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Akash Vilas Galande

College of Horticulture,
Dr. BSKKV, Dapoli, Ratnagiri,
Maharashtra, India

Pawar CD

Professor, College of
Horticulture, Dr. BSKKV,
Dapoli, Ratnagiri, Maharashtra,
India

Anil Ramdas Kakade

Ph.D. Scholar, College of
Horticulture, Dr. BSKKV,
Dapoli, Ratnagiri, Maharashtra,
India

Corresponding Author:

Akash Vilas Galande

College of Horticulture,
Dr. BSKKV, Dapoli, Ratnagiri,
Maharashtra, India

Physicochemical properties of jackfruit and kokum

Akash Vilas Galande, Pawar CD and Anil Ramdas Kakade

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Abstract

The experiment titled “Physicochemical properties of jackfruit and kokum” was conducted during the period 2022-2023 at Pomology Laboratory, Fruit Processing Unit, College of Horticulture, Dapoli and Fruit Beverage Research Centre of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri. During research work physical and chemical composition of jackfruit and kokum juice were studied. Kokum juice had a lesser percentage of titratable acidity, ascorbic acid, anthocyanin, protein, tannin, and pectin, while jackfruit pulp had the largest percentage of T.S.S., reducing sugars, and total sugars with pH.

Keywords: Jackfruit pulp, kokum juice

Introduction

The jackfruit tree (*Artocarpus heterophyllus* L.), which belongs to the Moraceae family, is thought to have originated in Malaysia. India grows jackfruit on 1,87,000 Ha of land, producing 18,77,000 MT of fruit overall (Annon., 2021) [5]. The fruit of the jackfruit tree is consumed when it is ripe or unripe, and people often refer to jackfruit in brine as "vegetable meat." Pureed jackfruit is a common ingredient in many recipes, such as ice cream, baby food, juice, jam, jelly, candies, fruit rolls, marmalades, and jackfruit leather. Jackfruit is low in calories, with only 94 calories per 100 grams. Its carbohydrate content ranges from 37.4% to 42.5%, and its mature flesh contains 1.9 grams of proteins. The protein content of jackfruit seeds can vary from 5.3% to 6.8%. According to Subburamu *et al.* (1992) [18], 100 g of ripe flakes of jackfruit include 7–10 mg of vitamin C, 287–323 mg of potassium, 30.0–73.2 mg of calcium, and 11–19 g of carbohydrates.

The tropical spice tree kokum (*Garcinia indica* Choisy) grows in India's Western Ghats. The Konkan region grows kokum on an area of around 1000 hectares, generating about 4500 MT of fruit annually, according to a baseline assessment carried out in 2010 (Annon., 2012) [3]. Because kokum fruit contains garcinol and hydroxy citric acid (HCA), it lowers cholesterol. Kokum is used to make several different items, including butter, powder, jam, pickles, dried rind (Amsul), nectar, and jam. To appeal to consumers, the art of blending entails producing products with a variety of colours, scents, astringency levels, and tastes. Known as an Indian spice, kokum is a favourite addition to food because of its pleasant, appetizing flavour and sweet, acidic (sour) flavour. It can be used as a cooking ingredient in food, medicine, and nutraceutical products. 80 percent moisture, 1.4 percent fat, 1.7 percent tannin, 0.9 percent pectin, 14.4% crude fibre, and 1% protein make up the fresh rind of kokum. One important spice that is used as a therapeutic agent in Ayurvedic medicine is kokum. The fruit kokum is anti-acidic, anthelmintic, and cardiotoxic. Burns, piles, allergies, sunstroke, diarrhoea, dysentery, tumours, heart ailments, and other ailments can all be helped by it.

Material and Methods

The experiment titled “Physicochemical properties of jackfruit and kokum” was conducted during the period 2022-2023 at Pomology Laboratory, Fruit Processing Unit, College of Horticulture, Dapoli and Fruit Beverage Research Centre of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Ratnagiri. For this investigation fruits of jackfruit and kokum were collected from the nursery no.4 of Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth. Jackfruit pulp was prepared from deseeded bulbs (Fig.1). For extraction of juice from kokum fruit stalks were removed and then fruits were cut with kokum cutter machine and rind and seeds are separated.

Pulp was prepared from rind by using heavy duty mixer and from this pulp juice was extracted (Fig.2). The selected soft fleshed ripe jackfruit was weighed on electronic weighing balance and average of 5 jackfruits was recorded in kg. The 30 fruits were taken for the experiment and fruits were weighed on an electronic top pan balance and an average weight of 30 fruits was expressed in grams. Total soluble solids (T.S.S.) were determined by using Hand refractometer (Erma Japan, 0 to 32^oB). Reducing sugars (%), total sugars (%), titratable acidity (%) and tannin (%) content of wine were determined by using methods described by Ranganna (1997) [11]. The pH was determined with the help of pH meter. (Model Systronics μ pH system 361). Ascorbic acid (mg/100 ml), pectin (%) and anthocyanin (mg/100 ml) content of wine were determined by using methods described by Ranganna (1986) [10]. The nitrogen content of wine was estimated by Kjeldahl method using Pelican kelplus equipment. Crude protein was calculated by multiplying with a factor 6.25 (A.O.A.C., 1980) [2]. The pulp recovery from fruit was calculated by using following formula.

$$\text{Pulp recovery from fruit (\%)} = \frac{\text{Weight of pulp (kg.)}}{\text{Weight of soft flesh jackfruit (kg)}} \times 100$$

The percent juice recovery was recorded by using following formula

$$\text{Juice recovery from rind (\%)} = \frac{\text{Weight of juice (g)}}{\text{Weight of rind (g)}} \times 100$$

Results and Discussion

The data of physical parameters of soft flesh jackfruit used during experiment is given in Table1. The average weight of jackfruit was 5.30 kg. The jackfruit had 2.45 kg (46.23%) weight of bulbs, and the weight of the seed was 0.45 kg (8.49%), according to the weight of the various fruit parts and their percentages on a fruit weight basis. The weight of the rind and core, which are not edible, was 2.50 kg (47.17%) and 0.35 kg (6.60%), respectively. The pulp recovered from the bulb weighed 2.0 kg and had a pulp recovery rate of 37.74 percent based on the weight of the fruit. Similar findings were reported by Nickhil *et al.* (2016) [12], who stated that the weight of the jackfruit varied from 2.92 to 9.20 kg, the weight of the bulb retrieved from each fruit varied from 0.68 to 3.0 kg, and the weight of the jackfruit seeds varied from 0.26 to 1.04 kg per fruit. Swami *et al.* (2018) [17] observed that 18.60 to 60 percent pulp obtained from jackfruit and Garje (2023) [13] reported that the pulp recovery from jackfruit was 39.46 percent. According to Dhakar (2020) [14], each fruit's core weight ranged from 0.20 to 1.16 kg. According to Maiti *et al.* (2002) [15], Cluster-11 jackfruit had the greatest rind weight (3.359 kg), followed by Cluster -10 (2.611 kg).

Table 2 clearly shows that the kokum fruit average weight was 32.30 g. Kokum fruit had a weight of 15.90 g (49.23%) for the pulp with seeds and 16.40 g (50.77%) for the rind, both of which were calculated based on the weight of the various parts of the fruit and their percentages. The recovery of juice from rind was 47.05 percent. The results analogous to the present findings are also reported by Nair (1986) [16]. He observed that the weight of kokum fruit at maturity stage was 34.01 g. According to Haldankar *et al.* (2005) [7], the average weight of the ripe kokum fruit's rind was between 6.80 and 17.40 g, the average weight of the pulp was between 2.75 and

18.30 g, and the average weight of the seeds was between 3.80 and 8.70 g. Garje (2023) [13] reported that the juice recovery from kokum fruit rind was 48.42 percent.

The jackfruit and kokum juice contained T.S.S., reducing sugars, total sugar, pH, titratable acidity, ascorbic acid, proteins, tannins, pectin and anthocyanin are 25 ^oBrix and 9.2 ^oBrix, 7.60 and 3.20 percent, 17.02 and 5 percent, 4.64 and 2, 0.34 and 4.63 percent, 9 mg/100 ml and 15.2 mg/100 ml, 0.84 and 1.4 percent, 0.4 and 0.6 percent, 0.8 and 2.6 percent, 30 mg/100 ml and 3682 mg/100 ml, respectively. Similar findings in chemical composition of jackfruit have been recorded by Jadhav (2017) [8] while studying wine preparation from jackfruit. In case of chemical composition of kokum fruit juice results were analogous with Haldankar *et al.* (2005) [7] and Chate *et al.* (2019) [6].

Table 1: Physical parameters of jackfruit

Sr. No.	Physical parameters	Values
1	Average weight of fruit at ripe stage (kg)	5.30
2	Average weight of bulbs (kg)	2.45 (46.23%)
3	Average weight of Pulp (kg)	2.0 (37.74%)
4	Average weight of the seeds (kg)	0.45 (8.49%)
5	Average weight of rind (kg)	2.50 (47.17%)
6	Average weight of core (kg)	0.35 (6.60%)
7	Pulp recovery from fruit (%)	37.74%

Table 2: Physical parameters of kokum

Sr. No	Physical parameters	Values
1	Average weight of fruit at ripe stage (g)	32.30
2	Average weight of rind (g)	16.40 (50.77%)
3	Average weight of seeds with pulp(g)	15.90 (49.23%)
4	Juice recovery from rind (%)	47.05

Table 3: Chemical composition of jackfruit and kokum natural juice

Sr. No.	Parameters	Jackfruit pulp	Kokum juice
1	T.S.S.(^o Brix)	25.0	9.2
2	Reducing sugars (%)	7.60	3.20
3	Total sugars (%)	17.02	5.00
4	Titratable acidity (%)	0.34	4.63
5	pH	4.64	2
6	Ascorbic acid (mg/100 ml)	9	15.2
7	Proteins (%)	0.84	1.4
8	Tannins (%)	0.4	0.6
9	Pectin (%)	0.8	2.6
10	Anthocyanin (mg/100 ml)	30	3682

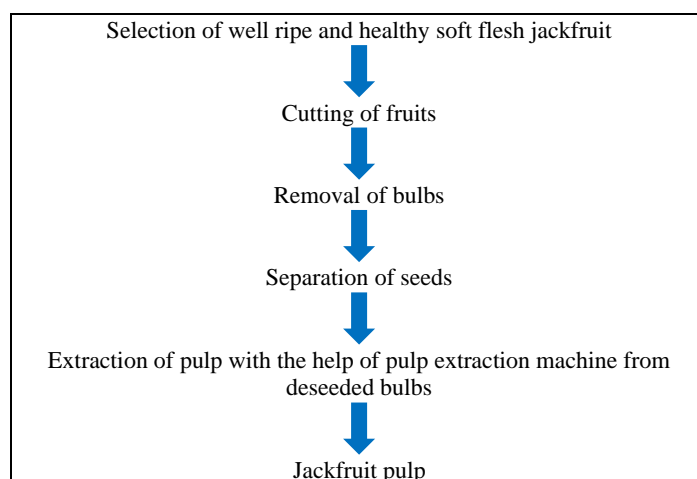


Fig 1: Preparation of soft flesh jackfruit pulp

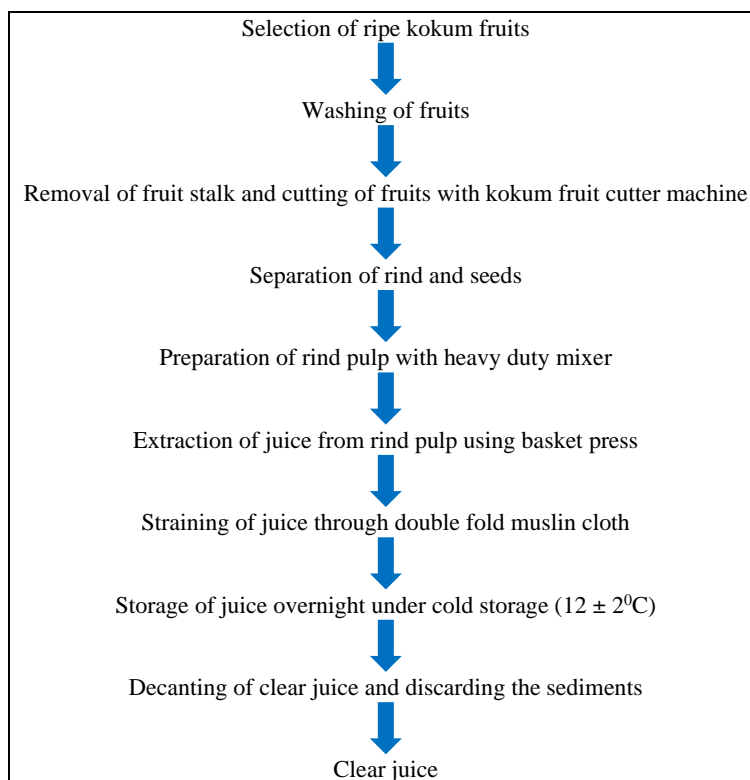


Fig 2: Extraction of juice from kokum fruits

Conclusion

Jackfruit and kokum production in the Konkan area has greatly increased. Jackfruit which is abundantly available during glut season can be utilized for preparation of various value-added products. Jackfruit is rich source of potassium and antioxidants with low acidity level. The medicinal properties and attractive natural colour of kokum juice make it suitable for blending with jackfruit in various products preparation.

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