

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
ISSN Online: 2617-4707
IJABR 2024; 8(11): 617-620
www.biochemjournal.com
Received: 12-09-2024
Accepted: 16-10-2024

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Preparation of jackfruit-kokum blended jelly and their sensory evaluation

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DOI: <https://doi.org/10.33545/26174693.2024.v8.i11h.2928>

Abstract

Jackfruit and kokum are nutritionally and medicinally valuable fruits. However, massive post-harvest losses are found in these fruits. To reduce post-harvest losses in jackfruit and kokum, value addition is the best choice. As a result, a study was conducted in 2021-2022 to prepare jackfruit-kokum blended jelly using a completely randomised design with six blended juice treatments: T₁ (100% jackfruit juice + 0% kokum juice), T₂ (90% jackfruit juice + 10% kokum juice), T₃ (80% jackfruit juice + 20% kokum juice), T₄ (70% jackfruit juice + 30% kokum juice), T₅ (60% jackfruit juice + 40% kokum juice), and T₆ (50% jackfruit juice + 50% kokum juice). From the study of sensory evaluation, it was observed that the jelly prepared from treatment T₂ (90% jackfruit juice: 10% kokum juice) was found to be best. The cost of production of 200 g jelly in glass jars was found to be increased from T₁ to T₆. T₁ recorded Rs. 17.54 cost of production and T₆ recorded Rs. 31.47. BC ratio was found to be decreased from T₁ to T₆. Highest BC ratio was recorded by T₁ (3.13) followed by T₂ (2.91) and there was not saw microbial growth at 0 month

Keywords: Jackfruit, kokum, blended jelly, sensory evaluation, microbial count, cost of production

Introduction

Ripe jackfruit is recognised as a pleasant and nutritious fruit. Jackfruit contains a variety of nutrients, including vitamin A, vitamin C, calcium, potassium, sodium, thiamine, iron, and zinc. It also provides carbs and aids the body's muscular and strength development. Jackfruit contains vitamin C, an antioxidant that protects the body from free radicals, enhances immunity, and maintains healthy gums^[5].

After being processed and dried, the ripe jackfruit pulp is marketed as dry pulp. Jackfruit can also be used to make juice, biscuits, chutney, jam, jelly, toffee, pastes, leathers, bars, nectar, squash, pickles, seed flour, jackfruit chocolate, jackfruit candy, jackfruit cake, muffins, pudding, jackfruit wine, dehydrated raw jackfruit slices, jackfruit rind jelly and frozen jackfruit^[8].

The fruit rind of kokum is a rich source of Hydroxyl Citric Acid (HCA), which is the primary natural source used in the development of anti-obesity medications because it inhibits the build-up of fat in body cells^[7]. It is also brimming with β-complex vitamins, minerals, and manganese, which help regulate blood pressure and heart rhythm and protect against heart attacks and strokes. Examples of these are magnesium, manganese, and potassium. Garcinol, HCA, and anthocyanin pigment are the three major chemical components found in kokum fruit rind.

A variety of commercially produced value-added products are made from kokum fruits, including kokum butter, dry rind (Amsol), pickles, jam, nectar, pickle, RTS, and squash.

In 2018, India produced 18,57,000 MT of jackfruit on 1,87,000 hectares of land^[3]. On 1000 hectares of land in Maharashtra, kokum is grown with a production of 4500 MT and a productivity of up to 4.5 tonnes/ha in the Konkan area^[4].

Despite having beneficial nutritional and therapeutic qualities, 60–70% of jackfruit and kokum fruits are lost after harvest. Value addition will be the most advantageous strategy to lessen these post-harvest losses. Therefore, there is currently a demand for research on novel products made from these fruits.

Objective and Hypothesis

In order to make blended jelly from jackfruit and kokum, a research was undertaken. Such a nutritious and medicinally rich food will be in high demand if it is produced commercially

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since consumers are becoming more aware of their health.

Materials and Methods

The current study was conducted in 2021–2022 at the Fruit and Vegetable Processing Unit, College of Horticulture, Dapoli–415712, Dist. Ratnagiri, Maharashtra State, India. The study involved kokum and soft flesh jackfruits. Jelly with a combined jackfruit-kokum flavour was made throughout the experiment. storage at room temperature (27 to 30 °C), the sensory assessment of blended jelly were investigated.

Experimental material

Crop	Jackfruit and Kokum
Design	CRD
No. of treatments	6
No. of replications	4
No. of glass jars used per treatment per replication	4
Total glass jars used	96

Treatment details

Treatments	Jackfruit juice (%)	Kokum juice (%)
T ₁	100	0
T ₂	90	10
T ₃	80	20
T ₄	70	30
T ₅	60	40
T ₆	50	50

Juice Extraction: Jackfruit that was disease-free, well-ripe, and in good condition was gathered and stored to ripen. To ensure that no dirt or mud clung to the fruit's surface, a 100 ppm sodium hypo chloride solution was used to completely wash the fruits. Fruits were chopped and the carpels were removed from the seed using a sharp, clean knife. Helicoidal juice extractor was then filled with carpel. Following pulp

extraction, jackfruit pulp was boiled for about 15 minutes with water added in a 1:1 ratio. A piece of muslin cloth was then used to extract juice. Trees yield ripe, healthy fruits that are free of diseases and have a good hue. Fruits were then put on an electric balance to weigh them. To get rid of dust and natural debris, kokum fruits were then thrice washed. Cut fruits were used to Keep the pulp and rind apart. Then the seed, rind, and pulp were weighed using an electronic balance. Kokum juice was extracted using a basket press after the rind was ground in a heavy-duty mixer. Next, the kokum juice is filtered using muslin cloth.

According to procedures, the juice of jackfruit and kokum was combined in a pan, and the blended juice was weighed using a weighing scale. In accordance with the pectin test, sugar was added to blended juice. Juice and sugar were well combined, and the mixture was heated gently while stirring from time to time. At the very end, preservatives (236 mg/kg) of sodium benzoate were added. A spoon was dipped into a boiling mass of jelly, and after cooling, the jelly was allowed to fall back into the vessel. This method was used to determine the jelly's end point by measuring the total soluble solids over 65 °Brix using a hand refractometer. Jelly signifies that the final point has been achieved when it falls in the form of a sheet. Pouring the jelly into a glass jar was now possible. Clean, dry, and sterilized glass bottles were filled with prepared hot jelly. Glass bottles that had been filled were correctly screw-capped, allowed to cool in the air, and then kept at room temperature in anticipation of more research.

Total soluble solids (TSS) were determined with the help of a hand refractometer (A.O.A.C., 1990) [1] and it was expressed in °Brix. The jackfruit-kokum blended jelly was examined for its qualities. The evaluation of sensory qualities in terms of colour, flavour, texture and overall acceptability was done at '0' months by 9- point hedonic scale [2]. Data regarding the changes in sensory qualities of jackfruit-kokum blended jelly is presented below.

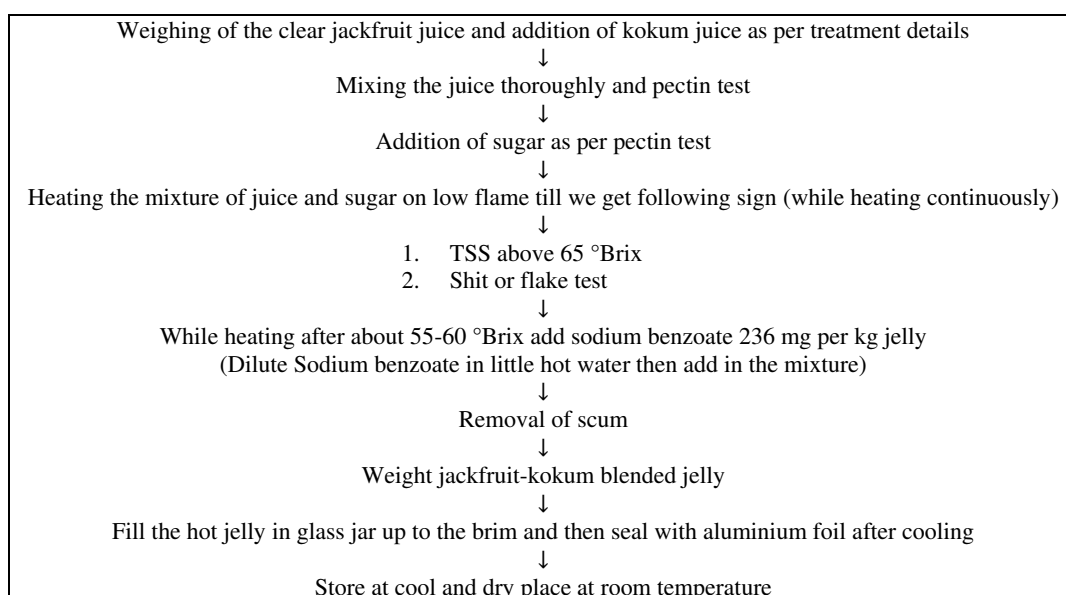


Fig 1: Preparation of jackfruit-kokum blended jelly

Result and Discussion

Colour

The data regarding changes in Colour of jackfruit-kokum blended jelly from treatment T₁ to T₆ is presented in Table 1.

At "0" months of storage, treatment T₂ had the highest colour score (7.85), whereas treatment T₃ (7.59) was comparable to treatment T₂. The treatment T₆ score (6.83) had the lowest colour score.

The colour score was increased from T₁ to T₂ and then decreased from T₂ to T₆ at '0' month. Decrease in colour score from T₂ to T₆ may be due to increase in proportion of kokum juice. Highest colour score recorded by T₂ may be due to best combination of jackfruit and kokum juice which gives better colour to the jelly. Similar result was observed by Kekan (2022) ^[6] reported that score for colour was decrease range between T₁ (8.13) to T₄ (7.88) and then increased at T₅ (8.29) and again decreased till T₇ (8.04) in pineapple-kokum blended jelly.

Table 1: Changes in Colour of jackfruit-kokum blended jelly.

Treatments	Colour score
T ₁ (J: 100%+ K: 0%)	7.10
T ₂ (J: 90% + K: 10%)	7.85
T ₃ (J: 80% + K: 20%)	7.59
T ₄ (J: 70% + K: 30%)	7.41
T ₅ (J: 60% + K: 40%)	7.01
T ₆ (J: 50% + K: 50%)	6.83
MEAN	7.29
S.Em. ±	0.07
C.D. at 1%	0.27

Note: J: Jackfruit juice, K: Kokum juice

Flavour

Table 2 provides the information on variations in the flavour of the blended jelly made of jackfruit and kokum.

At '0' month storage the significantly highest score for flavour was recorded in treatment T₁ (8.05) and it was at par with T₂ (7.92). The lowest score for flavour was recorded in treatment T₆ (6.63).

The flavour score was found to be decreased from T₁ to T₆ at '0'. This may be due to a decrease in the percentage of jackfruit juice from T₁ to T₆ who have strong flavour. Kekan (2022) ^[6] reported that score for flavour was decrease from T₁ (8.00) to T₃ (7.33) and then increased at T₄ (8.08) and T₅ (8.29) and again decreased till T₇ (7.46) in pineapple-kokum blended jelly.

Table 2: Changes in flavour of jackfruit-kokum blended jelly.

Treatments	Flavour score
T ₁ (J: 100%+ K: 0%)	8.05
T ₂ (J: 90% + K: 10%)	7.92
T ₃ (J: 80% + K: 20%)	7.37
T ₄ (J: 70% + K: 30%)	7.12
T ₅ (J: 60% + K: 40%)	6.84
T ₆ (J: 50% + K: 50%)	6.63
MEAN	7.32
S.Em. ±	0.03
C.D. at 1%	0.13

Note: J: Jackfruit juice, K: Kokum juice

Texture

The data presented in the Table 3 indicate the texture of jackfruit-kokum blended jelly.

The texture score was found to be increased from T₁ to T₂ and then decreased from T₂ to T₆. The decrease in texture score may be due to the decrease in percentage of jackfruit juice from T₂ to T₆ which has a good amount of pectin than kokum juice.

At '0' month storage the significantly highest score for texture was recorded in treatment T₂ (7.28). The minimum score for texture was recorded in treatment T₆ (6.75). Similar result was observed by Kekan (2022) ^[6] reported that score for texture decreased from T₁ (8.25) to T₇ (6.96)

except T₄ (8.04) and T₅ (8.46) in pineapple-kokum blended jelly.

Table 3: Changes in texture of jackfruit-kokum blended jelly.

Treatments	Texture score
T ₁ (J: 100% + K: 0%)	7.10
T ₂ (J: 90% + K: 10%)	7.28
T ₃ (J: 80% + K: 20%)	7.09
T ₄ (J: 70% + K: 30%)	6.93
T ₅ (J: 60% + K: 40%)	6.84
T ₆ (J: 50% + K: 50%)	6.75
MEAN	6.99
S.Em. ±	0.027
C.D. at 1%	0.12

Note: J: Jackfruit juice, K: Kokum juice

Overall acceptability

The data related to changes in the overall acceptability of jackfruit-kokum blended jelly from T₁ to T₆ are presented in the Table 4.

At '0' month storage significantly highest score for overall acceptability was recorded in treatment T₂ (7.68). The minimum score for overall acceptability was recorded in treatment T₆ (6.73).

Overall acceptability score was found to be increased from T₁ to T₂ and then decreased from T₂ to T₆. This may be due to the effect of similar increase and decrease in colour and texture score and even decrease in flavour score from T₁ to T₆. Similar result was found by Kekan (2022) ^[6] who reported that overall acceptability was decreased from T₁ (8.13) to T₃ (7.57) and T₆ (7.81) to T₇ (7.49) except T₄ (8.00) and T₅ (8.35) in pineapple-kokum blended jelly.

Table 4: Changes in overall acceptability of jackfruit-kokum blended jelly

Treatments	Overall acceptability score
T ₁ (J: 100%+ K: 0%)	7.41
T ₂ (J: 90% + K: 10%)	7.68
T ₃ (J: 80% + K: 20%)	7.35
T ₄ (J: 70% + K: 30%)	7.15
T ₅ (J: 60% + K: 40%)	6.89
T ₆ (J: 50% + K: 50%)	6.73
MEAN	7.20
S.Em. ±	0.054
C.D. at 1%	0.23

Note: J: Jackfruit juice, K: Kokum juice

Microbial Count

With respect to data regarding microbial count of jackfruit-kokum blended jelly, it is seen that there was no microbial growth observed in jackfruit-kokum blended jelly at '0' month of storage at ambient temperature. Similar results were reported by Kekan *et al.* (2019) ^[6] in pineapple kokum blended jelly. They observed that there was no microbial growth in pineapple kokum blended jelly at initial storage at ambient conditions.

Cost of production

The cost of production of 1 kg jackfruit kokum blended jelly is presented in the Table 18. Cost of production of jackfruit-kokum blended jelly increased with respect to different treatments.

From the table it can be seen that the expenditure for the production of 1 kg jackfruit-kokum blended jelly was found maximum (Rs.148.54) in T₆ i.e. (jackfruit juice 50%: kokum

juice 50%) and minimum (Rs. 154.38) in T₁(100% jackfruit juice). Highest net profit of 154.38 was obtained from treatment T₁ and lowest net profit of Rs. 148.54 was obtained from treatment T₆.

According to sensory evaluation of jackfruit-kokum blended jelly treatment T₂ (jackfruit juice 90%: kokum juice 10%) was most acceptable. Selling price of blended jelly was found to be highest among all treatments in T₂ i.e. (Rs. 60/200g) and its benefit cost ratio is 2.41. The minimum selling price was recorded in T₅ (Rs. 45/200g) and T₆ (Rs. 40/200g).

The benefit cost ratio of jackfruit-kokum blended jelly decreased with increase in proportion of kokum juice from T₂ (2.41) to T₃ (1.35). The benefit cost ratio of 100% jackfruit jelly (T₁) was 2.60.

Conclusion

In the current examination of the study of jackfruit-kokum blended jelly, it was found that the sensory score for colour, flavour, texture and overall acceptability dropped from treatment T₁ (100% jackfruit juice) to T₆ (J: 50% + K: 50%), except T₂ (90% jackfruit juice:10% kokum juice) in case of colour, texture and overall acceptability. no microbial growth was detected at '0' month storage. In the current study for jackfruit-kokum blended jelly, among the different treatments, treatment T₁ recorded minimum (Rs. 17.54) cost of production of 200 g jelly in glass jars and T₆ recorded maximum (Rs.31.54). The cost of production of jelly was found to be increased from T₁ to T₆. The highest BC ratio was recorded by T₁ (3.13), followed by T₂ (2.91), T₃ (2.37), T₄ (2.14), T₅ (1.61) and T₆ (1.27).

Acknowledgements

This work is a part of M.Sc research work, at College of Horticulture, DBSKKV, Dapoli, (M.S.), India. The authors are thankful to the Head and Associate Dean, College of Horticulture, DBSKKV, Dapoli and Research Guide for providing the facilities. Authors extend their sincere thanks to the colleagues of M.Sc. student, Department of Fruit Science College of Horticulture, Dapoli for their support in data collection.

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