utilized as a spice and an ingredient. Traditional Indian medicine utilizes species from the genus Amomum [10].

2. MATERIALS AND METHODS

The Experimental was conducted in Completely Randomized Design (CRD) with 10 treatments of

different level of Guava, Kinnow and sugar with three replications in the Post Harvest Laboratory of Department of Horticulture, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during 2022-23. Total number of treatments were nine viz. T0 (Control + 50% Sugar), T1 (50% Sugar + 2.0 g Ginger Extract), T2 (50% Sugar + 4.0 g Ginger Extract), T3 (50% Sugar + 6.0 g Ginger Extract), T4 (50% Sugar + 2.0 g Cardamom), T5 (50% Sugar + 4.0 g Cardamom), T6 (50% Sugar + 6.0 g Cardamom), T7 (50% Sugar + 2.0 g Mint Extract), T8 (50% Sugar + 4.0 g Mint Extract), T9 (50% Sugar + 6.0 g Mint Extract).

The experiment utilized a Completely Randomized Design (Panse and Sukhatme, 1985) with three replications for each of the ten treatment combinations. Quality attributes like TSS (ºBrix), pH, acidity (%), ascorbic acid (mg/100 gm) of jelly, reducing sugar (%) and non-reducing sugar (%) and Sensory attributes like colour, flavour, taste, aroma and overall acceptability was successfully taken at 0, 15, 30 and 45 days after storage.

The economic factors were also determined by calculating the Benefit Cost ratio in the given research.

3. RESULTS AND DISCUSSION

The present investigation entitled “Standardization of recipe for value added Herbal Kinnow and Guava jelly for its better quality and shelf life” was carried out during 2022-23 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 Kinnow and Guava jelly, 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 10 treatments, and three replications.

3.1 Quality parameters

It is evident that the Table 1 was influenced by different treatments at successive stage 45 days of storage. There was significant differences between the treatments. The quality parameters on TSS (°brix), was recorded in T6(500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (69.91) followed by T7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) withT7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) with (69.89) and minimum was T0 (Control). However T0 (Control) was recorded (0.63) highest acidity (%), followed by T_2-(500 Ml Kinnow Juice + 500 Ml Guava Juice + 4.0 g Ginger Extract) and minimum T9 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Mint Extract) with (0.32). in case of Reducing Sugar (%), treatments T6(500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (37.75), followed by T7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) and minimum was T0 (Control) with (30.97). similarly in Non Reducing Sugar (%),treatment used T8(500 ml Kinnow Juice + 500 ml Guava Juice + 4.0 g Mint Extract) with (35.60), followed by T7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) and minimum T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (23.90). Among the treatment used T8(500 ml Kinnow Juice + 500 ml Guava Juice + 4.0 g Mint Extract) with (3.76), followed by T7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) and minimum was T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (3.29) in pH and Ascorbic Acid (mg/100gm) treatment T6(500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (42.33), followed by T7 (500 ml Kinnow Juice + 500 ml Guava Juice + 2.0 g Mint Extract) and minimum ascorbic acid T0-Control with (39.45). 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 [11]. 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 in aonla RTS beverage [12]. Degradation of pectin substances into soluble solids might have contributed towards increase the level of acidity in the during storage period of aonla jam. [13] 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 and Deka et al. reported similar finding with lime aonla blended RTS [14,15]. The present findings are in agreement with those of Khan et al. [16] who observed decrease in non-reducing sugar in strawberry jam during storage of 60 days at ambient temperature. [17] also reported a similar trend in jam, squash and RTS

Table 1. Effect of different treatments on quality parameters of Kinnow-Guava Jelly

Treatments	TSS (°brix)	Acidity (%)	Reducing Sugar (%)	Non Reducing Sugar (%)	pH	Ascorbic Acid (mg/100gm)
T0	68.96	0.63	30.97	25.97	3.29	39.45
T1	69.14	0.41	32.14	27.57	3.46	40.23
T2	69.09	0.58	32.84	26.87	3.45	40.41
T3	69.25	0.32	32.94	27.14	3.55	41.55
T4	69.33	0.36	34.37	24.27	3.6	41.31
T5	69.74	0.46	33.51	30.4	3.55	41.01
T6	69.91	0.32	37.75	23.9	3.42	42.33
T7	69.89	0.35	35.71	34.64	3.62	41.49
T8	69.49	0.43	33.07	35.6	3.76	40.53
T9	69.66	0.32	33.24	30.57	3.63	41.01
Result	S	S	S	S	S	S
S. Ed. (±)	0.3	0.117	0.353	0.394	0.104	0.208
C.D. at 5%	0.636	0.249	0.749	0.836	0.221	0.442
CV	16.434	6.428	19.349	21.607	5.715	11.409

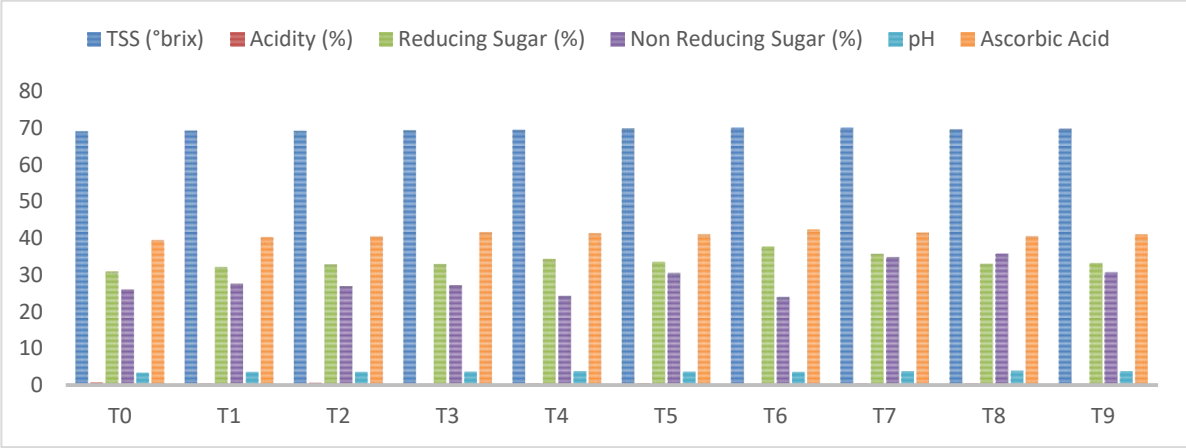

Fig. 1. Effect of different treatments on quality parameters of Kinnow-Guava Jelly

Table 2. Effect of different treatments on Sensory Evaluation of Kinnow-Guava Jelly

Treatments	Colour	Flavour	Taste	Aroma	Overall Acceptability
T0	6.43	6	6.2	6	6.09
T1	6.77	6.6	6.8	6.6	6.67
T2	7.43	7.2	7.4	7.4	7.37
T3	8.17	7.7	8	8	7.93
T4	6.6	6.2	6.4	6.2	6.32
T5	7.17	7	7.3	7.2	7.17
T6	8.5	8.2	8.2	8.4	8.28
T7	7	6.8	7.1	7.1	7
T8	7.6	7.5	7.6	7.6	7.56
T9	7.8	7.6	7.8	7.8	7.74
Result	S	S	S	S	S
S. Ed. (±)	0.317	0.266	0.244	0.251	0.256
C.D. at 5%	0.672	0.564	0.518	0.533	0.543
CV	17.367	14.575	13.383	13.77	17.367

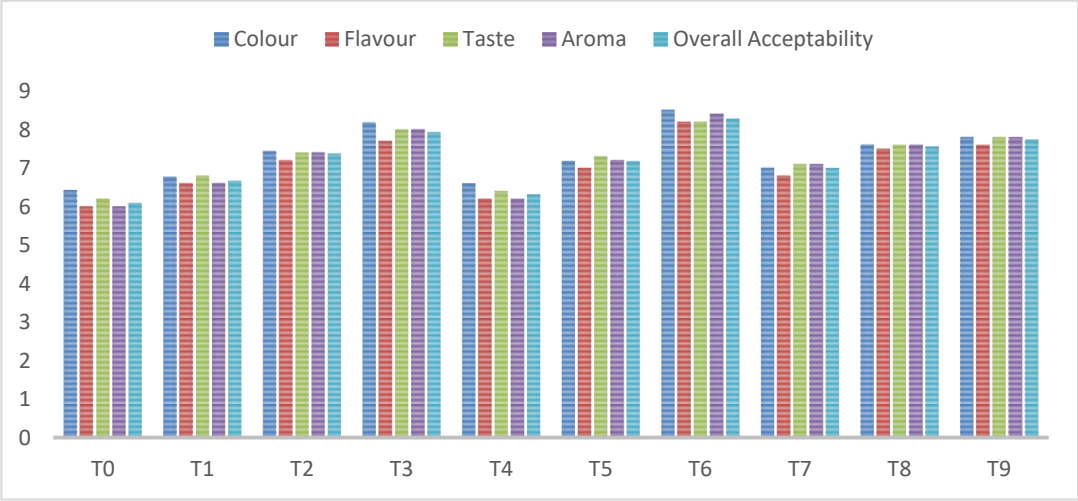

Fig. 2. Effect of different treatments on Sensory Evaluation of Kinnow-Guava Jelly

Table 3. Cost of production

Treatments	Common expenditure (Rs)(1924.526÷8)	Selling pricein market (Rs/bottle)	Gross returnfor 3 bottle (Rs)	Net returnfor 3 Bottle(Rs)	B : Cratio
T0-Control -500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar	265.57	140	420	154.43	1:1.58
T1-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 2.0 g Ginger Extract	265.57	160	480	214.43	1:1.81
T2-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 4.0 g Ginger Extract	265.57	175	525	259.43	1:1.98
T3-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 6.0 g Ginger Extract	265.57	195	585	319.43	1:2.20
T4-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 2.0 g Cardamom	265.57	160	480	214.43	1:1.81
T5-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 4.0 g Cardamom	265.57	175	525	259.43	1:1.98
T6-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 6.0 g Cardamom	265.57	195	585	319.43	1:2.20
T7-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 2.0 g Mint Extract	265.57	160	480	214.43	1:1.81
T8-500 ml Kinnow Juice + 500 ml Guava Juice + 50% Sugar + 4.0 g Mint Extract	265.57	175	525	259.43	1:1.98
T9-500 ml Kinnow Juice + 500 ml Guava Juice+ 50% Sugar + 6.0 g Mint Extract	265.57	195	585	319.43	1:2.20

beverage of local mango stored for 100 days. 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 and Rayguru et al. [18,19] also reported similar trend in apple jam. 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 and Deka et al. reported similar finding with lime aonla blended RTS [16,17].

3.2 Sensory Evaluation

It is evident that the Table 2 was influenced by different treatments at successive stage 45 days of storage. There was significant differences between the treatments. The Sensory Evaluation on Colour / Appearance score, treatment T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (8.08) have highest Colour / Appearance, followed by followed by T3 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Ginger Extract) and minimum was T0 (Control) with (6.17), however in Flavour, treatment T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (7.60) found highest Flavour, followed by T3 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Ginger Extract) and minimum was T0 (Control) with (5.50), similarly in Taste, treatment T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (7.60) were significantly superior, followed by T3 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Ginger Extract) with (7.30) and minimum was T0 (Control) with (5.70). in case of Aroma , treatment T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (7.80), followed by T3 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Ginger Extract) and minimum was T0 (Control) with (5.50) and in overall acceptability the highest score in T6 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Cardamom) with (7.74), followed by T3 (500 ml Kinnow Juice + 500 ml Guava Juice + 6.0 g Ginger Extract) and minimum was T0 (Control) with (5.63). Deterioration of colour due to enzymatic and nonenzymatic 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 in sweet orange based products [16]. 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 in aonla segments in syrup, prepared from stored fruits and in aonla RTS beverages [17,12]. Overall acceptability scores were decreased in all the treatments during storage due to decline in colour, consistency and flavour scores. Similar results were reported in aonla beverages [18,19,11].

4. CONCLUSION

Based on the data, it is stated that kinnow is ideal for making jelly when combined with guava. Because of its physicochemical properties, Organoleptic qualities, maximum Mean shelf life is of 41.66 days, maximum net return of 106.47 Rs/ Bottle, and best Benefit Cost Ratio of 1:2.20, the blend of Kinnow 50% + Guava 50% treated with 6.0gm cardamom extract i.e. T6 was found to be the best recipe for Herbal Kinnow-Guava jelly.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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