

# Development of Ready to Serve Fruit Juice Using Mangosteen Peel

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**ABSTRACT:** Mangosteen peel contents anti-oxidants, anti-inflammatory, Anti-bacterial, Anti-fungal, Anti tumors, Anti histamines. Extract is widely used as health food and pharmaceutical raw materials. In Sri Lanka peel is removed without making any use. Objective of the research is value addition to Mangosteen peel through preparation a beverage. Deferent five volumes of sugar syrup with constant amount of juice were applied. Juice was mixed with the syrup while heating up to 80 OC. Carboxy methyl cellulose and sodium Meta bisulphate was applied to all trials and pasteurizing was done keeping the mixture in 80OC per 15 minutes. Estimation of glucose, fat, fiber, moisture content and determination of ash was performed. Two sensory evaluations were done using thirty untrained panelists. Five point hedonic scales were used to access sensory attributes. Sensory evaluation data were analyzed with Friedman non-parametric statistical method in terms of mouth feel, texture/body and overall acceptability. As the juice extracted from the peel had 0.9 % good protein percentage, peel is rich with nutrients. The Fat content of peel juice is 0.12% and lesser than to market available juice while the fiber content is higher than to that of market available juice. Ash content was in good level. Treatment one with higher sugar level is the most preferred sample by the analysts. But when the sugar content increases it gives somewhat undesirable mouth peel. With respect to the color, odour and aroma treatment 03 is the most preferred by analysts. According to the results treatment three gets the overall acceptability of analysts and shown acceptable microbial level according to the standards of Sri Lankan standards (SLS). Therefore based on the results conclusion can be made, the mangosteen peel juice extraction is health beneficial and economical viable value added process should be implementing.

**KEYWORDS:** Mangosteen peels, nutrients, sugar syrup, Value added.

## I. INTRODUCTION

Mangos teen dubbed the finest fruit of the world has high potential to both domestic and export market. The fruits dark violet or deep brownish- purple skin and white edible portion make it one of the most valuable fruits of the tropics it is consumed fresh and also in processed forms. [4][9][10][11][12][18] Many westerns enjoy its delicious taste and consider it health food. Sri Lanka Mangos teen is restricted to small scale home gardens. Main fruiting season - June to August considered as underutilized fruit crop. Mainly cultivate Kalutara and Kandy area. [5] A mangosteen is round, about the size of a tangerine, and has a dark, thick rind and creamy flesh. Similar to many fruits and vegetables, mangosteen is a rich source of antioxidants, although mangosteen also contains phytonutrients called xanthones, which are unique to this fruit. [2][7][8] More than 200 xanthones have been identified in plants, and mangosteen contains more than 40 of them. [17][24] The vast majority of the nutrients in mangosteen are in the rind and not the pulp. Xanthones are believed to have anti-inflammatory and anticancer properties, and these benefits have been shown in laboratory and animal studies.[1][3][9][14][15][17] However, research into mangosteen health a benefit is in its infancy, and no human studies have been done to determine if mangosteen health benefits extend to people.

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## II. MATERIALS AND MATHDOLOGY

### Preparation of peel juice

Got the ripe mangosteen remove the edible portion and used peel part (remove to out hard layer) were got soft part of the peel then slicing to small pieces then put pulpy machine make the pulp . Straining process after got peel juice heated 80 C fifteen mints.

### Preparations of sugar syrup

Deferent volume of sugar syrup with constant amount of juice will be applied so sugar syrup preparation are used some ingredient water, citric acid, sugar then

- For stabilizing purpose constant amount of CMC (Carboxy methyl cellulose)
- Constant amount of SMS (sodium meta bisulphite) will be applied to all trials. Seal with bottling and pasteurizing 800C per 15 mints mixed with heating (80oC) the sugar syrup.

Trails	T1	T2	T3	T4	T5
peel juice (ml)	100	100	100	100	100
sugar syrup (ml)	50	80	100	150	200

Table 1 Treatments

### A. NUTRITIONAL ANALYSIS

Protein, fiber, moisture, glucose, fat, and ash content of Peel juice extracted were determined according to the standard methods. [23 ] Nutritional studies were analysed by Minitab softer.

### B.SENSORY ANALYSIS

Two sensory evaluations were done using thirty untrained panellists. Five point hedonic scales were used to access sensory attributes. Sensory evaluation data were analysed with Friedman non-parametric statistical method interms of mouth feel, texture/body and overall acceptability.

### C.MICROBIOLOGICAL ASSESSMENTTOTAL

#### PLATE COUNT

Colony count techniques at 30 °C

This standard gives general guidelines for enumeration of micro – organisms present in products intended for human consumption or feeding of animals, by counting the colonies growing on a solid medium after incubating aerobically at 30 °C.[6]

Method

Liquid samples

1 ml of the samples + 9 ml of diluents = 10 -1 dilution

Solid samples

# International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

10 g ± 0.1 g + 90 ml of diluents      10 -1 operate the rotary blender for a sufficient time to give a total number of 15,000 to 20,000 revolutions. Even with the slowest blender this time shall not exceed 2.5 minutes. Operate the stomachs for 11 minutes to 2 minutes according to the nature of the product.

Pour plate – after complete solidification and only 1 in the count where it is suspected that the product being analyzed contains microbes whose colonies will over grow the surface of the medium, pour about 4 ml of count agar medium at 45 °C ± 0.5 °C in to the surface of the inoculated medium. Allow to solidify.

Drop plates – modified miles and misra

Preponed plates with plate count medium one kept at 37 °C for 16 hours or open and inverted at 45 °C for 30 minutes.

### III.RESULTS AND DISSCUSSION

Results of sensory evaluation were analyzed by using MINITAB-14 statistical analysis package. Each sensory aspect was analyzed according to Friedman test at 5% level of significance.

Sugar syrup	Treatment					P value
	T1(200ml)	T2(150ml)	T3(100ml)	T5(80ml)	T6(50ml)	
Mouth feel	3.625	3.845	4.625	2.625	3.625	0.000
Colour	3.542	3.542	4.545	3.375	2.875	0.000
Ordure	3.8125	3.7295	3.9792	2.8958	2.6458	0.000
Aroma	3.6042	3.4375	3.6208	2.8542	2.2708	0.000
Ov.accpt	3.771	3.771	4.688	2.854	1.938	0.000

Table 2Friedman results for sensory evaluation I

#### A. Effect of gelatin percentage on mouth feel

According to table 2, at least one treatment is significantly (P<0.05) different from other treatments with respect to the mouth feel. Treatment 3 (100ml sugar syrup) gave the highest estimated median (4.625) and highest sum of ranks (163.5). Thus treatment 1 was the highest. Preferred sample by the panelists. Addition of higher levels of sugar syrup results the somewhat undesirable mouth feel of the juice.

#### B.Effect of colour

According to table 2, at least one treatment is significantly (P<0.05) different from other treatments with respect to the colour. Treatment 3 (100ml sugar syrup) gave the highest estimated median (4.545) and highest sum of ranks (149.5).

#### C.Effect of Ordure

According to table 2, at least one treatment is significantly (P<0.05) different from other treatments with respect to the ordure. Treatment 3 (100ml sugar syrup) gave the highest estimated median (3.9792) and highest sum of ranks (140.5).

#### D.Effect of Aroma

According to table 2, at least one treatment is significantly (P<0.05) different from other treatments with respect to the ordure. Treatment 3 (100ml sugar syrup) gave the highest estimated median (3.6208) and highest sum of ranks (140.5).

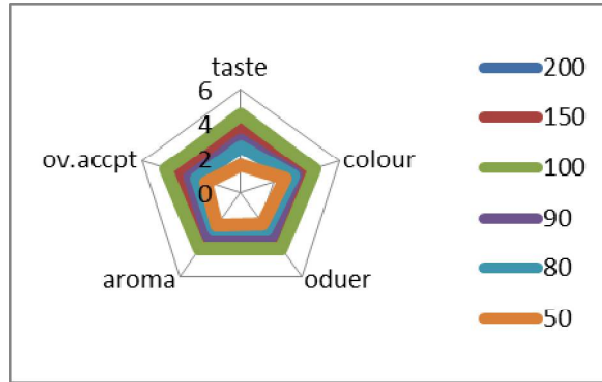
#### E. Effect of gelatin percentage on overall acceptability

According to table 2, at least one treatment is significantly (P<0.05) different from other treatments with respect to the overall acceptability. Treatment 3 (100ml sugar syrup) gave the highest estimated median (4.688) and highest sum of ranks (159). This effect has been attributed to the interaction of sugar level with the extract juices to develop a stronger five-dimensional network. Treatment 3, gives the most desirable characters to the juice.

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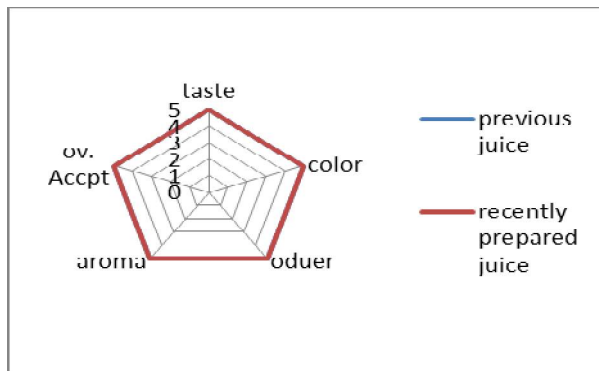
Vol. 5, Issue 6, June 2016



Web diagram 1 for six samples in sensory evaluation I

According to diagram I compare to each treatments of highest Preferred (taste, colour, odour, aroma, over acceptability) treatment 3 (T<sup>3</sup>)

## F. Results of sensory evaluation II



Web diagram 2 for six samples in sensory evaluation II

Diagram 2 Compare with recently prepared juice and previous juice there can't be find differences in taste, colour, odour, aroma, over acceptability according to the following diagram.

## G. MICROBIAL TEST

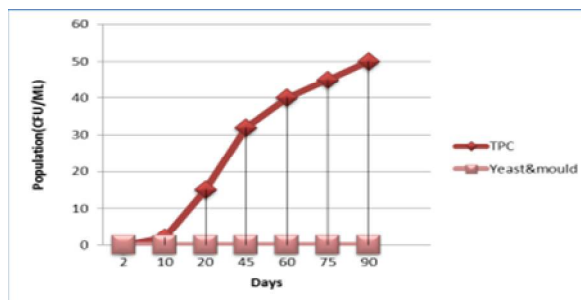


Figure 1 Microbial count variation

## International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Vol. 5, Issue 6, June 2016

Figure 1 showed Within 90 days there is TPC has increased 90th with days. According to the Sri Lankan standards (SLS) Microbial limits maximum total plat count 50. According to this Mangosteen peel juice fulfills the Sri Lankan Standards requirements. It means this product within the acceptable level. [6]

### H. pH

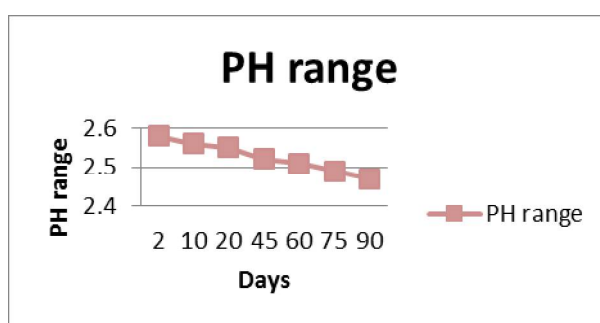


Figure 2 pH fluctuation of juice storage duration

As figure 2 indicates, fluctuation of pH in Mangosteen peel juice is slightly declined ranged  $2.58 \pm 0.1$  to  $2.52 \pm 0.1$  pH around 2.52 which declined with the time up to  $2.58 \pm 0.1$ .

### IV. NUTRITIONAL ANALYSIS

Were all nutritional analysis done with treatment three [T3] proteins 0.9%, fiber 1.3%, moisture 80.69%, glucose 2.2%, fat 0.12%, Ash 1.2%.

### V. CONCLUSION

According to the sensory evaluation I, sample which having 100ml sugar syrup & 200ml juice gained taken highest overall acceptability among six samples. So with the 100ml sugar syrup sample it gives best sensory characters to the juice. Cost analysis of the product showed that cost of production in 1L juice as Rs 80. So this is low cost product. Analyzing data of day 2nd and day 90th of juice samples, there is no significant difference in sensory characters. Also there is no effect in microbes and microbial counts of the product. According to both evidence this product has a shelf life of more than 85 days with room temperature.

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Vol. 5, Issue 6, June 2016

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