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Preparation of Coconut Milk Ice-Cream with Mulberry Flavour

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ABSTRACT

Coconut milk ice-cream with mulberry flavour is a dairy-free frozen dessert that combines the rich, creamy texture of coconut milk with the sweet and tart taste of mulberries. This abstract highlights the unique features of this particular ice-cream flavour, including its vegan and lactose-free composition. The coconut milk provides a creamy base that complements the bold and fruity flavour of mulberries, creating a delicious and refreshing treat that is perfect for hot summer days. Furthermore, mulberries are packed with antioxidants, vitamins, and minerals, making this ice-cream a healthier option compared to traditional dairy ice cream. Overall, coconut milk ice cream with mulberry flavour is a unique and enjoyable dessert that can be enjoyed by people with a wide range of dietary preferences.

KEYWORDS: *Coconut Milk, Mulberry flavor, lactose-free composition, vegan, dietary preferences*

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1. INTRODUCTION

1.1. Coconut milk

The term "coconut milk" refers to the liquid collected by manually or mechanically pressing coconut flesh [3]. It is a white oil-in-water emulsion made from fresh coconut flesh, with or without water. It is created by steeping finely shredded coconut flesh in boiling water and then filtering it. Coconut milk is becoming a more essential raw ingredient in both home cooking and the food processing sectors [4].

Coconut milk is predicted to utilise 25% of the world's coconut output [5]. It is an important and necessary ingredient in a broad range of culinary products, including curries, sweets, coconut jam spread, coconut syrup, coconut cheese, bread goods, and drinks [5, 6]. It can also be used as a substitute for milk in various sweets, such as chocolate and other exotically flavoured confectionaries [4]. Coconut milk comprises fat, water, carbohydrate, protein, and ash, with water and fat being the most important components [7]. According to [8, 7], coconut milk includes around 54% moisture, 35% fat, and 11% solid non-fat, and they also demonstrated that fat content was crucial in the flow characteristic of coconut milk [9]. Coconut milk has more fat and calories than cow's milk [1]. It contains a lot of proteins such albumin, globulin, prolamin, and gluten. Emulsifying substances aid in the stability of food emulsions; examples include phospholipids, cephalin, and lecithin found in coconut milk [10]. It is acknowledged, however, that the product is particularly sensitive to chemical and biological deterioration, such as lipid oxidation [11].

Coconut endosperm is made up of liquid, white coconut kernels, and a thin brown outer skin of the coconut kernel known as coconut test. In addition to the extraction process, the endosperm components may have a crucial influence in influencing the ultimate phenol level of coconut oil [12]. Which chemicals are primarily responsible for coconut milk's antioxidant qualities [13]. As a result, coconut milk is high in antioxidants, which help to reduce free radical damage. Several illnesses, including cancer, cardiovascular disease, Alzheimer's disease, and age-related dementia, are linked to free radicals. Additionally, antioxidants can aid in the repair of

prior damage and the slowing of the ageing process [14]. A glass of coconut milk with other antioxidant-rich foods like pecans, raisins, and cranberries may enhance immunity while mending the body's damaged cells [14].

Coconut milk contains considerable levels of fat, but unlike other nuts, it offers fat mostly in the form of medium chain saturated fatty acids (MCFAs), particularly lauric acid [13]. This is turned in the body into monolaurin, a very helpful antiviral and antibacterial molecule that eliminates a wide range of disease-causing organisms. According to the National Centre for Biotechnology Information, lauric acid possesses several germ-fighting, antifungal, and antiviral qualities that are extremely powerful at clearing the body of viruses, germs, and a variety of illnesses [13]. Lauric acid may also decrease cholesterol and triglyceride levels, lowering the risk of heart disease and stroke [14]. As a result, it is claimed that drinking coconut milk may help protect the body from infections and viruses. Additionally, because the body does not retain coconut lipids, the fats found in coconuts are less likely to block arteries, making coconut milk a healthier option to cow's milk when it comes to heart health [14]. For example, [15] noted that coconut yoghurt has nutritional and health benefits since it contains no cholesterol or lactose and only trace amounts of saturated fatty acids, in addition to its inexpensive cost [16].

In Malaysia, coconut milk, known as Santan in Malay, is obtained by adding water to freshly grated coconut flakes and giving it a thorough press or squeeze, whereas Pati Santan does not include any water. It is a frequent component in Malaysian and Southeast Asian dishes such curries, soups, stews, sweets, and desserts. [17]. Because of the importance of coconut milk to Malaysian businesses, food scientists and food engineers in this nation are developing novel coconut milk products for use as components in family recipes for both the Malaysian market and export [2]. In the current study, coconut milk from several Malaysian markets was analysed for antioxidant activity and physicochemical properties. In terms of physicochemical parameters, the antioxidant activity of local coconut milk was compared to goat and cow's milk as well as other tropical nations. As a result, the purpose of this study was to determine the antioxidant activity and physicochemical properties of Malaysian coconut milk.

1.2. Mulberry

Mulberry (Morus alba L.) is a member of the Moraceae family and belongs to the Morus genus [18]. Mulberry is also known as Sangzhi or Ramulus Mori [19]. This genus now comprises 24 recognised species and 100 variants [18]. Mulberry is a Chinese native that has been widely planted in Asia, Africa, America, Europe, and India [20]. Mulberry has been grown in China for about 5000 years, and it is a traditional Chinese edible fruit that may be eaten fresh [21]. Mulberry fruits are used in traditional Chinese medicine to strengthen vision and protect against liver damage [22]. They are cultivated to feed silkworms [23,24]. Fresh mulberry fruit is normally available in China for less than a month. Mulberry fruits are difficult to keep because they contain a large percentage of water (i.e., 80%) [22]. Mulberry has been used to cure diabetes and premature white hair in traditional Eastern medicine [25].

Mulberries are tasty and low in calories [26]. Mulberry fruits have a sour flavour and a pH of 3.5, resulting in a more concentrated flavour for fruit production and fresh eating [27]. Mulberry fruits have been shown to have anti-cholesterol, anti-diabetic, antioxidative, and anti-obesity characteristics [19,28-30]. These pharmacological effects are attributable to the presence of polyphenol chemicals such as anthocyanins; however, various colours of mulberry fruits, even those from the same species, may have varying levels of anthocyanins [31]. The main anthocyanins extracted from mulberry fruits are cyanidin-3-rutinoside and cyanidin-3-glucoside [32,33].

Although nutritional benefits and pharmacological qualities of various mulberry kinds with the same genotype are expected to differ [34], the goal of this work was to evaluate some potential functions of mulberry fruits (Morus alba L.) and their bioactive substances in health. In addition, some of the putative mechanisms of their activities will be briefly reviewed. We believe that our study will serve as a significant reference resource for future research in this field.

2. Materials and Method

Coconut milk powder, Coconut milk cream and Mulberry flavour were obtained from online platform (Amazon). Mulberry crush, stabilizer and emulsifier were obtained from local store in Surat. Coconut milk and Mulberry were used to make ice-cream for increasing nutritional and biological value of ice-cream. Various tests were conducted on the product by food laboratory. The Total milk solid, Protein, fat, Carbohydrate, total sugar in the product were analysed by standard methods. The ingredients used for production of nutritional ice-cream are powder of *Cocus nucifera* (Coconut milk) and the crush of *Morus* (Mulberry) with a formulation comparison in Tab 1. Firstly, we must pasteurize water till 40ºC.

After reaching 40ºC we must add coconut milk powder and coconut milk cream. When temperature rise to 60ºC add mixture of sugar with stabilizer and emulsifier. Mix the mixture properly. Moreover, maintain the temperature of mixture at 70ºC**.** After this step filter the mixture and pour it in utensil, put this utensil in refrigerator until the mixture become semi-solid. After that add flavour, colour, and crush of Mulberry in mixture. Furthermore, to get uniform quality grind it, after that pour it in utensil and put in refrigerator until it become semi-solid. Next is overrun, in which bitter is used to improve the texture of product and it also helps to increase the quantity of product. For last time, put it in refrigerator until it become hard, after getting hard pack it and store it in refrigerator.

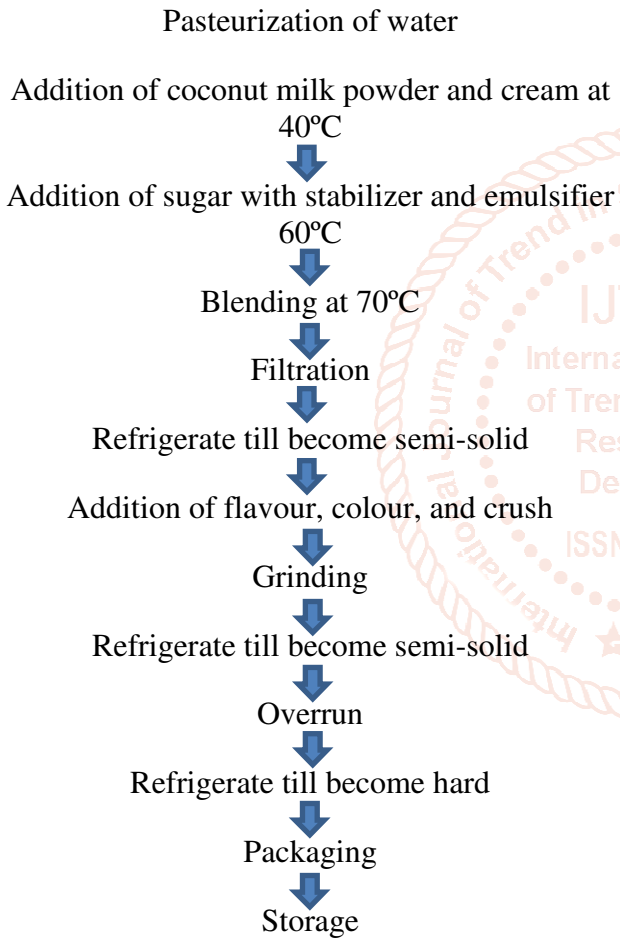

Fig 1: Flow chart of manufacturing of Ice-cream

3. Optimization of level of Mulberry flavour and crush in ice-cream

3.1. Level of Mulberry Crush

Depending upon the beaker trial the selected type of Mulberry crush was added at 10, 15, 20 percent level of ice-cream.

T_1 = Ice-cream containing Mulberry Crush at 0% of ice-cream

T_2 = Ice-cream containing Mulberry Crush 5% of ice-cream

T_3 = Ice-cream containing Mulberry Crush at 10% of ice-cream

3.2. Level of Mulberry Flavours

M_1 = ice-cream containing Mulberry Flavour at 3.0 ml

M_2 = ice-cream containing Mulberry Flavour at 2.5 ml

M_3 = ice-cream containing Mulberry Flavour at 2.0 ml

The ice-cream prepared with this formulation were, evaluated for sensory qualities and level of addition was optimized based on sensory qualities of ice-cream.

Sr. no.	Ingredients	S1	S2	S3
1	Mulberry Crush	0.0 gm	25 gm	50 gm
2	Coconut milk powder	60 gm	60 gm	60 gm
3	Coconut milk cream	48 gm	48 gm	48 gm
4	Sugar	60 gm	60 gm	60 gm
5	Colouring agent	1 ml	1 ml	1 ml
6	Flavouring agent	3 ml	2.5 ml	2 ml

Table: 1 Formulation of Ice-cream based on Mulberry flavour and crush

4. Physicochemical Analysis of Coconut Milk Ice-cream

4.1. Moisture content:

The AOAC formula for Moisture test is:

Moisture (%) = (Initial weight - Final weight) / Initial weight x 100

Where:

Initial weight: The weight of the sample before drying

Final weight: The weight of the sample after drying to a constant weight (usually in an oven at a specific temperature)

4.2. Fat content

The AOAC formula for Fat test is:

Fat % = (W2 - W1) / W3 x 100

Where;

W1 = Mass of empty container

W2 = Mass of container + extracted fat

W3 = Mass of sample

4.3. Protein content

The AOAC formula for Protein test is;

Protein (%) = (N x F x 6.25) / W

Where;

N = the nitrogen content of the sample, in grams

F = the nitrogen-to-protein conversion factor, which varies depending on the type of sample. The most used factors are 6.25 for most plant and animal products, and 6.38 for fish and seafood products.

W = the weight of the sample, in grams

4.4. Carbohydrate

The AOAC formula for carbohydrate test is:

Carbohydrate (g/100g) = [(A – B) x F x 0.05] / W

Where;
A = absorbance of the test sample,
B = absorbance of the blank (containing all reagents except the sample),
F = dilution factor, and W = weight of the sample (in g).

The factor 0.05 is used to convert the result from g/mL to g/100g.

4.5. Sugar

The AOAC formula for Total sugar test is;

Total sugar (%) = [(V x F x 0.1)/W] x 100

Where;
V is the volume of Fehling's solution required to react with the sugar in the sample,
F is the Fehling's factor, 0.1 is the conversion factor from grams to milligrams,
W is the weight of the sample.

4.6. Cholesterol Test

The AOAC formula for Cholesterol test is;

Cholesterol (mg/100g) = (A x D x 2000)/ (E x W)

Where:
A = Absorbance of the sample at 500 nm
D = Dilution factor of the sample
E = Extinction coefficient of hydrogen peroxide (0.0259 mM-1 cm-1)
W = Weight of the sample (in grams)

4.7. Trans fat

The AOAC formula for Trans Fat test is;

Trans Fat Content = (Peak area of the trans fatty acid isomer / Peak area of the total fatty acids) x 100

4.8. Total Solid

The AOAC formula for Total Solid test is;

Total Solids (%) = (Weight of Residue / Weight of Sample) x 100

5. Sensory Evaluation

Ice-cream was evaluated for different sensory attributes by a group of five panellists. Sensory attributes like appearance, taste, texture, and over all acceptability for all the samples were assessed using nine-point hedonic scale.

5.1. Scores to Be Given as Follows

1. Liked extremely – 9
2. Liked very much – 8
3. Liked moderately – 7
4. Liked slightly – 6
5. Neither liked nor disliked – 5
6. Disliked slightly – 4
7. Disliked moderately – 3
8. Disliked very much – 2
9. Disliked extremely – 1

6. Result and Discussion

6.1. Organoleptic evaluation of Ice-cream

Sensory evaluation acceptance test was performed for ice-cream. Which were formulated by coconut milk with mulberry flavour, proportion to know the acceptability of product prepared. The acceptance score was assigning for varies sensory parameter like colour, flavour, taste, texture, appearance, and overall acceptability.

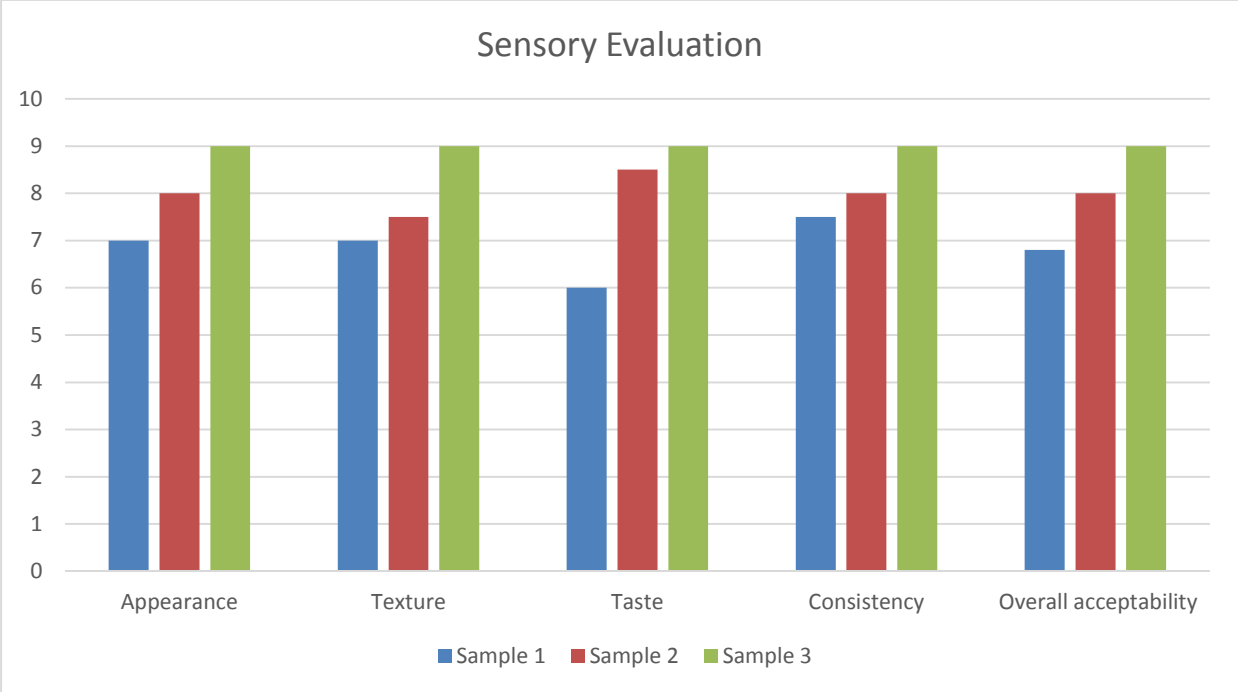

Fig 3: Organoleptic evaluation of Coconut Milk Ice-cream

6.2. Chemical Analysis of coconut milk Ice-cream

The parameters like moisture content, protein content, Total solid, Fat content, Carbohydrates, Trans fat, Cholesterol and Total sugar were evaluated for ice-cream.

Sr. No.	Parameter	Per 100 g
1	Moisture	59.88%
2	Total solid	28.38%
3	Protein	1.84%
4	Carbohydrates	26.26%
5	Total Sugar	18%
6	Fat	11.74%
7	Trans Fat	BLQ
8	Cholesterol	29.31mg

Tab 2: Organoleptic evaluation of Coconut milk ice-cream.

7. Conclusion

Finally, this study report investigated the creation of a coconut milk ice cream with mulberry flavour. According to the study, using coconut milk as a foundation for ice cream gives customers both a vegan and lactose-free choice. Mulberry flavour, which is high in antioxidants and minerals, adds a distinct and refreshing flavour.

The study also included sensory evaluation and an examination of the physicochemical qualities of the ice cream. The results revealed that the ice cream had a desired texture and was well-liked by sensory evaluation participants.

Overall, the invention of a coconut milk ice cream with mulberry flavour provides a new and fascinating choice in the ice cream market, especially for people who have dietary constraints. Further study may be done to investigate the possible health advantages of integrating mulberry into ice cream, as well as to improve the recipe for commercial manufacture.

Compliances with ethical standards

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest.

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