

Formulation and Evaluation of Dragon Fruit Ice Cream

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Abstract: Ice-cream is a sweetened frozen food typically eaten as a snack or dessert. It is usually made from dairy products like milk, cream, emulsifier, and stabilizer & often combined with fruits & nuts. It is typically sweetened with sugar or sugar substitutes. The research study was conducted to make an antioxidant rich ice-cream with incorporation of dragon fruit & beet root extract. Due to attractive fruit colour, mouthwatering pulp and edible black seeds, dragon fruit (*Hylocereus* spp) has gained tremendous nutraceuticals popularity. Proximate analysis & sensory evaluation of dragon fruit ice-cream were conducted by standard approved method. The proximate analysis report shows, Moisture (67.49%), Carbohydrate (19.21%), Crude Fat (9.30%), Crude Protein (2.73%), Crude Fiber (0.45%), Total Minerals (0.82%), and Energy (171.46%). Vitamin C content is found to be 18.32mg. The dragon fruit ice-cream was found to be acceptable in sensory evaluation.

Key words: antioxidant, beetroot, dragon fruit, frozen food, vitamin C

1. INTRODUCTION

Ice cream is a poor source of phytochemicals and antioxidants therefore, the present study was undertaken to enhance the functional properties and nutritional quality of ice cream with the incorporation dragon fruit & beet root extract. Dragon fruit is low in calories but packed with essential vitamins and minerals. It also contains substantial amount of dietary fiber. Beyond essential nutrients, dragon fruit supplies beneficial plant compounds like polyphenols, carotenoids and betacyanins. Dragon fruit contains antioxidants, vitamin C, beta-carotene, lycopene and betalain (M. S. Sonawane, 2017). Dragon fruit helps to control diabetes, blood pressure, cancer, high cholesterol and aids in digestion (P. C. Tripathi *et al* 2014).

Beets are packed with essential vitamins, minerals and plant compounds, some of which have medicinal properties It is good source of fiber A large number of synthetic colorants used in food products may cause severe health problem to the consumer e.g. carcinogenic effect. Beet root is used as a natural coloring pigment. Beetroot is a rich source of phytochemicals compounds that includes ascorbic acid, carotenoids, phenolic acids and flavonoids. Beetroot is also one of the few vegetables that contain a group of highly bioactive pigments known as betalains. The functional bioactive components reduce risk of heart attacks, heart failure and strokes. (G. P. Deshmukh *et al* 2018). Whipping cream contains a healthy source of fat. Corn starch is used as a thickening agent. CMC (Carboxyl Methyl cellulose) is used as stabilizer.

GMS (Glycerol Monostearate) is used as an emulsifier to create a smooth texture. Vanilla essence is a solution made by macerating and percolating vanilla pods in a solution of ethanol and water. It is used to obtain flavor to ice cream.

2. MATERIALS AND METHODS

The present study was carried out at Department of Food Technology and Management, CNCVCW, CSIBER, Kolhapur during the year 2018-2019.

2.1 Raw material

For the present investigation ingredients i.e. milk, cream, corn flour, GMS, CMC powder, sugar, beetroot, dragon fruit, vanilla essence, dry fruits were procured from the local market of Kolhapur city. All material used in ice cream making is procured from local market of Kolhapur.

2.2 Methodology

2.2.1 Preparation of control Ice cream

Table No. 1 Preparation of Control Ice Cream

Ingredients	Control
Milk	100 ml
Sugar	24 gm
Whipping cream	50 ml
CMC	1 g
GMS	4 g
Corn Flour	4 g
Vanilla essence	1ml

The control ice cream was made by ingredients like milk, whipping cream, sugar, corn flour, GMS and CMC powder, vanilla essence.(Qamar Abbas Syed *et al* 2018). It contains 100ml of milk, 24gm of sugar, 50 ml of whipping cream, 1gm of CMC, 4gm of GMS, 4gm of corn flour and 5ml of vanilla essence.

Flow sheet of Control Ice Cream

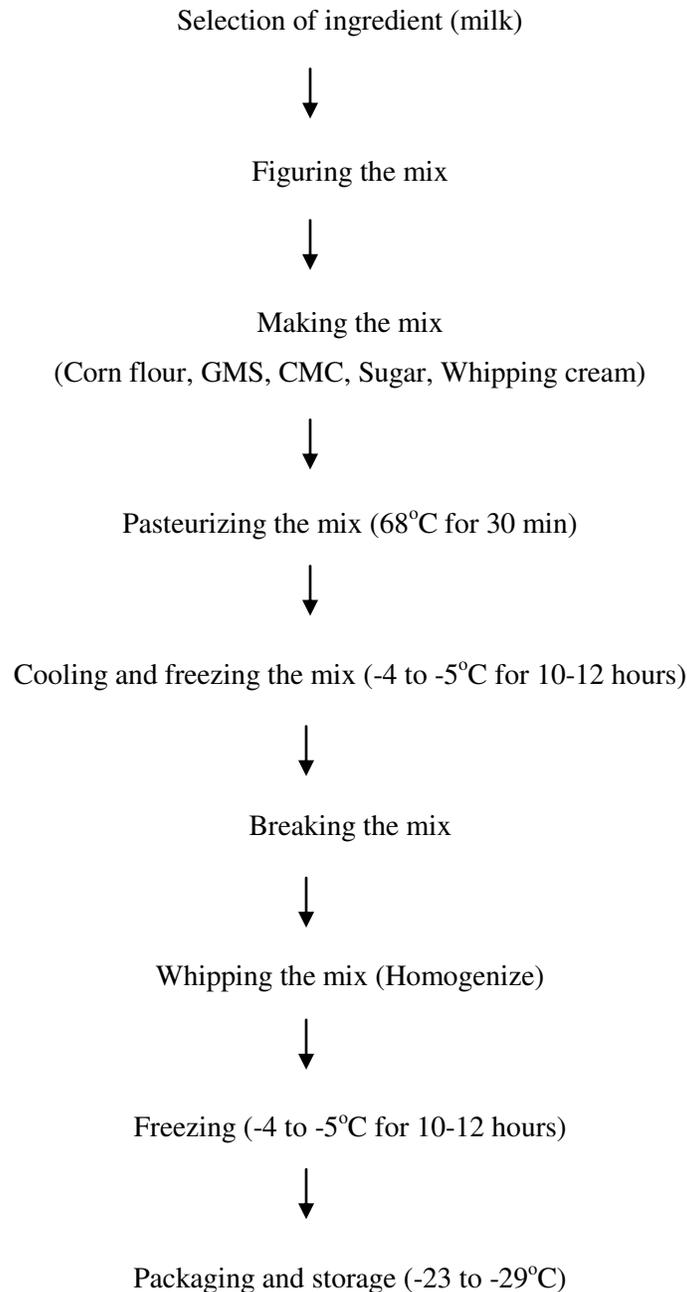


Figure No.1 Flow sheet of control Ice cream

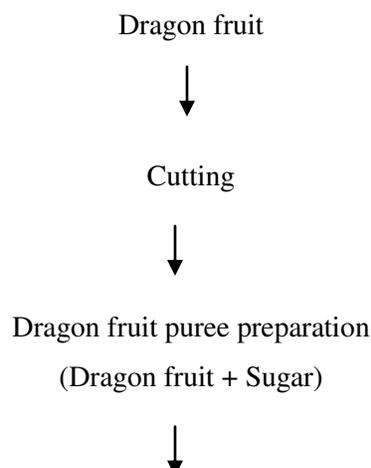
2.2.2 Formulation of Dragon Fruit Ice cream

Table No. 2 Formulation of Dragon Fruit Ice cream

Ingredients	Sample A	Sample B	Sample C
Milk	100 ml	100 ml	100 ml
Sugar	30 gm	32 gm	38gm
Whipping cream	50 ml	50 ml	50 ml
Dragon Fruit	20 ml	30 ml	40 ml
CMC	1 g	1 g	1 g
GMS	4 g	4 g	4 g
Corn Flour	4 g	4 g	4 g
Beetroot extract	2 ml	2 ml	2 ml
Nuts	10 gm	10 gm	10 gm

The ice cream is made by using ingredients like milk, sugar, whipping cream, CMC, GMS, corn flour, beetroot extract and dragon fruit variations are made by adding different amounts of dragon fruit puree such as sample A contains 20 ml of dragon fruit puree, sample B contains 30 ml of dragon fruit puree and sample C contains 40 ml of dragon fruit puree.

Flow sheet of Dragon fruit Ice Cream



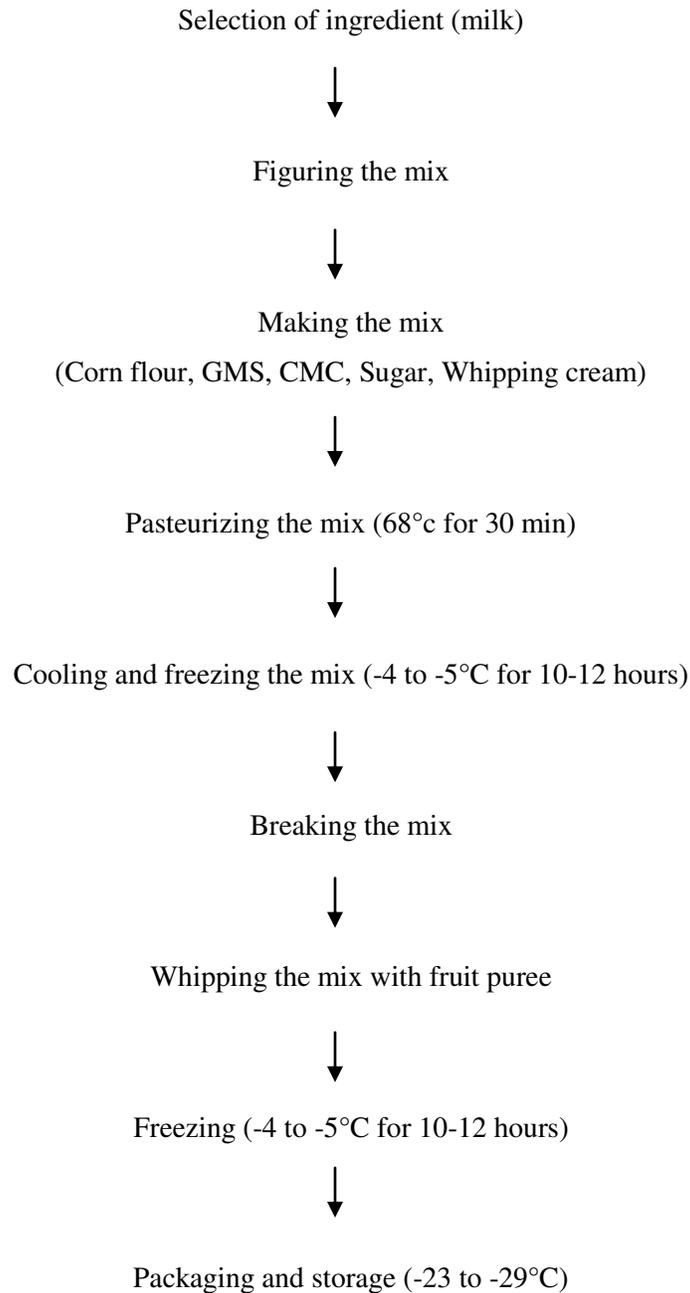


Figure No. 2 Flow sheet of Dragon fruit Ice cream

2.2.3 Sensory Analysis

The prepared samples were evaluated for sensory parameters such as color, flavor, texture, taste and overall acceptability using 9 point hedonic scale by semi trained panel.

2.2.4 Physico-Chemical analysis of Dragon fruit Ice Cream

Physico-Chemical analysis of dragon fruit ice cream includes determination of Overrunvalue and estimation of Moisture, Ash, Fat, Crude Fiber, Protein, and Iron were estimated by standard methods (AOAC 2005).

2.2.5 Overrun

The amount of air in the final product is expressed as overrun which is calculated using the following formula.

$$\text{Overrun} = \frac{\text{Weight of mix unit volume} - \text{weight of final product unit volume}}{\text{Weight of final product}} \times 100$$

3. RESULTS AND DISCUSSION

The results obtained are categorized into two major parts.

3.1 Sensory Evaluation

Table no. 3 Sensory evaluation of Control vs. Different formulations of Dragon Fruit Ice cream

Ice Cream Sample	Colour	Texture	Flavour	Taste	Mouth Feel	Overall Acceptability
Control	8.2	7.7	8.21	8.0	8.05	7.8
Sample A	7.3	7.4	7.4	7.2	7.1	7.4

Sample B	7.3	7.2	7.3	7.0	7.2	7.5
Sample C	7.9	8.0	8.0	7.6	8.10	8.40

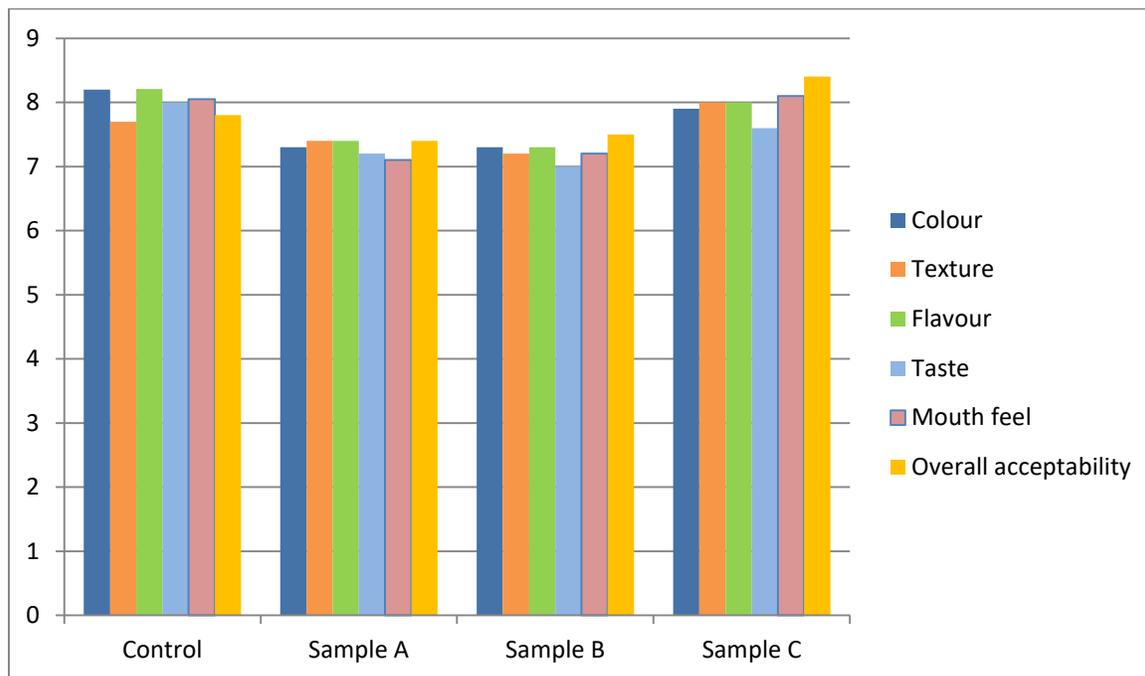


Figure no.3 Graphical representation of Sensory Evaluation

Figure No.9 is a graphical representation of the four samples of ice-cream. According to the result of hedonic rating test we plotted a graph of four samples which shows clear score representation. The sample C shows higher score in the graph according to the result.

Sample C scored the highest in terms of overall acceptability 8.40. Sample A scored lowest 7.4 in terms of overall acceptability with respect to control sample 7.8. Sample B has scored 7.5.

From the above sensory evaluation by semi-trained panel, sample C has received maximum score. After sensory evaluation the selected sample i.e. C evaluated for chemical analysis.

3.2 Physico-Chemical analysis of Dragon fruit Ice Cream

After completing the sensory evaluation of dragon fruit ice cream samples, the best acceptable sample (C) was evaluated for chemical analysis. The dragon fruit ice cream was analyzed for moisture, protein, fat, crude fibers, vitamin C and iron and also overrun was determined.

Table No.4 Physico-Chemical analysis of Dragon fruit Ice Cream

Sr. No.	Parameters	Control Sample	Sample C
1	Moisture	60.00gm	67.49gm
2	Crude Protein	02.00 gm	02.73 gm
3	Crude Fat	09.00 gm	09.30 gm
4	Total Minerals	Absent	0.082 gm
5	Crude Fiber	Absent	0.45 gm
6	Carbohydrate	15gm	19.21 gm
7	Energy	181.20 Kcal	171.46 Kcal
8	Vitamin C	Absent	18.32 mg
9	Iron	Absent	1.9mg
10	Over run	55%	60%

The sample C contains 40% of dragon fruit puree. The chemical analysis of sample C reveals 67 gm of moisture, 2.73 gm of protein, 9.30 gm of fat, 19.21 gm of carbohydrates, and 0.082 mg of total minerals, 171.46 Kcal of energy and 18.32 mg of vitamin C.

The sample C is high in moisture, protein, carbohydrates and vitamin C. It is anti-oxidant rich ice cream. Sample C is comparatively high in protein, minerals, fiber and iron than control sample.

The overrun value of sample C was found to be higher than control. This result might be due to addition of dragon fruit puree.

4. CONCLUSION

Ice cream is made by freezing and simultaneously beating air (aerating) into a liquid mixture that contains fat, sugar, milk solids, an emulsifying agent, and sometimes coloring. The fat can be from milk, cream or butter or from a non- dairy

source. However, the composition of ice cream is legally defined in many countries. In our study, formulation of ice cream was done by adding ingredients like milk, cream, sugar, GMS and CMC powder, dragon fruit, and beetroot extract. We prepared 4 samples in of which one was control sample and other samples contained dragon fruit and beetroot extract. For the acceptability of the ice cream, the product is tasted by different judges. The sensory evaluation of the product is done on the basis of hedonic rating tests. Semi-trained panel members were invited for sensory evaluation of ice cream. The sensory evaluation was carried out by organoleptic evaluation that is mouth feel, colour, flavor, body texture and overall acceptability. The sample C showed higher score in the graph according to the result. The sample C scored the highest in terms of overall acceptability 8.40. Sample A scored lowest 7.4 in terms of overall acceptability. Sample B has scored 7.5 with respect to control sample 7.8 Sample C contains 60 ml of dragon fruit puree. The chemical analysis of sample C showed 67 gm of moisture, 2.73 gm of protein, 9.30 gm of fat, 19.21 gm of carbohydrates, and 0.082 mg of total minerals, 171.46 Kcal of energy and 18.32 mg of vitamin C. The sample C is anti-oxidant rich ice- cream. Sample C is comparatively high in protein, minerals, fiber, vitamin C and iron than control sample. As the ice-cream is found to have no antioxidants and low in vitamin C, B1, B2, B3 content, we have prepared the ice-cream with dragon fruit puree and beetroot extract which are rich in antioxidants and vitamins.

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