



“Development and Evaluation of Sensory Quality of Coconut Ice-cream”

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APPROVAL

I am delighted to clarify that the project report on “**Development and Evaluation of Sensory Quality of Coconut Ice-cream**” organized by Sadia Sharmin Urmi (I’d 183-34-822) student of department Nutrition and Food Engineering has been approved as satisfactory for the defense/viva voce under my supervision. Sadia worked in the laboratory at Daffodil International University. The presentation has been held on 4th April, 2023.

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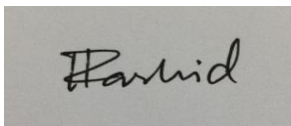
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DECLARATION

We hereby declare that, this project has been done by us under supervision of Sadia Sharmin Urmi (I'd No: 183-34-822), Department of NFE, Daffodil International University. We also declare that neither this project nor any part of this project has been submitted elsewhere for award of any degree or diploma.

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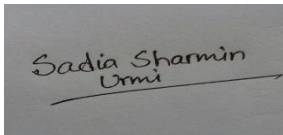
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ABSTRACT

Each year, Bangladesh produces a large number of coconuts (*Cocos nucifera*). Coconut ice cream is a vegan friendly frozen dessert prepared by using coconut dry and wet flakes as the major ingredient. The aim of this research was to develop the formulation for coconut dry flakes and to study the effect of milk solid non-fat (MSNF) on ice cream quality. From the Proximate Composition it's found that the coconut ice-cream (100g sample) would be good source of fat (%), moisture content (%), carbohydrate (%), minerals & fiber since its ash contained (%), Protein (%) and pH of ice cream = 6.47, degree of brix= 24 (approximately 24% sugar). Also, Sensory attributes are shows that 65% of participants was much very appreciated, 20% was enjoyed slightly and 15% was liked tremendously.

This report is intended as a guide for teachers and students when conducting research is part of course-work requirements.

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CHAPTER 1

INTRODUCTION

CHAPTER 1

1 INTRODUCTION

Ice cream is a frozen dairy dessert made of milk fat, sugar, air, water, stabilizers and emulsifiers, as well as additional colors and flavors, and is prepared by pasteurizing and homogenizing the mixture before freezing. The final form of ice cream consists of three phases: liquid, solid, and air. Ice crystals in contained form and air cells in extended form are both present in the liquid phase. The liquid phase also contains milk proteins, soluble and insoluble salts, fat particles, stabilizers, emulsifiers, and sugars. Therefore, the physiochemical food system is quite complex. Ice cream is a type of dairy cuisine dessert, along with other frozen treats including water ice, frozen custard, kulfi, and sherbet-like items. According U.S standards, ice-cream must be consisted of not < 20% MSNF and 10% fat from milk while when flavors added in bulk than there should be 16% MSNF and Fat 8%. Stabilizers should not be greater than 0.5% (Sayed *et al.*,2018).

The coconut (*Cocos nucifera L.*) is a member of the family Arecaceae (palm family). It's the only species of the genus "Cocos" that has been recognized, and it's a giant palm that can reach a height of 20-30m. It provides essentially all requirements for life, including food, water, oil, medicine, wood, mats, fuel, and household items. It's appropriately referred to as the "tree of paradise" (Banglapedia,2021). Coconut is available in two sizes: tall and dwarf.

1.1 Motivation of the research

Dessert is a widely recognized treat that many people connect with pure pleasure. While flavor is an important factor in food product selection, individuals nowadays are also concerned about nutrition with healthiness (Lin,2012). Coconut milk is regarded mostly for its unique nutty flavor, smooth texture with nutritional value. Coconut milk-based ice cream is ideal for vegetarian diet people, it's a cholesterol free product (Jayasundera and Fernando,2014).

1.2 Research objectives

Here I work on making coconut ice cream using dry coconut flecks with coconut meat to conduct its sensory quality evaluation.

- a) To study the physio-chemical properties of plain coconut ice cream.
- b) To analysis the proximate composition of coconut ice cream.
- c) To checking for overrun, freezing time, texture, melting time, shelf life of ice cream.

1.3 Statement of the problem

Consumers connect ice cream a common treat, with complete joy. People are now pretty concerned about nutrition and healthiness in addition flavor, which is a key component in determining which food product they choose (Lin,2012). Currently, the price of ice cream products is increasing day by day. As a result, underprivileged areas of society are unable to

afford such expensive products. Therefore, need to reduce cost of this products. Coconut ice cream is ideal for all peoples.

1.4 Benefits and usage of Coconut

Since ice cream is the most popular food item among consumers. Coconut is source of nutrients that is full of saturated fat, fiber, vitamins and minerals. Coconut has a high amount of saturated fat, which is known as ‘‘healthy’’ saturated fat since it’s rapidly metabolized and utilized as energy by our bodies. It’s also effective as an anti-bacterial, anti-carcinogenic, anti-pathogenic & anti-inflammatory agent (Ishiaq and Obeyemi,2012). Coconut is used to make drinking water, oil, milk or manufacture of ropes, baskets, brooms, brush and other items.

1.5 Restrictions

All service jobs come with some requirements. Additionally, this product has some restrictions: -

- Storage condition
- Could not determine the rheological characteristics of prepared ice cream.

Coconut ice cream cannot be stored for a long time because its shelf life is short. Therefore, once the lid of this product is opened, it cannot be stored for a long time. If it is kept, it can be infected by microbial fungi or bacteria. It can be stored in the refrigerator for 1-2months; if it’s longer, the texture, flavor, or consistency of the ice cream may change.

CHAPTER 2

LITERATURE REVIEW

CHAPTER 2

2.1 Background of Ice cream

Ice cream began its journey to worldwide dessert fame as a luxury dish. Through its history, it has been referred to differently as ‘ices’, ice cream or others. The question of “**Who invented ice cream?**” is difficult to answer because there are so many viable candidates. In addition to many people taking credit for it, numerous nations also assert that they originated it. Ice or snow flavorings were first recognized around 550-330 B.C. During the “**Persian Empire**”, people concentrated grape juice on ice and ate it.

First evidence of ice cream has arrived in Rome. “**Nero of the Roman Empire**” brought ice from the mountain and topped it with fruit. Ice cream was invented in China during the Tang dynasty, which was the precursor of the Song dynasty and it was introduced to France in 1770 B.C. The first large-scale ice cream manufacturer was a Baltimore dairy seller named **Jacob Fussells** who was the first person to produce ice cream commercially and opened the first ice cream factory in Pennsylvania 1851 B.C. He became the father of the wholesale ice cream industry (Wikipedia-Book of Firsts).

After 1900, the industry improved with the invention of pasteurization, homogenization, freezers, and various processing equipment. Ice cream was acknowledged as a necessary food by 1920 and has been extremely popular ever since (Arbuckle,1986). The marketplace for desserts without dairy has grown rapidly, ice cream companies have developed plant-based alternatives (Mintel,2019). Even though vegan frozen desserts have a similar nutrient quality to their dairy-based versions, they may be considered as healthier (Bullock *et al.*,2020). Vegetarian diets have recently gained popularity. A vegetarian diet has various health benefits because of its higher fiber, folic acid, vitamins B, C & E, potassium, magnesium, zinc, calcium, many phytochemicals and present unsaturated fat content. It aids in the treatment of high blood pressure, Cancer, bone health, and heart disease among other things (Volume 89, Issue 5; 2009).

Milk fat is three-molecule structure known as “triglycerides.” It they are linked by ester bonds and itself is made up of three fatty acids and glycerol. Fresh cream is the best source of fat; alternative source includes frozen cream, butter, butter oil, and condensed milk mixtures. Milk fat is a major ingredient in ice cream. The use of the correct measure and proper mixing results in a consistent texture (Arbuckle,1986). Fat acts as a structural agent, increasing in the stabilization of the air phase (Goff *et al.*,1999). It providing the intended sensory qualities of ice cream (Mendez-Velasco & Goff,2012). According to research it has been found that the fat component boosts flavor richness fat soluble vitamins and other growth promoting factors. It produces a unique smooth texture (Koeferli *et al.*,1996; Marshall *et al.*,2003). So easily stated, the effect of milk fat in ice cream adds richness, increase the density of the mixture, smoothens it also increase flavor.

Food additives called sweeteners, usually sucrose and fructose are used as sugar substitutes- Honey, high fructose corn syrup (Encyclopedia, Food safety 2014). The main functions of sweeteners are given below:

- It adds sweetness, enhances the viscosity of the mixture.
- It improves product acceptance by not only making it sweeter, but also by improving the delightful creamy flavor and sweet fruit flavors. The ice cream to become too soft, smooth or chewy.
- Reduces the mixture's freezing point.

For a long time, sucrose was the only sweetener used in ice cream. The commercial supply of alternative sugars like fructose, glucose syrup, and many excellent sugar combinations has developed. Non-nutritive sweeteners including- saccharine, sucralose, aspartame, acesulfame-K are constantly used in ice cream (Arbuckle,1986; Asghar *et al.*, 2013; Khuenpet *et al.*, 2015). A surface-active substance known as an emulsifier forms a stable solution between liquid phase that don't actually mix.

This reduces fat globule stability, allowing partial flocculation during the whipping and freezing process, which tightly impacts to texture and meltdown qualities. Given below main functions of emulsifiers:

- To produce ice cream with a smoother, texture to impact dryness.
- Reducing aging time.
- Mono or diglycerides, soy, sorbates and other emulsifiers are frequently used. A large quantity causes in the product having faults in the body texture and slow melting qualities (Deosarkar *et al.*, 2016).

It enhanced the viscosity of the cream samples using coconut phospholipids as emulsifiers, which had the highest hardness, resistance to melting, high fat instability, and moderate overrun values. In ice cream, volatile fat has been observed to stabilize air cells and limit the liquid phase, minimizing outflow during melting (Rinaldi *et al.*, 2014). **Stabilizers** are also known as “hydrocolloids” are a type of water- soluble or irrigation biopolymers that are commonly applied in the manufacture of ice cream (Clarke,2004). Their primary purposes are:

- It's minimized diffusion of texture caused by changes in temperature in shop fridges & provide the proper tolerance to melting (Bahramparvar & Tehrani,2011).
- Prevent the production of enormous, unwanted crystals.
- At a rate of 0.2-0.3% of the mixture, stabilizers are added.

Examples are Sodium caseinate (milk derivatives), Sodium Carboxymethyl Cellulose (CMC), Sodium alginate, microbial gum (xanthan), Seaweeds extracts (carrageenan) gelatin, pectin, seed gums (locust bean gums) and other things (Deosarkar,2016; Hartel & Goff 2013).

Flavor is enhancing the taste of food or drink by adding a particular ingredient. An ice cream mix is processed to provide a neutral testing base that can be flavored with any unique flavors. The most flavors include- vanilla, fruit, nut, chocolate, vanilla, ripples (Kilara and Chandan, 2008). Flavor is the most significant aspect of ice cream. There are 02 kinds of flavors: Synthetic and Natural. Flavorings are now available in liquid syrup, solid, semi solids form. Any type of flavor to be added is defined by the consumers preference (Marshall et al.,2003;

Deosarkar,2016). **In physics, Color** is defined as the percentage of the visible spectrum of light reflected back from a surface as well as the amount of light reflected or absorbed by that surface. Black surfaces, for instance, absorb all light while white surfaces reflect all light. Most are of chemical origin and are available in markets in liquid or powder form. It's mostly found in foods products. There are two types of colors: synthetic and natural.

Most of ice cream varieties need the addition of certain colors. Yellow color is added to vanilla ice cream to give it the golden hue of cream, whereas in fruit ice creams, the amount of fruit used is enough to impart a suitable color. The majority of colors are synthetic in nature. While annatto color is the most commonly used natural color in ice cream, additional natural colorings have been produced, including: Anthocyanin (red-purple), Chlorophyll (green), Chlorophyllin (green-yellow), Caramel (brown), Carotenoid (saffron), betanin (beet). Colorants permitted for use in ice cream include: erythrosine, allura red, green, sunset yellow, indigo carmine, tetrazine (Jana *et al.*,2016).

Ice cream contains a significant amount of water. It's a continuous stage that dissolves all of the other soluble components. It is a combination of the two physical states that exist as a liquid or solid. Water varied in pH, alkalinity, and hardness unless any of these factors is extremely high it doesn't require organic solvents. Water must be of high standard, drinkable and contaminate-free. For microbiological reasons, it may be essential to chlorinate the water in some cases. It's possible that using fluid milk as a source of water is standard policy. When water is added to the mix to equalize it, a large portion of dry milk is utilized to provide (MSNF) milk solid non-fat (Chhetri,2016).

Lactose, casein, whey protein, minerals, vitamins, acid and enzymes found in milk or milk products are present in milk solids but not in fat. Milk solid non-fat can be found in skim milk, sweetened condensed milk. It has a high food value is economical and while it doesn't greatly impact the flavor of ice cream, it does make it more pleasant. Proteins which provide to nutritional restrictions as well as beating qualities, are its main elements. It's enabled an expending overrun without the pretty standard coarse or frosty textures than other overruns (Arbuckle, 1986; Marshall *et al.*,2003; Jana *et al.*,2016; Chhetri,2016). Coconut (*Cocos nucifera L.*) is a tropical fruit endemic to the wet tropics. It's used by industry, confectionaries, bakeries, biscuits, cake. Through coconut, Ice-cream industries is improved their flavor and taste. In contrast to the dominant perception, the coconut provides nutritious source of meat, juice, milk and oil. It's classified as a 'functional food' because it provides many health benefits beyond its nutritional content, due to its fiber and oil content (Sanful,2009).

2.2 Current market value of ice cream (Source: World atlas article; Joyce chepkemoi, 2020)

Table 1: Current Market Value of ice cream

Country	Per capita consumption (Litter/Year)
Newzeland	28.4
United States	20.8
Australia	18.0
Sweden	12.0
Canada	10.6
Denmark	9.8
Italy	8.0
United Kingdom	7.0

According to the report published, “Global plant-based ice cream market: industry trends and forecast to 2029.” Plant-based ice creams, also known as vegan ice creams, it’s made from soy, coconut, almond, cashew or others. It helps the body lose weight, lower the risk of cardiovascular disease and improve the texture of our skin (Global report,2022).

The value of the Global ice cream industry has been slowly rising day by day, with a reported value of \$54.80 billion in 2016 and a projected compound annual growth rate (CAGR) of 4.1% by 2025. The Brazilian association of industries and the ice cream industries both claim that China, India, and Brazil are the main rising markets for ice cream consumption (Campidelli *et al.*,2021). Dairy and dairy-derived products are consumed by around 6 billion people. Approximately 65% of those who don’t consume dairy out of the 6 billion people who do have a reduced potential for lactose intolerance & experience lactose- related health issues beyond childhood, according to the US National Library of Medicine (Katoch *et al.*,2022).

Benefits of non-dairy or vegetarian foods include lactose intolerance and low cholesterol as in case of coconut, almond, cashew, soy or others (Rayes-Jurado *et al.*, 2021). Since coconut milk contains calcium, potassium, phosphorus, Vitamins C, E and B6, as well as proteins, vital amino acids, and antioxidants, it is easily digestible source of nutrients. Furthermore, a desire for healthier lifestyle, milk allergies, intolerance of milk, and environmental awareness are driving a global preference for plant-based diets (Chavan *et al.*,2018; Katoch *et al.*, 2022)

2.3 Types of ice cream & related products

There are several variations of the formula, ingredients (dairy/non-dairy), flavors, freezing point temperature, sizes, shape, texture and other things within the ice cream category that enable the creation of widely variety of products, such as follows (Goff and Hartel, 2013; Jana *et al.*, 2016).

- Fruit ice cream: Without the use of additional fruit flavoring and coloring, different fruits are frozen with sugar to produce fruit ice cream.
- Nut ice cream: It's containing nut like peanut, almond, cashew, walnut, pista other things.
- Chocolate ice cream: When it has a cocoa flavor agent added.
- Ice milk: A frozen food that looks like ice cream and is sweetened, flavored, and contains 2-7% fat, and 12-15% MSNF.
- Sherbet: Fruit juice also contains sugar, stabilizers and milk products, example as watermelon sherbet.
- Sorbet: made of fruit juice but has higher sugars; stabilizers are also added; the overrun is 20% or less.
- Custard ice cream: Here ice cream is cooked to custard before freezing. It contains whole egg or egg yolks in such a proportion that the total egg yolk solids should not be less than 1.4% of the weight of the finished frozen custard.
- Kulfi ice cream: Kulfi is mostly made with condensed milk (milk & sugar) with flavoring such as- saffron, cardamom, rosewater, and fruits as coconut, watermelon, mango, almond, kesar, strawberries, cranberries or others as well as pista nuts.
- Turkish ice cream: It's differentiated by a slightly more elastic texture as a result of salep, an orchid root flour, and mastic, a chewy resin.
- Gelato: Italian ice cream that is lower in fat (4-8%) and sugar (25-60%) than standard formulations but higher in sugar up to 25%, including corn syrup.
- Pudding: with or without spices, wine or eggs, ice cream with a thick layer of mixed fruits, nut, and resins.
- Rippled ice cream: It's produced by injecting ice cream with 10% of fixed base.
- Mousses: whipped cream, sugar, color, and flavoring are mixed into ice cream and frozen without further stirring.
- Cassata ice cream: A multicolored ice cream known as cassata is comprised of alternating layers of various flavors with liquor- soaked sponge cake on top.
- Aufait ice cream: Aufait means that the ice cream contains layers of viscous fruit.
- Soft serve ice cream: It's also known as a "soft ice" similar to ice cream but softer, it's a frozen dessert. These are offered for sale fresh out of the freezer. The taste buds may recognize more flavors because of the increased temperature.

CHAPTER 3

MATERIALS & METHOD

CHAPTER 3

3.1 Materials

All the ingredients are purchased locally, and some ingredients are homemade. The ingredients that go into making ice cream are listed below:

- Coconut
- Sweeteners
- Flavors
- Colors
- Water
- Milk solid non-fat (MSNF)
- Vegetable oil
- Milk fat
- Equipment and chemicals

3.2 Equipment and Chemicals

On campus facilities and substances included the following: lists the materials that were used during the analysis and lists of the equipment's.

3.3 Lists of Chemicals:

- Hydrochloric acid (HCl)
- Sulfuric acid (H₂SO₄)
- Sodium Hydroxide (NaOH)
- Amyl Alcohol, Ethyl alcohol
- Distil water
- Phenolphthalein, methyl red indicator
- Potassium iodide and other things.

3.4 Lists of Equipment's:

- Conical flask
- beaker, test-tube
- Electric balance machine
- Crucible lid,
- spoon, bowl, ice cube
- Centrifuge,
- test-tube racks
- Burette, pipette, pipette filler
- pH machine, Brix
- Kjeldhal digestion and distillation set
- Filter paper, moisture analyzer machine
- Garber butyrometer
- Muffle furnace
- Titration apparatus

- Refrigerator
- Measuring cylinder
- Bunsen burner
- Test tube holder
- Sediment tester
- Thermometer
- Lactometer
- Dropper
- Desiccator
- Hot waterbath
- Hot air oven etc.

3.1.1 Flow chart manufacture of ice cream (General process)

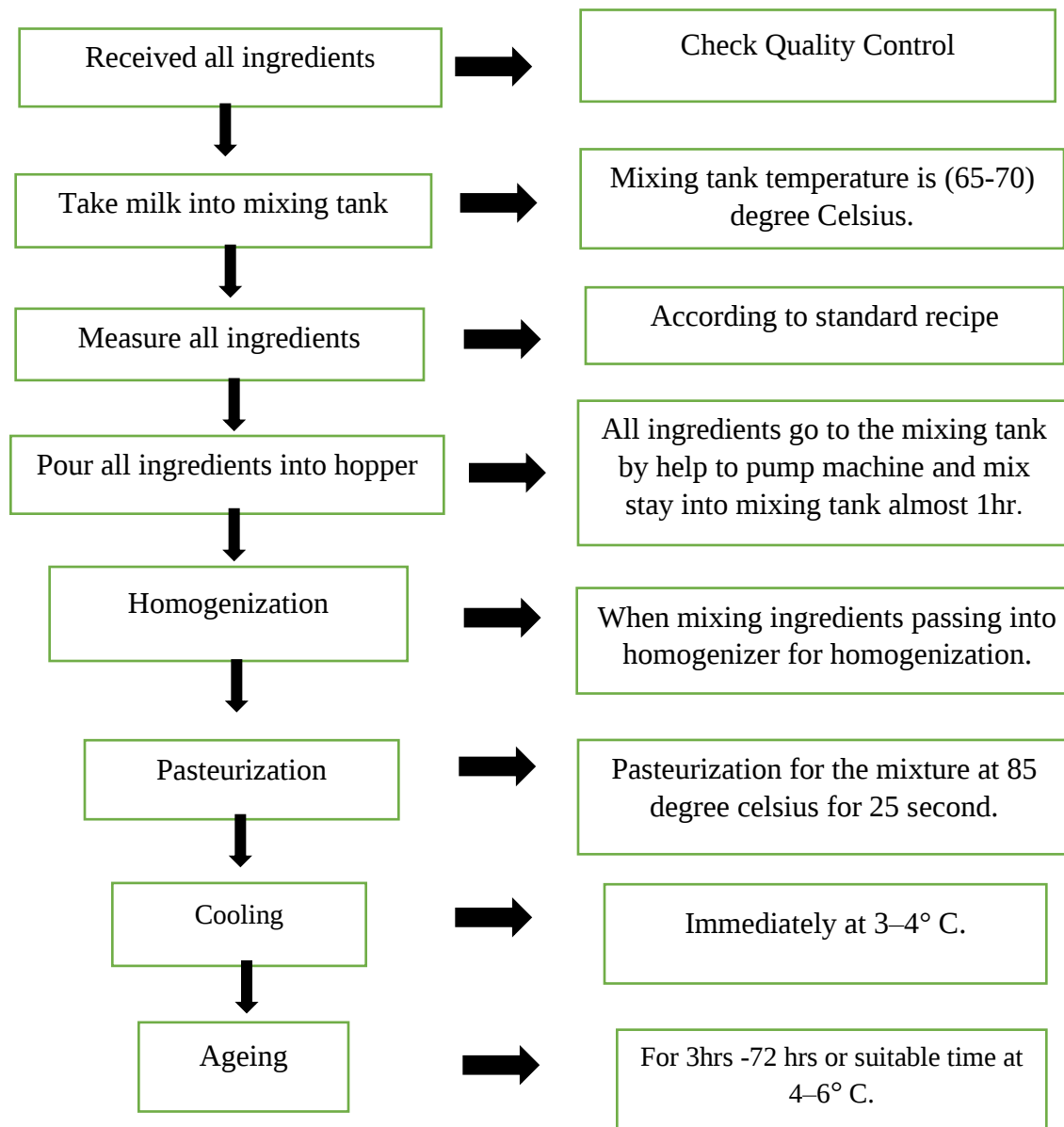


Figure A1: Process of Ice cream

3.1.2 Pictorials flowchart of coconut ice cream process



Figure A2: Ice cream making process

3.1.3 Determination of Moisture Content

Objective: The quantity of water or moisture that is contained in material is known as its moisture content. It's described as a percentage (%). It determines both the products physical characteristics and their shelf-life.

Apparatus:

1. Digital moisture analyzer
2. Spatula and pan



Figure A3: Moisture Analyzer

Procedure:

- Take 1 gram of the sample on the moisture analyzer's pan initially.
- After that, activate the analyzer's upper cover and adjust the temperature to 120° Celsius.
- Until then the machine gives a beep signal with analyzer lighting off.
- When the machine beeps then as well as take note of the reading on the analyzers display.

Precaution:

- Set the temperature carefully
- Set the sample pan very carefully
- Take reading properly

3.1.4 Determination of Ash Content:

Objective: The term “ash” describes is the inorganic material that remains after burning or complete oxidation of organic substances in a food sample. It's an important part of the proximate analysis of the food sample also it containing for nutritional evaluation. (Figure-3)



Apparatus:

1. Electric muffle furnace
2. Crucible lid
3. Digital balance machine
4. Spatula
5. Desiccators
6. Dry oven

Figure A4: Muffle Furnace (JSMF-45T)

Procedure:

- Firstly, take dry two crucible lid for 30 minutes at 75 degree celsius.
- After that, taken weight of the crucible (W_1).
- Then take 5gm sample with properly insert it into the crucible lids and take weight (W_2).
- After that, I heated the crucibles containing the sample for 6hrs at 600 degree celsius in the muffle furnace.
- After 6 hours, the crucible lids were replaced and left to cool for 5 minutes in the desiccator.
- Then again take weight repeatedly (W_3).

Calculation:

Here, W_1 = empty crucible lid weight.

W_2 = Weight for sample in crucibles.

W_3 = drying weight

% Of ash content = $\{(W_2 - W_3) / W_2 - W_1\} * 100$

3.1.5 Determination of Garber method

Objective: Garber methods are used for analysis content of milk fat; it's widely used all over in world. Milk fat is separated from proteins by adding H_2SO_4 , amyl alcohol and centrifugation.

Apparatus:

- Butyrometer
- Amyl alcohol for pipette 1ml.
- 90% Garber H_2SO_4 acid
- Water bath
- 10ml acid pipette for H_2SO_4
- Electric centrifuge
- Garber test tube
- Sample

Chemicals: Milk, Garber H_2SO_4 acid, Iso amyl alcohol



Figure A5: Garber apparatus (Fat test)

Procedure:

- Use the 10ml acid pipette to replace 10ml of H_2SO_4 into the butyrometer.
- Fill the 10.75ml pipette with the sample and insert the sample into the butyrometer.
- After that, add 1ml of iso-amyl alcohol by using the 1ml pipette and tie up.
- Then shake the butyrometer in the shaker stand until no white elements are observed.
- After that, replace the butyrometer in the waterbath at 65 degrees Celsius for 5min.
- Then, take it out dry with a cloth, leave it in the centrifuge, placing two butyrometers diametrically opposite, centrifuge at maximum speed for 4min.
- Bring the lower end of the fat column on to a main graduation mark by slightly withdrawing the stopper.

[**Note:** The color of the fat should be straw yellow. End of the fat column should be clear and sharply observed.]

3.1.6 Determination of total solid and solid non-fat

Objective: Total solid content is the entire residue left after complete evaporation of water from milk. Includes fat, protein, lactose and mineral solids are mixed in milk.

Apparatus:

- Balance machine
- Desiccator
- Porcelain
- Hot air oven
- Heat proof gloves
- Centrifuge machine
- Pipette, Garber sulfuric acid, waterbath
- Iso amyl alcohol/ amyl alcohol

Procedure:

- Step-1 (Determination of moisture content)
- Step-2 (Determination of fat content)
- Step-3 (calculation)

Calculation: At first find out Total moisture content of milk this formula

$$= \{W_s - (W_2 - W_1) / W_s\} * 100\%$$

Total solid% = Total solid% - Total moisture content of milk%

Solid non-fat (SNF) = Total solid% - Fat %

3.1.7 Determination of protein (Kjeldhal method)

Objective: Kjeldhal methods has 3 step- Digestion, Distillation and Titration

Apparatus:

- 100mL of volumetric flask
- Funnel, conical flask
- Pipette
- Measuring cylinder
- Burette, dropper
- Kjeldhal machines
- Spatula
- Masking tape

1) Digestion process:

- Firstly, measuring sample and insert 0.4-gram in the digestion flask.
- After that, add 10mL of conc. H_2SO_4 and 2gm of the sample solution.
- After that, in a Kjeldhal digestion chamber the flask will be heated to 90 degree celsius until the cloud has vanished and formed greenish yellow color.

2) Distillation process:

- Into a volumetric flask, transfer the digestion flask's water. When it reached 100mL add more water. In order to replace any trace of the digested material then, add distilled water to the digestion flask before utilizing it to the volumetric flask.
- The digestion flask is again filled with 10ml diluted sample solⁿ, which is transferred to the distillation flask. In order to, fill the flask with 10ml of 40% NaOH & 150ml of distil water.
- Here this process was in used 2 distillation flasks. There first flask contained d in only distilled water, while the another one contained a sample of NaOH.
- After that, to distribute the evaporated sample 2 conical flask also known as a trapping flask are produced, containing 10ml of 0.1N HCl also added 1 drop of methyl orange inserted inside the trapping portion.
- Again, when trapping & distillation flask are adequate, the heating process begun at 90 degree celsius. When bubbles begin to form the temp falls to 60 degree celsius. For 30min this process is repeated.

3) Titration process:

- Burette is filled with 0.1N NaOH then inserted the sample flasks, one by one beneath the burette for initiate titration. When the color changes from pinkish to golden yellow, resist the burette.
- Then collect the initial and final burette readings for both of the flask.

Calculation:

Wt. of sample = 0.4g

B = titration value for blank

S = titration value for sample

% Protein = $\left[\frac{(B-S) * 1.4 * 10 * 5.31 * 0.1}{\text{Wt. of sample}} \right]$

Precaution:

- Handle HCl, H₂SO₄ carefully.
- Collect reading carefully.
- Masking tape must be attached carefully.
- Setting the temp properly.

3.1.8 Determination of Carbohydrate (CHO)

Total carbohydrate was obtained using the subtracting method describe below:

% CHO = {100% - (% of protein+ % fat+ %moisture +% ash)}

3.2 SENSORY EVALUATION

A hedonic scale is method of quantifying levels of information that indicate a quantity of like or dislike. The 9-point hedonic scale, developed by Perham and Girardot in 1952, is the most widely used sensory test. Thirty untrained evaluators executed a sensory evaluation using a 9-point hedonic scale, based on the products color, flavor, texture/mouthfeel, smell and overall acceptability they have submitted their reviews.

CHAPTER 4

RESULT & DISCUSSION

CHAPTER 4

4.1 RESULT & DISCUSSION

Given below proximate composition of the coconut ice cream sample is shown the table.

Table 2: Proximate composition

Parameter	Result
Moisture content	56.93%
Ash Content	0.37%
Protein	1.85%
Fat	5.3%
Carbohydrate	31.0%

Moisture content: The coconut soft ice cream contains around 56.93%

Ash content: The total ash percentage of Ash 0.37% has shown that the product has high nutritional quality.

Protein: The coconut soft ice cream contains 1.85% protein, which is very similar amount compare to sarbet.

Fat: The fat content was 5.3%, which is similar to gelato and ice milk.

Carbohydrate: Which is contains 31.0%.

4.2 SENSORY QUALITY

Sensory quality is defined as appearance, odor, color, flavor, taste, and texture of foods detectable by human senses are often used to evaluate food quality.

4.2.1 TEXTURE

The texture had high possibility. The participants gave it a rating of “very much liked”. Given below their response on textural quality. (Figure 5)

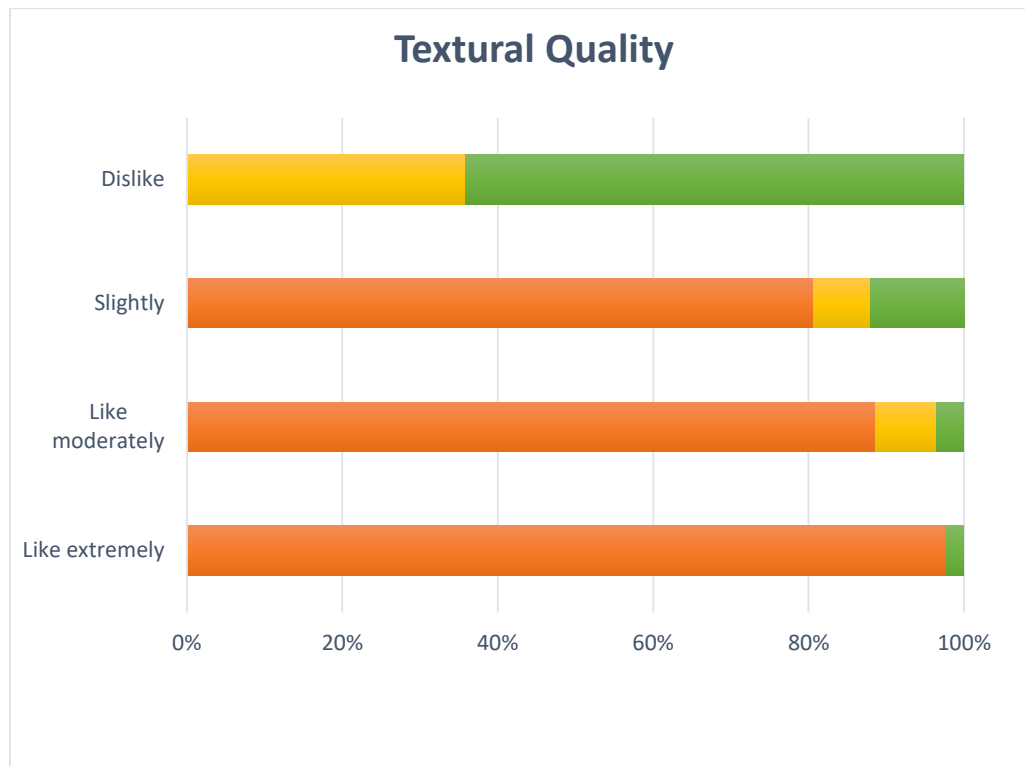


Figure B1: Texture quality

4.2.2 TASTE

The freshly made coconut soft ice cream has really good flavor. Of the 30 participants, 18 thought it was excellent (Figure 6).

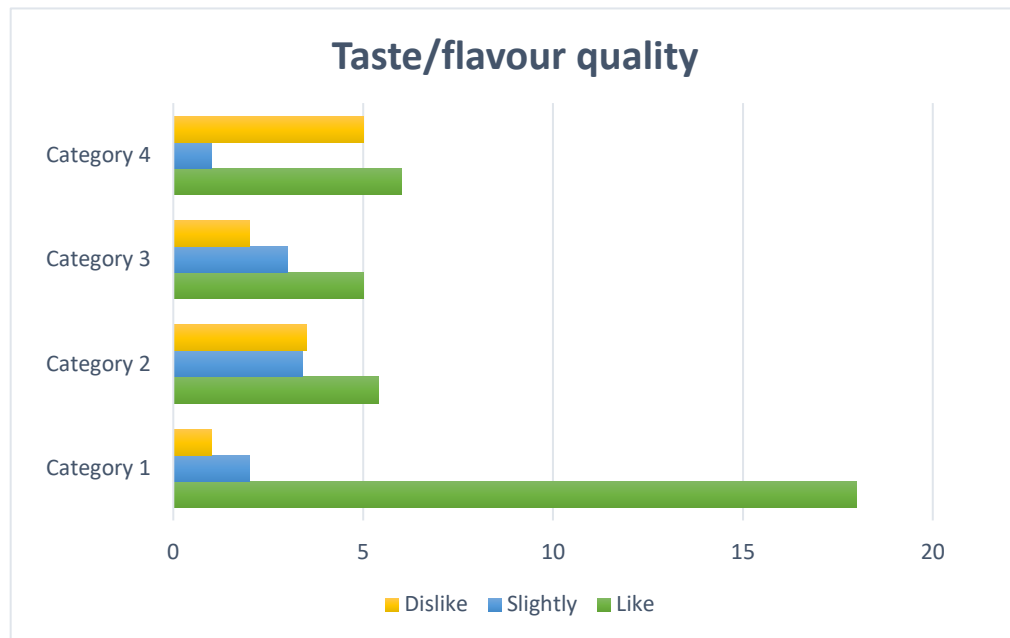


Figure B2: Taste/Flavor quality

4.2.3 COLOR

Given below the table for the products color acceptability rate, which are mentioned in like extremely, slightly, moderately and dislike table- 4.

Table-3: Color acceptability rate

Sensory food color	Acceptability rate
Like extremely	18
Like very much	15
Like moderately	4
Like slightly	6
Neither like or neither dislike	
Dislike slightly	2
Dislike moderately	
Dislike very much	
Dislike extremely	

4.2.4 OVERALL SENSORY ANALYSIS

A hedonic scale-9 test performed on 30 participants evaluated the sensory attributes of a coconut soft ice cream. 65% of participants thought this product was much very appreciated, 20% thought it was enjoyed slightly and 15% said it was liked tremendously. This product is liked by everyone who participated (Figure 7).

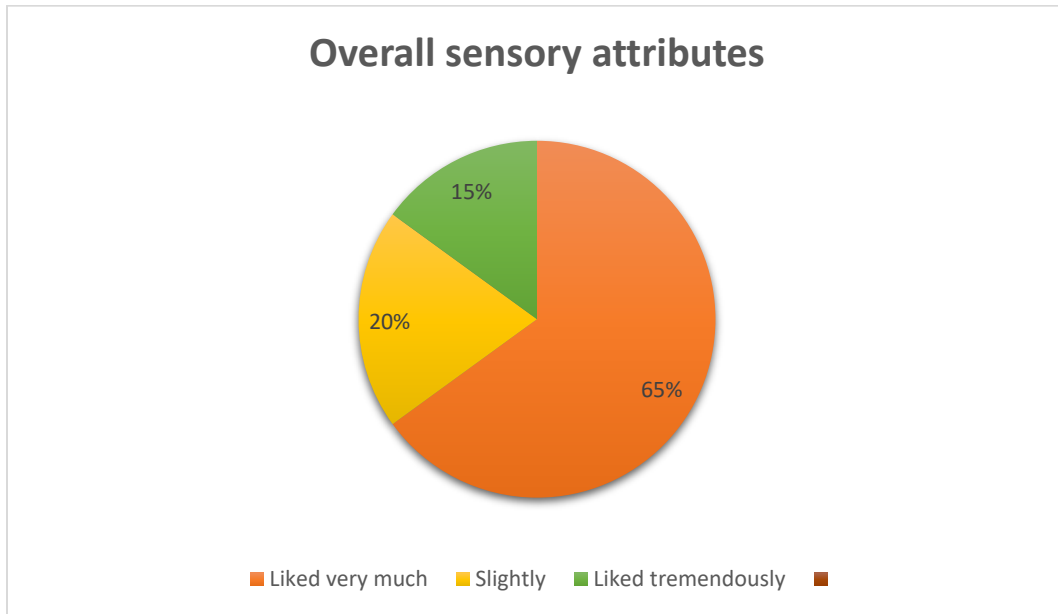


Figure-B3: Overall sensory attributes

CHAPTER 5

CONCLUSION

CHAPTER 5

5.1 CONCLUSION

In this project a coconut soft ice cream was developed, and its composition also sensory attributes. The proximate compositions are denoted that Protein (1.85%), fat (5.3%), minerals and fiber contain 0.37% ash content. Also, sensory attributes are shows that 65% of participants was much very appreciated, 20% was enjoyed slightly and 15% was liked tremendously.

APPENDIX

Appendix 1: Proximate composition of (raw data)

Parameter	Sample 1	Sample 2
Fat	6.57	5.3
Protein	2%	1.85%
Moisture content	56.93%	56.23%
Ash content	17.89%	17.90%

Appendix 2: Color Acceptability rate

Sensory food color	Acceptability rate
Like extremely	18
Like very much	15
Like moderately	4
Like slightly	6
Neither like or neither dislike	0
Dislike slightly	2
Dislike moderately	0
Dislike very much	0
Dislike extremely	0

CHAPTER 6

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6.1 REFERENCE

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