Studies on the Development of Papaya and Musk Melon Fruit Bar

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Abstract— *Papaya and Muskmelon fruit bar enriched with palm jaggery is a nutritious product which has been shown to be effective in providing health and nutritious benefits for human beings. In present study on the development of papaya-muskmelon fruit bar enriched with palm jaggery, Papaya- muskmelon fruit bar was prepared from blend of ripe papaya and muskmelon pulp in the ratio of (50:50), cane sugar (25%), Pectin (1%), Citric acid (0.5%), on weight basis and taken as standard or control. The main aim of the present study is to replace the cane sugar with the palm jaggery in order to increase the nutrient composition of papaya- muskmelon fruit bar. The palm jaggery incorporated in three different compositions (25%, 20%, 30%) and analyzed physico- chemical, colour, texture and sensory characteristics of the Papaya-muskmelon fruit bar. The results obtained that papaya and muskmelon fruit bar enriched with palm jaggery had moisture content of about 12-15%, TSS 65-75 Brix, Total ash content of 0.04-0.5%. Colour study revealed that standard is totally different from three samples which is dark chocolate colour. Sensory characteristics revealed all the samples of the Papaya-muskmelon fruit bar enriched with palm jaggery are acceptable. In that 30% palm jaggery enriched papaya-muskmelon fruit bar is highly acceptable in appearance, taste, aroma and overall acceptability. The samples are packed in LDPE pouches, stored at room temperature (27ºC).*

Keywords— Fruit bar, palm jaggery, colour.

I. INTRODUCTION

Papaya (*Carica papaya L*) is considered as one of the important fruit because it is rich source of antioxidants, phyto-chemicals, nutrients such as; carotenes, vitamin C, and flavonoids, the B vitamins including folate and panthothenic acid, minerals such as potassium and magnesium, and dietary fiber ((Murcia et al. & Leong and Shui, 2004). The fruit is mostly consumed fresh but the immature fruit is also cooked or used in fruit salads, preserves, sauces and pies. The fruit is characterized for its active pectinolytic enzymes during ripening. Papaya (Carica papaya L) is a good source of α-carotene. Health benefits of Papaya (Carica papaya L) are diabetic cure, improves Heart health, improves digestion, cancer prevention, activate human growth hormone, reduce stress and improves bone health (Jain, 2004). Musk melon fruit is commonly known as Kharbooja in Hindi and Musk melon or Cantaloupe in English. Musk melon (Cucumis melo) vary in size, shape and rind. The outer skin may be smooth, netted, ribbed, furrowed. The Fruits are many seeded. The unique aroma of melon is composed of many volatile compounds, biosynthetically derived from fatty acids, carotenoids, amino acids and terpenes. Musk melon (Cucumis melo) is cultivated in all tropical and subtropical areas of the world for its nutritional and medicinal value. This fruit possess useful medicinal properties such as analgesic, anti-inflammatory, anti-oxidant, free radical scavenging, anti-platelet, anti- ulcer, anti-cancer, anti-microbial, hepato-protective, diuretic, anti-diabetic, anthelmintic and anti-fertility activity. The phytoconstituents from various parts of the plant include β-carotenes, Apo-carotenoids, ascorbic acid, flavonoids, terpenoids, chromone derivatives, carbohydrates, amino acids, fatty acids, phospholipids, glycolipids, volatile components and various minerals.

India stands first in terms of its wealth of palmyrah palms with a population estimated to nearly 122 million palms in the world, it has great economic potential referred to as tree of life and all parts of the palm are useful to human beings in different forms such as food, beverage, fiber, fodder and timber. The edible palm products are rich vitamin and minerals, but products are not commercialized as lack of value addition. Palm Jaggery is made from the extract of Palm trees in Southern India. These trees are also known as Toddy palm trees or Palmyra trees. The Jaggery is processed from the unfermented Palmyra tree sap called Neera. It is highly priced due to its medicinal properties. The Palm Jaggery obtained after processing is darker and richer in colour. Palm Jaggery is quite popular in the Southern states of Tamil Nadu (called Karupattivellam or panavellam), Karnataka (it is called Thaatibella in some places and Olebella in Mangalore, which is believed to be the best), Kerala and Andhra Pradesh. Palm Jaggery usually contains 65-85% sucrose and 5-15% reducing sugars, and is consumed directly or used for preparation of sweet confectionary items (like Payasams and neyyi appams) and ayurvedic/traditional medicines, and it may have a role to reduce the chance of lung cancer. It is a good source of minerals like calcium, phosphorous and iron. Due to its cooling effects over human body, it is of high value. It does not have the bone meal content which is used for whitening processed sugar. Health benefits of Palm Jaggery includes Liver detoxification, purifies blood, activates digestive enzymes, acts as energy booster, helps to reduce weight and also prevent constipation (by stimulating bowel movements). Excess consumption of sugar which is calorie rich food leads to Obesity, Heart disease and Type 2 diabetes. The attempt was made to use of palm jaggery which is substitute for Sugar in the Process technology of Papaya – Musk melon Fruit bar is to overcome the calorie intake, obesity, moreover it also reduces the risk of Heart disease and Type 2 diabetes. It offers many opportunities to develop balanced health product high in quality with respect to both sensory and nutritional aspects. Therefore the present study on "Studies on the Development of papaya- muskmelon fruit bar enriched with palm jaggery" was undertaken.

II. MATERIALS AND METHODS

The present study entitled "Studies on the Development of papaya- muskmelon fruit bar enriched with palm jaggery" was attempted to analyze the texture and appearance of the fruit bar enriched with Palm Jaggery

2.1 Preparation of Papaya and Muskmelon Fruit Pulp:

Fruits are washed and sanitized in Chlorinated water (100ppm).Leathery skin of papaya and hard rind of the muskmelons are peeled off and seeds are removed. Then, fruits are cut into cubes and pulping is done by using mechanical pulper. The papaya pulp and muskmelon pulp are blended indefinite proportions. Sugar (25%) and Palm Jaggery syrup (20%, 25%, 30%) areadded to the blended pulp and are thermally processed till it satisfies sheeting test. Then the mix is transferred to the trays and dried in cabinet tray drier for 4-6 hrs at 60°C. Finally cut the bar sheet into suitable sizes (2.5x5.0 cm) and packaged in LDPE.

TABLE 1
FORMULATION USED TO PREPARE PAPAYA-MUSKMELON FRUIT BAR ENRICHED WITH PALM JAGGERY

Papaya: Muskmelon 50:50	Citric Acid	Sugar	Palm Jaggery	Pectin
C(Control)	0.50%	25%	-	1%
S1	0.50%	-	20%	1%
S2	0.50%	-	25%	1%
S3	0.50%	-	30%	1%

The sample blended with papaya: muskmelon pulp 50:50, and sugar (25%) is now taken as control and the physical, chemical and sensory properties are studied. Papaya pulp and Musk melon pulp taken in equal proportions (50:50) were blended with each other with an amount of Citric acid, Palm Jaggery and Pectin each in different.

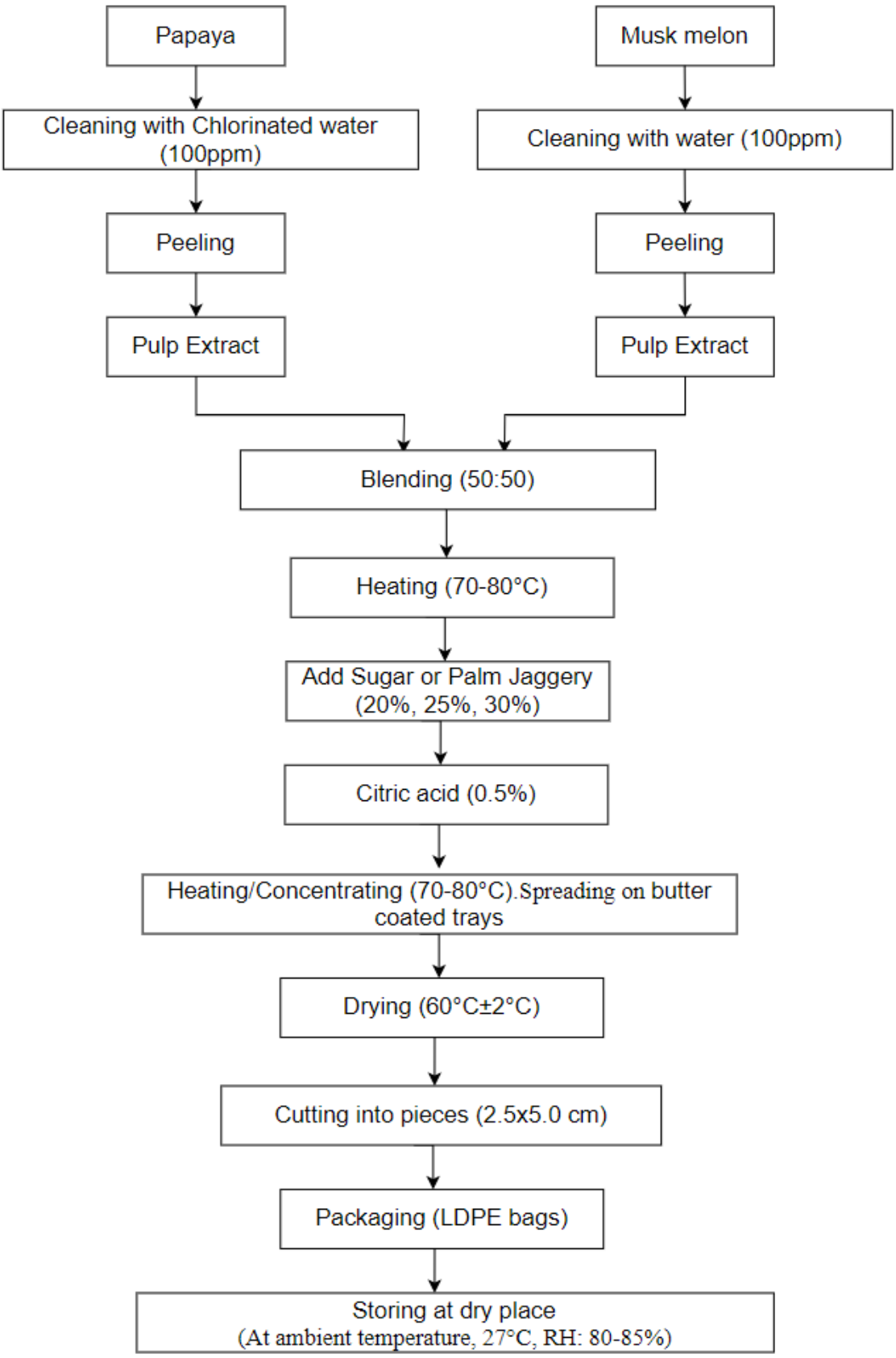

FIGURE 1: Flow chart of the process technology of papaya-muskmelon fruit barenriched with palm jaggery

2.2 Physico-chemical analysis:

2.2.1 Moisture content:

Moisture content of the Papaya-Musk melon fruit bar enriched with Palm Jaggery determined according to (AOAC, Analysis, Official methods of Agricultural Chemists, 1990) method.

2.2.2 Total Soluble Solids:

TSS is the most important quality parameter used to indicate sweetness of fresh and processed food products. A hand refractometer is used to measure the total solublesolids of the sample. A Hand refractometer works on the principle of total refraction. A few drops of sample were taken on prism of refractometer and direct reading was taken and the results were expressed as percent soluble solids (^{0}Brix). The total soluble solids in all the treatments of samples were directly recorded with the help of hand refractometer for 21 days at 7 days of intervals.

2.2.3 pH:

The pH of each sample was determined with the help of digital pH meter. The pH meter was standardized by using buffers of pH 7.00 and 4.00 prior to recording pHof the samples. A sufficient quantity (50mL) of beverage was taken in 100mL beaker and pH meter was used to record pH according to method described by (Ranganna, 1986)

2.2.4 Colour:

Colour parameters of the Papaya-Musk melon fruit bar enriched with Palm Jaggery were measured by using Hunter Lab Colorimeter. Results were reported as L value and chroma at hunter scale, where L and chroma correspond to lightness and color saturation or intensity, respectively.

2.3 Total Ash content:

Total Ash content of the Papaya-Musk melon fruit bar enriched with Palm Jaggery can be determined using according to (AOAC, 1970) method.

III. RESULTS AND DISCUSSION

3.1 Total Soluble Solids:

The Total soluble solids data obtained for the prepared Papaya-Muskmelon Fruit bars are presented in Table. The data revealed that the increasing trend of total soluble solids content was noticed by the increase in Palm Jaggery Concentration. The initial variation in TSS was found in different samples which are attributed to processing variation. Among samples the highest TSS recorded in S_3(71.15) followed by S_2(65.99), S_1(65.33) and the control sample S_0 (75).Increase of TSS may be due to conversion of Polysaccharides to simple sugars.

TABLE 2
TSS VALUES OF PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S.No	Particulars	TSS(Brix)
1	Fruit bar- Control (25% Cane sugar)	75
2	Fruit bar- Sample 1 (20% Palm Jaggery)	65
3	Fruit bar- Sample 2 (25% Palm Jaggery)	66
4	Fruit bar- Sample 3 (30% Palm Jaggery)	71

3.2 pH:

The pH values of the prepared Papaya-Musk melon Fruit bars are presented in Table 3. The pH of the prepared Papaya-Musk melon Fruit bar samples recorded an increasing trend. The maximum pH of 4.11 was observed in sample 3.

TABLE 3
pH VALUES FOR THE PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S.No	Particulars	pH
1	Fruit bar- Control (25% Cane sugar)	3.75
2	Fruit bar- Sample 1 (20% Palm Jaggery)	3.39
3	Fruit bar- Sample 2 (25% Palm Jaggery)	3.73
4	Fruit bar- Sample 3 (30% Palm Jaggery)	4.11

3.3 Moisture content:

The Moisture content in % values of the prepared Papaya-Muskmelon Fruit bars are presented in Table 4. The moisture content of the samples showing decreasing trend and sample 3 obtained lowest value which is desirable than other sample fruit bars.

TABLE 4
MOISTURE CONTENT IN % VALUES FOR THE PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S. No	Particulars	Moisture content %
1	Fruit bar- Control (25% Cane sugar)	12.54
2	Fruit bar- Sample 1 (20% Palm Jaggery)	14.21
3	Fruit bar- Sample 2 (25% Palm Jaggery)	13.62
4	Fruit bar- Sample 3 (30% Palm Jaggery)	12.36

3.4 Colour:

For food items, colour is being used as a measure to signify value and freshness. It has therefore been vital for food producers to be able to determine the value of their product. The colour of different dried fruit bars were reported by L^*, a^*, b^* values corresponding to lightness, greenness and yellowness respectively. Colour plays an important role in attracting consumers. The colour of fruit bar sample 3 was remarkably better than other sample fruit bars. The Colour values of the prepared Papaya-Musk melon Fruit barsare presented in Table 5.

TABLE 5
COLOUR PARAMETER VALUES FOR THE PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S. No	Particulars	ΔL*	Δa*	Δb*	ΔE*
1	Fruit bar- Control (25% Cane sugar)	0.33	1.96	0.32	2.01
2	Fruit bar- Sample 1 (20% Cane sugar)	-8.77	-6.67	-8.28	13.78
3	Fruit bar- Sample 2 (25% Palm Jaggery)	-7.25	-7.64	-10.42	14.81
4	Fruit bar- Sample 3 (30% Palm Jaggery)	-13.21	-5.87	-6.49	15.85

3.5 Total ash content:

The total ash content values of the prepared papaya-musk melon fruit bars are presented in Table 6. Total ash content values showing better in sample 3 than other sample fruit bars which is recommendable for more availability of minerals.

TABLE 6
TOTAL ASH CONTENT VALUES FOR THE PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S. No	Particulars	Total ash content %
1	Fruit bar- Control (25% Cane sugar)	1
2	Fruit bar- Sample 1 (20% Palm Jaggery)	0.4
3	Fruit bar- Sample 2 (25% Palm Jaggery)	0.6
4	Fruit bar- Sample 3 (30% Palm Jaggery)	0.9

3.6 Sensory Analysis:

Sensory attributes like appearance, taste, flavour and overallacceptability were analysed by using 9-point hedonic scale and results were shown in Table 7.

TABLE 7
SENSORY ANALYSIS VALUES OF PAPAYA-MUSK MELON FRUIT BAR SAMPLES

S. NO	Particulars	Attributes			
		Appearance	Taste	Flavor	Overall acceptability
1	Fruit bar- Control (25% Cane sugar)	8.25	8.33	8.58	8.38
2	Fruit bar- Sample 1 (20% Palm Jaggery)	7.91	6.75	7.08	7.24
3	Fruit bar- Sample 2 (25% Palm Jaggery)	8	7.33	7.58	7.63
4	Fruit bar- Sample 3 (30% Palm Jaggery)	8.83	8.16	7.91	8.4

The score for appearance was found highest in sample 3 Papaya- Musk melon Fruit bar enriched with Palm Jaggery (30%) with a score of 8.83. The score for Taste in sample 3 papaya-musk melon fruit barenriched with palm jaggery (30%) with a score of 8.16. Flavour of sample 3 Papaya-Musk melon Fruit bar enriched withpalm jaggery (30%) with a score of 7.91. The sensory score presented in Table 7. Significant increase in overall acceptability was found with increase in palm jaggery content. Themaximum overall acceptability (8.40) was obtained by the sample 3 papaya-musk melon fruit bar enriched with palm jaggery (30%).

IV. CONCLUSION

Fruit bar was prepared by blending papaya-musk melon fruit pulp (50:50) withenrichment of palm jaggery syrup in the proportions of 20%, 25% and 30%. The formulations were analysed to study their physico-chemical parameters and overall acceptability. In the sensory evaluation and also in Textural Evaluation, highest overall acceptability was attained by Papaya-Musk melon Fruit barenriched with Palm Jaggery (30%). Thus, it may be recommended that the palm jaggery syrup may be utilized in abetter way by blending with papaya-musk melon fruit pulp (50:50). This ultimately can be boon for calorie conscious population in replacement ofSugar which is Non-nutritious and calorie rich for their daily intake.

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