



# FORMULATION AND NUTRITIONAL EVALUATION OF ICE CREAM FORTIFIED WITH ROSE APPLE (*Syzygium jambos*)

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**Abstract:** Rose apple is an underutilized mild flavoured, slightly astringent and juicy fruit. The fruits are very low in cholesterol and sodium and good source of niacin, iron, sulfur, calcium and potassium. They are high in vitamin A and vitamin C. The objective of the study was to formulate rose apple-based ice cream formulation and analyze its nutrient composition. The addition of fruits in ice cream will increase the nutritive value of the product specially minerals, carbohydrates and dietary fibre. The organoleptic parameters (i.e., color, flavor, taste, texture, overall acceptability) and chemical parameters (i.e., fat, protein, total solids, sucrose, and acidity) of rose apple ice cream was analysed. Sensory analysis was also conducted in a nine-point hedonic scale in which the overall acceptability of rose apple ice cream was found to be high in the case ice cream with 15% rose apple.

**Index Terms** - Rose apple, Ice cream, organoleptic parameters, hedonic scale

## I. INTRODUCTION

Ice cream is quite possibly the most charming and flavorful frozen pastry with high dietary benefit and high tangible acknowledgment by all age gatherings (Nande, 2013). In the dietary perspective, it is a phenomenal wellspring of energy, plentiful in protein and minerals. On a normal, the ice cream contains multiple times more fat and marginally more protein than that is available in milk. It is rich wellspring of calcium, phosphorous and different minerals significant for working out (Hemali et al., 2015). While the supplement substance of the ice cream relies upon the sort of ice cream just as the fixings that are utilized in the production of frozen yogurt. It contains assortment of fixings like milk, cream sugar, natural product mash, nuts, dry organic products, chocolate and their blends (Wangcharoen et al 2012). The incalculable blends and assortments make ice cream a result of high tactile acknowledgment, high business development and perceived around the world. Rose apple (*Syzygium jambos*) is a fruit plant native to the tropics of South-East Asia and it has been very common in South India especially in the state of Kerala. The fruit has a long history of use in Indian domestic market and as an ingredient in traditional medicine for the treatment of various diseases is a common practice (Savitha et al., 2011). Rose apple is locally named as wax apple, love apple, java apple, bell fruit, jambu air, mountain apple, and chambekka. The delicious, tasty rose apple fruits usually are bell or pear-shaped and somewhat mushy fruits have mild green, white, pink, or even red in color and also consist of 1 or 2 grey seeds. The shelf life of fruit is very short and can only be kept for 2 days under room temperature due to its thin skin and soft texture when ripe.

This results in the loss of water and a vulnerability to infectious disease (Kishore et al., 2006). Low temperature can be used to extend the shelf life of rose apples. The fruits are simply palatable with a moderate sweet taste (Bolarin et al., 2016). Biochemical studies showed that rose apple pulp low in calories and rich in antioxidants and dietary fibre (Costa et al. 2006). It also contains vitamins A, B1, B12, along with calcium, iron and phosphorus (Augusta et al. 2010; Ravishankar et al., 2011). The pulp could be used in many food formulations such as fruit juice, squash, jam, pickle, alcohol etc. However, the fortification of rose apple pulp in ice cream has not yet been documented. The objective of the study was to enrich the nutritional property of widely consumed ice cream with the nutrients of rose apple, as a step to decreasing malnutrition and micronutrient deficiencies.

## II. MATERIAL AND METHOD

Raw materials such as cow milk, cream, skim milk powder, sugar, CMC (Carboxymethyl Cellulose), GMC (Glycerol monostearate) and fresh rose apple were purchased from local market Cochin, Kerala. Method for Ice cream preparation was done according to Hemali et al 2015.

### III. PREPARATION OF ROSE APPLE PULP

For ice cream preparation, all the fixings were gauged utilizing the equilibrium as per the definition (Hemali et al., 2015). All the dry fixings just as fluid fixings were physically blended completely by mixing until a uniform combination came about. The blend was bubbled at 72°C for 30 minutes as announced by Marshall and Arbuckl (1996) to obliterate pathogenic organic entities and the amount decreased to 33%. Subsequent to heating up, the thick blend was homogenized in electric homogenizer to get a uniform scattering of the fat as recommended by Berger and White (1976). After legitimate blending, the natural product mash was added into milk as indicated by treatment. Ensure the milk isn't hot or, in all likelihood it might coagulate. Appropriately mixed blend was chilled off to 4° C, at that point quickly positioned in a cooler at - 4°to - 5°C for 5 hours. Remove the combination from cooler and whipped in a blender for 3 to 4 minutes. At that point the item put away at 4°C for maturing. Various structures were utilized in the examination. Ice cream as control, Ice cream with rose apple mash 5% (A), Ice cream with rose apple mash 10% (B), Ice cream with rose apple mash 15% (C), Ice cream with rose apple mash 20% (D).

**Table I.**Composition of standard ice cream and their variants

Ingredients	Control	A	B	C	D
Cow Milk (ml)	100	95	90	85	80
Roseapple pulp (g)	-	5	10	15	20
Sugar (g)	20	20	20	20	20
GMS (g)	0.75	0.75	0.75	0.75	0.75
CMC (g)	0.25	0.25	0.25	0.25	0.25
Cream(g)	25	25	25	25	25
Vanilla essence	2-3 drops	2-3 drops	2-3 drops	2-3 drops	2-3 drops

### IV. PHYSICO-CHEMICAL ANALYSIS

The ice-cream sample Control, A, B, C, D was analyzed for their different physico-chemical properties. pH was measured by electronic pH meter directly used M. Tronic digital-225 pH meter. Ash, total solid, moisture, titrable acidity content of the sample was determined according to AOAC. (1984, 1990, 2000).

### V. NUTRITIONAL ANALYSIS

The ice test control, A, B, C, D were broke down for their distinctive nourishing properties. Fat were assessed by Garber Method (schedule) or by gravimetric strategy (reference technique). Protein assessment is finished by the Kjeldhal technique (Bradstreet, 1965). Ascorbic corrosive was decided by volumetric of Harris and Ray (1935), iron was assessed by the Bipyridyl technique. Calcium was assessed by the titrametric strategy for Clark and Collip (1925). The CHO was assessed by BIS (1997) strategy. Energy content was determined for Ice-cream by factorial strategy for AOAC (1995) on dry utilizing equation.

### VI. SENSORY ANALYSIS

Sensory evaluation of control and experimental ice-cream was done in three palatability trials by 15 trained judges for taste, colour, flavor, mouth feel, appearance, consistency and over all acceptability. Scoring was done for maximum score 20 to a minimum score of 10 for all the seven attributes. Composite score card using for **sensory evaluation**

### VII. STATISTICAL ANALYSIS

All results were expressed as Mean±SD. All statistical analysis was performed using single factor one way analysis of variance (ANOVA) (M.S. office, Excel). The significant is separated by \*\*p≤0.001 and \*p≤0.05 level.

### VIII. RESULT AND DISCUSSION

#### I. Result of Physico-chemical Analysis of ice cream

The pH value of control ice-cream was observed to be **7.28**, which was higher than the sample A,B,C and D that has the pH 6.87, 6.33,5.95,5.67 respectively. There was a highly significant difference in control and formulated ice-cream.

The total solid content of sample D ice-cream was found to be **71.8 g %**, which was higher than control, A,B,C that contain 70.58, 70.92 and 71.35 g% respectively. There was non significant difference between the control and the experimental ice creams.

The SNF content of the control ice cream was found to be **25%** which was lower than the sample A,B,C and D, with SNF content 26.85, 28.10, 28.73 and 29.34% respectively. There was significant difference between control and the test samples.

**Table II.** Physico-chemical analysis of ice cream

Sample	Total solids	pH	SNF (%)
Control	70.42±1.26	7.28±0.01	25±0.21
Sample A	70.58±1.03	6.87±0.01	26.85±32
Sample B	70.92±1.06	6.33±0.03	28.10±03
Sample C	71.35±1.22	5.95±0.11	28.73±25
Sample D	71.82±1.16	5.67±0.01	29.34±46

## II. Result of Proximate analysis of ice cream

The moisture, fat, protein, carbohydrates, ash and dietary fiber of the samples were analysed. The moisture content of the control was found to be **65.62** and the samples A,B,C,D had moisture content, 65.33,64.82,64.62 and 63.42%. There was no significant difference between the moisture content of all the test samples.

The protein content of the control sample was found to be **4.35** and there was non significant difference between other experimental samples A, B, C and D which was found to be 4.12, 3.96,3.45 and 3.15.

The fat content of the samples A,B,C and D was estimated to be 10.34,10.28,10.14 and 10.05 which had non significant difference with the control sample which had the percentage of fat content **10.41**.

The carbohydrate content of the control sample was found to be **21.45** which was lower than the samples A,B,C and D that has carbohydrate content 21.92,22.44,23.15 and 23.24. There was highly significant difference in the carbohydrate samples between the control and the test samples.

It was found that there is **no dietary fibre content** in the control samples and the fibre content in the experimental samples A,B,C and D was found to be 0.02, 0.05,0.06 and 0.13. There was high significant difference between the samples compared to control. Fibre addition contributes to the modification and improvement of the texture, sensory characteristics, and shelf-life of food because of its water-binding capacity, gel-forming ability, antisticking, anticlumping, texturising, and thickening effects. (Yangilar., 2016).

**Table III.** Proximate analysis of ice cream

Component (%)	Ice cream Formulas				
	Control	A (5% CA)	B (10% CA)	C (15% CA)	D (20% CA)
Moisture	65.62±0.26	65.33±0.13	64.82±0.06	64.62±0.22	63.42±0.02
Crude Protein	4.35±0.02	4.12±0.32	3.96±0.28	3.45±0.14	3.15±0.40
Crude Fat	10.41±0.33	10.34±0.16	10.28±0.11	10.14±0.03	10.05±0.45
Carbohydrates	21.45±0.01	21.92±0.10	22.44±0.25	23.15±0.22	23.24±0.11
Ash	0.68±0.14	0.71±0.12	0.78±0.33	0.80±0.17	0.84±0.44
Dietary Fiber	0.00±0.00	0.02±0.13	0.05±0.02	0.06±0.02	0.13±0.05

### III. Results of Sensory Analysis

The result of ice cream fortified with 20% rose apple pulp (sample D) was liked very much for colour and appearance compared to control and other test samples. The taste, mouth feel, consistency and texture was found to be liked very much for sample C compared to control and sample A,B,D. Hence the overall acceptability was found to be best for sample C, ice cream fortified with 15% rose apple pulp.

**Table IV.** Sensory Analysis

Attributes	Control	A (5% CA)	B (10% CA)	C (15% CA)	D (20% CA)
Taste	14.87 ±2.76	15.32 ±2.96	16.2 ± 3.88	16.82±2.87	16.73 ± 2.80
Colour	14.23±3.81	15.03±2.80	16.80±2.83	16.23±3.81	17.23±2.13
Mouth feel	16.96 ± 1.12	17.02 ± 2.19	17.16± 1.16	17.50±2.01	17.32±2.12
Appearance	16.43 ± 1.46	16.92 ±1.32	17.42 ±1.47	17.45 ±1.69	17.93±1.45
Flavour	15.01 ±2.10	15.60 ±2.73	16.20 ±2.70	17.12± 2.17	16.20± 2.90
Consistency	16.20± 1.58	16.71± 2.56	16.93 ±1.23	17.06± 1.58	17.05± 1.56
Overall Acceptability	16.50± 1.25	16.94± 1.36	17.10± 1.28	18.01±1.35	17.50± 1.94

### IX. CONCLUSION

The enhancement of ice cream with rose apple is a compelling method to build its dietary and physiological angles. Inappropriate treatment of natural products brings about injury to the surface layer making them more defenseless to contamination by decay creatures with resulting decrease in customer bid on the lookout. These conditions further lead to the advancement of physiological issues, for example, weight reduction during capacity and showcasing, natural product decay and so forth. Consequently many worth added items can be produced using such kinds of underutilized organic products. The general agreeableness of created frozen yogurt tests was assessed by considering the compound structure and tactile qualities like appearance/shading, surface, flavor and taste of the test samples. Due to the nutritive worth and wonderful kind of rose apple, it could be utilized as a reasonable wellspring of common added substance in frozen yogurt creation to upgrade dietary benefits. Better innovations away, handling, conservation and so forth can thrive the rose apple industry and furthermore create pay hotspot for little and medium scale ranchers.

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