



# Thesis Report

On

## Preparation and Proximate Analysis of Functional Cookies Made by Mixed Flour and Dragon Fruit Peel Powder

Supervised By

**Dr. Nizam Uddin**

Assistant Professor

Department of Nutrition and Food Engineering

Faculty of Allied Health Science

Daffodil International University

Submitted By

Zerin Akter

ID: 182 - 34 -788

Department of Nutrition and Food Engineering (NFE)

Faculty of Allied Health Science (FAHS)

Daffodil International University

## Letter of transmittal

Date: 13/1/2023

Dr. Nizam Uddin

Associate professor and Head In-charge

Department of Nutrition and Food Engineering

Daffodil International University

**Subject: Submission of project Report.**

Dear sir,

With due respect, I hereby submit my project report on "**Preparation and Proximate Analysis of Functional Cookies Made by Mixed Flour and Dragon Fruit Peel Powder.**" Which was a compulsory requirement of the NFE program m of the Daffodil International University? The purpose of this project was to educate myself with my edge and experience on cookies. I believe that knowledge the and the patience I gathered during the project period will be helpful in my future professional life.

I while have my best to make the best out of it and avoid any kind of mistake.

I would appreciate if you it illuminated me with your through and views regarding the report. In addition, if, you wish to enquire about an aspect of my report. I will gladly answer your queries.

Your support in this regard will be highly appreciated.

Sincerely yours



Zerin Akter

ID: 182 - 34 -788

Department of Nutrition and Food Engineering (NFE)

Faculty of Allied Health Science

Daffodil International University

## Letter of Authorization

Date: 13/1/2023

The Head of the Department

Department of Nutrition and Food Engineering

Daffodil International University

**Subject: submissions of thesis report paper.**

Dear sir/ madam,

My humble statement is that it is my sincere declaration that the project report I have written is not a copy of any other students writing or any previous thesis report.

I also express my legitimate authority to prove the fact that the thesis report mentioned above has never been used to meet the requirements of any other course, and that it will not be provided to any other person or authority in the future.

Your most obedient pupil



.....

Zerine Akter

ID: 182-34-788

Department of Nutrition and Food Engineering

Daffodil International University

## Certificate of Approval

I am pleased to certify that the project Report “**Preparation and Proximate Analysis of Functional Cookies Made by Mixed Flour and Dragon Fruit Peel Powder** “. Conducted by **Zerin Akter**, bearing ID: 182-34-788 student of the Department of Nutrition and Food Engineering has been approved for presentation and defense/viva- voice.

I am also happy to certify that the result and findings showed in the study are genuine work of **Zerin Akter**. He bears a strong moral character and a very pleasant personality. wish him all success in life.



.....  
**Dr. Nizam Uddin**

Associate Professor and Head in-charge  
Department of Nutrition and Food Engineering  
Faculty of Allied Health Science  
Daffodil International University



.....  
Zerin Akter  
ID: 182 - 34 - 788  
Department of Nutrition and Food Engineering  
Faculty of Allied Health Science  
Daffodil International University

## **Acknowledgment**

First and foremost, I would want to thank the almighty God for enabling me to properly and appropriately finish my project.

Then, I'd want to express my gratitude to my honorable teacher Dr. Nizam Uddin, Associate professor and head (In-charge), Department of Nutrition and Food Engineering, Allied health science faculty. He always assisted me when I needed it and provided the guidance I needed to finish the project.

I appreciate all of your assistance, consultation, advice, motivation and, assistance.

## Abstract

Dragon fruit, also known as pitaya and strawberry pear, is a tropical fruit of different cactus species.

This fruit has become popular more of unique appearance. Though people primarily enjoy it for its unique look and taste, evidence suggests it may provide health benefits as well.

The leather-like skin that has scaly spikes is the reason why people call it dragon fruit. The red dragon fruit peel powder has potential in the n reducing total cholesterol, triglyceride, and LDL-c and Increasing HDL-c levels. Red dragon fruit peel powders can be consumed as a supplement in foods that are expected to maintain a healthy body and prevent hyperlipidemia.

In this observation dragon peel powder used as is element of cookies. Cookies produced with whole-grain flour contain nutrients including vitamins, minerals, and fiber that are good for you. Dietary fiber aids in weight loss lowers blood cholesterol and prevents constipation, all of which are the nutrition advantage stage of cookies. One of the health benefits of cookies is their high protein level.

Dragon peel was dried at 60°C for 6 hours, reducing the moisture content to 9%. was blended with wheat flour throughout the cookie-making procedure and forwarded for assessment.

Some different methods were analyzed to determine ash percentage, protein content, fiber percentage, moisture content and presence of microorganisms.

**Keywords: Cookies, Healthy food, Wastage reuse, dragon peel etc.**

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# Chapter-1

## Introduction

### 1.0 Introduction

The consumption of bakery goods is quite important in the global food market. Everyone enjoys cookies, one of the most popular bakery foods. Fats, calories, cholesterol, salt, potassium, carbs and protein are all found in cookies. Dragon fruit peel flour can be used to provide natural color, dietary fiber and minerals to processed foods as well as a source of energy and nutrition.

### 1.1 Dragon fruits:

The tree is a climbing cactus vine that thrives in desert environment. Due to the epiphytic character of it. It thrives in soil that has a lot of organic matter. Because its blossoms only open at night, the plant is also frequently referred to as the "moonflower" or "lady of night ". The flowers are huge and white, and bloom for just one night. The red, purple and yellow-skinned varieties of the Dragon fruit have a striking look, as do the conspicuous scales. The fresh has mildly sweet or occasionally slightly sour test. The flesh is then either white or crimson, and there is edible black seeds scattered throughout.



**Fig: Dragon fruit**

According to a 2013 estimate, the vitamin is the world's top exporter of Dragon fruits, accounting for 55 percent of the nation's total fruit export earnings. However, other nations have also been attempting to cultivate the fruits, including Thailand, northern Australia, southern China and the Philippines.

Classification of dragon fruits:

Class: Liliopsida

Division: Magnoliophyta

Kingdom: Plantae

Family: Cactaceae



## 1.2 Dragon fruits peel

One of the most well-known tropical fruits in the world is the Dragon fruit. However, there are still a lot of myths about eating fruits' id you also discard the peel right immediately when you finished eating. As it has been discovered that the skin of a Dragon fruit has incredible nutritional content is, the skin of a Dragon fruit can be eaten. The pitaya peel has long been utilized in traditional Chinese medicine because it contains significant amounts of pectin, vitamins, antioxidants, bacteria and fiber.

### 1.3 Nutritional composition of Dragon fruits peel (per 100g)

Parameters	Amount (per 100g)
Dietary fiber	59.83g
Insoluble dietary fiber.	9.42g
Soluble dietary fiber.	50.41g
Phenolic	65.71g
Carotenoids	1.87g
Moisture	9.99
Vitamin C	2.62g
Protein	6.03g
Fat	6.14 g
Ash	4.34g



**Fig: Dragon Fruit peel**

### 1.4 Health benefits in Dragon fruits peel

The powder peel of Dragon fruits may help lower total cholesterol .Red Dragon fruits peel powders can be added to meals as a supplement to help people stay healthy and avoid hyperlipidemia .According to a recent study ,the skin of Dragon fruits includes substances that can bend blood vessels ,which means that the numerous health issues caused by blood vessels that are too stiff can be resolved .Dragon fruits peel can also be used as a natural cancer treatment ,according to some herbal medicines .Cancer is one of the most dangerous diseases in the world, but you can prevent it by using herbal treatments produced from this Dragon fruits peel .It would be better for you if you look herbal medicine made from the peel of this Dragon fruit in addition to other prescription medications if you were receiving cancer therapy. One of the natural ways to prevent cancer naturally is to use Dragon fruits peel.

### 1.5 Aim of the study

- The Dragon fruits peel added to the cookie recipe.
- Development the wastage product
- 3.To perform organoleptic testing to determine consumer acceptability.
- 4.To fulfill requirements for graduation.

## Chapter-2

### Material and Method

#### 2.0 Material and Method

The research was conducted in Dhaka, Bangladesh at the Daffodils International University Department of Nutrition and Food Engineering.

#### 2.1 Procurement of raw materials

Dragon wheat flour and other ingredients was collected from the Prince bazar.

#### 2.2 processing of Dragon fruits peel powder

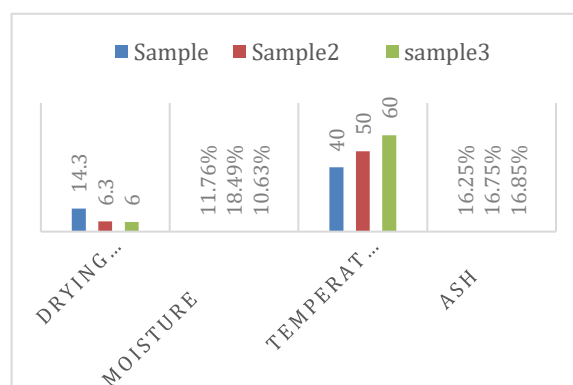
Slice the Dragon fruit peel pieces after washing the Dragon fruits. The Dragon free peel pieces were then baked in a dry oven at 60°C for six hours. The peel is ground in a blender after drying. To obtain powder with uniform particle size, the obtained powder was sieves through a sieve with a mesh size of 70 mm. Dragon fruit peel powder was then packed in airtight containers for later use.



Fig: Peel powder Process

#### 2.3 Dragon fruit peel powder sample

	Sample1	Sample2	sample3
Drying Time :	14.30h	6.30h	6h
Moisture :	11.76%	18.49%	10.63%
Temperature :	40°C	50°C	60°C
Ash :	16.25%	16.75%	16.85%



## 2.4 cookies formulation

First butter and sugar beat until light and fluffy. Then added flour and peel powder and mix combined. If the dough is too soft then shape into a disk from wrap in plastic wrap. Refrigerate for 1-hour. Roll out cut into desired shape. Transfer the cookies to a baking tray and bake at 180°C temperature. Allow to cool.



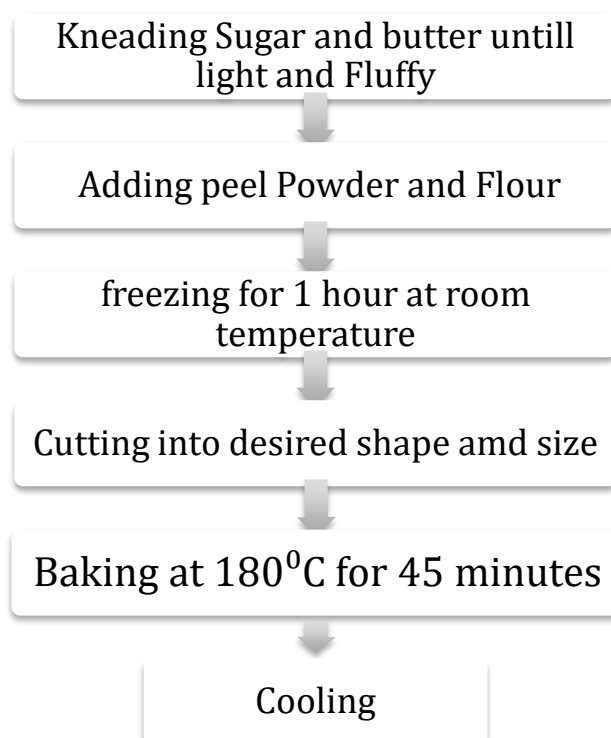
**Fig: Cookies processing**

<b>Ingredients</b>	<b>used</b>
Butter	80g
Sugar.	29 g
Vanilla essence	1g
Flour	75g
Peel powder	8g
Salt	1g

## 2.5 Health benefits in cookies

Cookies produced with whole -grain flour contain nutrients including vitamins, minerals and fiber that are good for you. Dietary fiber aids in weight loss, lowers blood cholesterol and prevents constipation, all of which are nutritional advantage of cookies. One of the health benefits of cookies is their high protein level. You won't overeat if your body gets the right number of calories each day for metabolic activity. Additionally, you will not feel exhausted because you have the body the nutrition and energy it needs. Eat a few cookies to give your body energy and avoid fat storage because cookies are heavy in carbohydrates. One of the health advantages of cookies is their high protein level. The process through which these substances are transformed into energy is called metabolism. Therefore, if your diet is short in protein, a cookie will more than make up for it. The growth of new tissue and muscles is greatly aided by protein and filling source of protein that is rich in nutrients. It doesn't contain any artificial sweeteners, colors or preservatives. Therefore, it is okay for your kids to eat. Cookies are healthy meals for personal who have been diagnosed with lifestyle disorders like obesity and diabetes because of their nutritional benefits. Consuming in moderation can significantly lower your risk of getting chronic diseases.

## 2.6 Cookies making flowchart:



## Chapter -3

### Proximate Analysis

#### 3.0 Determination of Ash content

##### Procedure

Step-1: crucible preparation

Step-2: sample preparation

Step-3: combustion / Burning

Step-4: Final weight (after ash)

Step-4: calculation

##### Apparatus and equipment

- Metal tong
- Heat resistant gloves
- Spatula
- Weight machine Blanche
- Desiccated
- Crucible
- Muffler furnace



Fig: Ash content

##### Step-1: Crucible preparation

Place the clean crucible in the oven .150°C of drying the crucible after 20 minutes, remove the crucible from the oven and let it cool in a desiccator. Ash can now be analyzed using the crucible.

##### Step-2: Sample preparation

1. Note the weight of the blank crucible and tire the weight of the crucible.
2. Take 3-4 g of sample in the crucible
3. Note the sample weight.

**Step-3: Combustion/Burning**

1. Turn on the furnaces power.
2. Carefully insert the crucible containing the sample into the furnace.
3. Squeeze the furnace door shut.
4. Set the timer for 6 hours and the temperature at 600°C.
5. Turns on the furnace.
6. Turn off the power and cautiously open the door 6.6 hours later.
7. Take the crucible out of the furnace and place it in the desiccators to cool.

**Step-4: Taking final weight**

Now take the final weight of the crucible containing ash.

**Step:5 calculations**

$$\text{Ash\%} = \frac{W_2 - W_1}{W_s} \times 100$$

Weight of crucible = W1

Weight of crucible with ash = W2

Weight of sample = Ws

**DFPP Ash content:**

Crucible weight= 24.005 g

Sample= 2g

After ash crucible weight= 24.342 g

Ash = (24.005+2) g – 24.342g

= (26.005 – 24.342) g

=1.663 g

Ash= 1.663%

**Cookies Ash content:**

Crucible weight = 27.419 g

Product = 2 g

After ash crucible weight = 20.822 g

Ash =  $(27.419 + 2) \text{ g} - 20.822 \text{ g}$

= 29.419 - 20.822

= 8.597

Ash% = 8.597 % (ans)

### 3.1 Determination of protein content

**Procedure:**

Step-1: Digestion

Step-2: Distillation

Step-3: Titration

Step-3: Calculation

**Supplies:**

1. Conical flask 250ml.
2. Volumetric flask 100ml.
3. Burette 50ml.
4. Pipette 10ml.
5. Glass boiling beads.
6. Graduated cylinder 100ml.
7. Motor and pestle.
8. Plastic gloves.
9. Food sample (need to be fairly dry and able to be ground with a mortar and pestle)
10. Funnel.
11. Spatula
12. Weighing pan

## CHEMICAL/ Reagent list

### Digestion:

- Catalyst (potassium Sulfate+ copper Sulfate)
- Sulfuric acid (concentrate 95%-98%)

### Distillation:

- 1.40% sodium hydroxide solutions
- 2.4% boric acid solution

### Titration:

- Hydrochloride acid (0.1N)
- Methyl red indicator (0.1%)



**Fig: Protein Content**

### Digestion:

Get a sample 10ml of sulfuric acid ,4g of digestion mixture and 2g of product the digestion flask should receive it. For this technique, use two digestion flasks so that an average value may be determine. Heat for the first three to four hours, then turn up the heat. The solution will be perfectly clear and there won't be any sulfuric white smoke at the end. For a while, let it rest.

### Distillation:

Use distilled water to level off the solution in a volumetric flask to 100ml. Take 10ml and transfer it to the distillation flask form the volumetric flask. Add 10ml of 40% Noah and 150ml of distilled water to the distillation flask. In the trapping conical flask add 50ml of distilled water,10ml of 0.1 Hcl, and 2 drops of methyl red (1%) for this method, utilized three distillation flasks, one of which should be empty. No sample for IC just takes 10ml of 40% Noah and 150ml of purified water. Utilized three trapping solutions in three trapping conical flasks while keeping everything the same. Condenser apparatus for 30 minutes after starting it.

### Titration:

Pour 0.1NaOH into the burette. Titration three times using the trapping solution, three times three. The pink color will eventually turn bright yellow towards the end.



## Calculation

### DFPP Determination of protein:

Weight of sample ( $W_s$ ) = 1.462g

Volume of 0.1 N HCL ( $V_1$ ) = 2.1 ml

Normality of HCL ( $N_1$ ) = 0.1

Acid factor ( $F_1$ ) = 1

Molecular weight of N ( $M_{wn}$ ) = 14.007

Factor = 5.7

Dilution factor ( $F_2$ ) = 10 ml

N% = 0.21%

Protein % = 11.97 %

### Cookies Determination of protein:

Weight of sample ( $W_s$ ) = 1.462g

Volume of 0.1 N HCL ( $V_1$ ) = 2 ml

Normality of HCL ( $N_1$ ) = 0.1

Acid factor ( $F_1$ ) = 1

Molecular weight of N ( $M_{wn}$ ) = 14.007

Factor = 5.7

Dilution factor ( $F_2$ ) = 10 ml

N% = 0.2001%

Protein % = 11.4057%

### 3.2 Determination of moisture content

1. First, remove the cover from the analyzer and insert an empty moisture dish.
2. Flip the switch off. The analyzer will show 0.000 along with etching time and temperature.
3. To set the temperature, press the select button.
4. Precisely weight a 2.00gm sample in a dish. Spread the mixture evenly as you can.
5. Snap the cover shut and clicks the START button.
6. The analyzer will automatically calculate the moisture content and present it in percentage from.
7. The determination analyzer will stop automatically after three beeps.
8. Note the outcome.
9. Flip the switch off.

#### **Dragon fruits peel powder Moisture:**

Analyzed by digital moisture analyzer

determined moisture content 6.39 %

#### **Cookies Moisture:**

Analyzed by digital moisture analyzer

determined moisture content 10.63%



### 3.3 Determination of fat content

#### Equipment:

1. Weighing balance
2. Thimble
3. Water bath
4. n-Hexane
5. Hot plate
6. Dish
7. Soxhlet apparatus



**Fig: Fat content**

#### Procedure

1. Weight a 5gm sample of ground and dried sample (moisture removed) and put it in the thimble.
2. The thimble should be placed inside the 12 soxhlet extractor.
3. Pour 90ml of n-Hexane into a 150 ml round bottomed flask.
4. Set the entire apparatus on a heating mantle and let the n-Hexane come to a boil.
5. The extraction process should be continued for nearly 6 hours.
6. Take the condensing unit out of the extraction unit, then let the sample cool. It removes all the lipid in the end.
7. After distillation, collect almost all of the solvent.
8. After removing the sample from the oven, place it in the desiccators.
9. Determine the sample weight.

**Calculation:**

$$\text{Total Fat} = \frac{W_2 - W_1}{W_s} \times 100$$

Weight of sample =  $W_s$

Thimble before fat extraction =  $W_1$

Thimble with fat after fat extraction =  $W_2$

**Fat content:**

Flask weight = 168.751 g

Sample = 2.5 g

Flask after extraction = 169.517 g

Fat % = 30.68 %

Fat % = 30 %

### 3.4 Total bacteria count

#### Apparatus and materials:

1. Petrified
2. Micropipette
3. Alcohol
4. Laminar air flow
5. Autoclave
6. Incubator
7. Nutrient agar
8. Colony counter

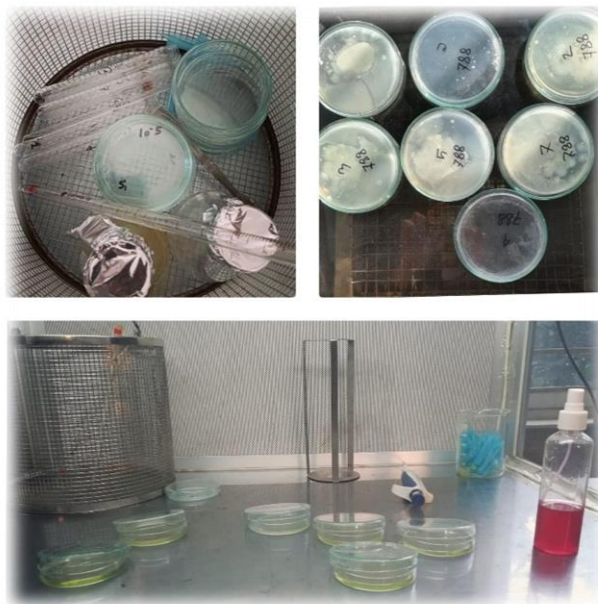


Fig: Microbial activities determination

#### Procedure

After preparing the media, we sterilize it for 30 minutes at 14.5 psi and 121°C in an autoclave. Then, add a certain amount of sample to the Petridis. The media should be allowed to cool to 37- 40° c after the autoclave. The medium Petridis is filled with around 15 - 20 ml, and it is thoroughly assembled clockwise and counter clockwise before being allowed to stabilize. Flip the plate over and incubate it for 24 - 28 hours at 37°C after the plate has solidified.

#### Calculation

$$\text{Cfu/ml} = \frac{\text{No. of Colonies} \times \text{Total dilution factor}}{\text{Volume of Culture Plated in ml}}$$

**Cookies Cfu = 80 cfu/1g.**

**Peel powder cfu = 100 cfu/1g**

### 3.5 Determination of crude fiber content

#### Procedure:

Step-1: Boiling in acid

Step-2: Boiling in base

Step-3: Drying fiber

Step-4: Incineration of fiber

Step: 5: Calculation

#### Apparatus and equipment

1. Balance machine
2. Muffler furnace
3. Hot plate
4. Hot air oven
5. Measuring cylinder
6. Conical flask
7. Beaker
8. Funnel
9. Marker pen
10. Crucible
11. Cotton cloth
12. Spoon



**Fig: Fiber Content Determination**

**Chemical /Reagent list:****Boiling acid**

Dilute 3.49 ml Sulfuric acid in 500 ml distilled water.

**Boiling in base**

Dissolved 6.25g sodium hydroxide palette in 500 ml distilled water.

**Reagent preparation**

500 ml volumetric flasks with 0.128 M Sulfuric acid labeled.  $\frac{1}{3}$  fill up volumetric flask by distil water add 3.49 ml Sulfuric acid in the volumetric flask (acid solution).

6.25 g sodium hydroxide label volumetric flask 0.313 M sodium hydroxide solution after 10-minute fill up the volumetric metrics flask with distil water.

**Working process**

Take sample 2-5g. Add 200 ml Sulfuric acid solution conical flask. Add sample in that conical flask. Place the flask on hot plate for 30 minutes. Set the funnel with cotton cloth with the discard flask. Fiber the boiled sample to drain the acid solution. wash the flask with hot water to remove the acid residues completely. Measure 200 ml 0.313 M sodium hydroxide solution. Pour the sodium hydroxide solution into the conical flask washing the filter.

**Boiling base**

Shake the flask to mix and place on hot plate for 30 minutes. Filter by cotton cloth wash with hot water to remove sodium hydroxide residues. Finally collect the fiber by crucible and take weight. After collect the fiber dry in hot air oven at 130°C for 2 hours. After drying take out the crucible and place in desiccators for 20 minutes. Note the fiber with crucible

**Incineration of fiber:**

Place the crucible inside of muffle furnace 550°C for two hours. Run the furnace attach a cautious tag. After 4 hours' temperature 250°C take out the crucible and cool in desiccators. After 20 minutes weight the crucible containing ash. Note the weight.

**Calculation****Peel powder Fiber content:**

$$\text{Fiber} = \frac{(W2-C) - (W1-C)}{W_s} \times 100$$

Weight sample =  $W_s$

Crucible with fiber =  $W_1$

Crucible with ash =  $W_2$

Crucible weight =  $C$

$$\begin{aligned} \text{Crude Fiber \%} &= \frac{(W2-C) - (W1-C)}{W_s} \times 100 \\ &= 18.6 \text{ g} \end{aligned}$$

**Cookies Fiber content:**

Weight of sample ( $W_s$ ) = 3g

Weight of crude with fiber ( $W_1$ ) = 20.909g

Weight of crucible with Ash ( $W_2$ ) = 20.001g

$$\text{Crude Fiber \%} = \frac{(W2-C) - (W1-C)}{W_s} \times 100$$

Crude fiber percentage = 2.88g



## Chapter 4

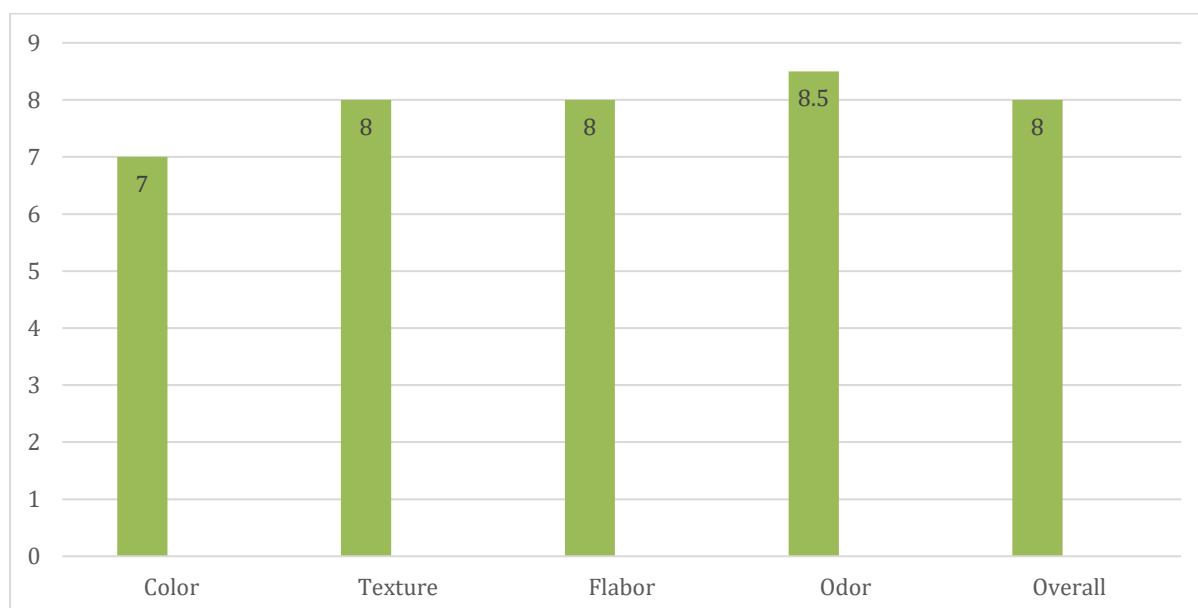
### 4.0 Sensory Evaluation

Cookies' sensory evaluation was graded using a nine-point hedonic scale. The panel, which consists of five faculty members and thirty students from the Department of Nutrition and the Food Engineering at Daffodil International University, judges the sensory qualities of cakes, including texture, flavor, color, taste appearances after tasting, and overall acceptability. On those scales, testers were asked to rate the sample. Comments about the products' qualities, taste, odor, and appearance. Based on the item that received the most votes, the outcome is assessed. Lowest or highest ratings.

#### 4.1 Sensory Evaluation data:

The mean scores of sensory evaluation data are given below:

	Color	Texture	Odor	Flavor	Overall Acceptance
9.Like extremely	20	14	28	26	10
8.Like very much	16	24	4	8	22
7.Like moderately	2	2	6	2	6
6. Like slightly					
5. Neither like or Dislike				2	
4. Dislike Slightly					
3. Dislike moderately					
2. dislike very much					
1. Dislike extremely					



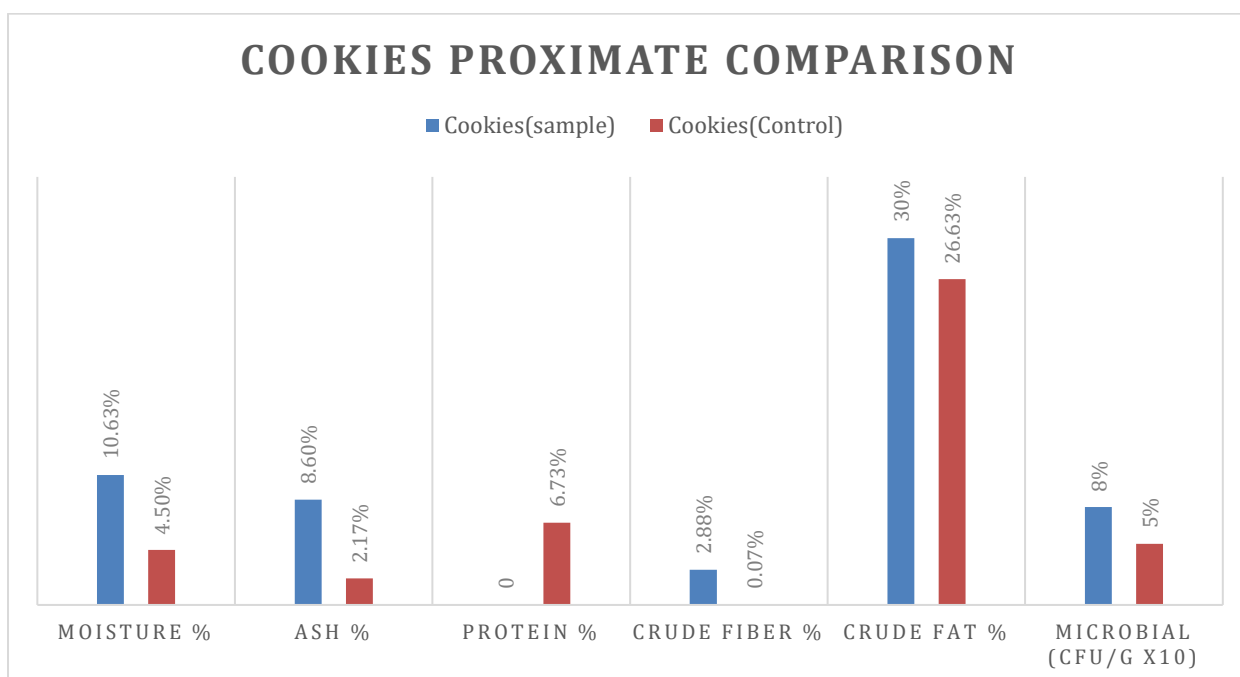
**Fig: Sensory evaluation data chart**

## Chapter 5

### Result and Discussion

In the chapter, the results of the approximate analysis of Dragon fruits peel powder are shown. The amount of fiber in the Dragon fruits peel I made was Dragon fruits peel powder cookies This is because the amount of fiber present in Dragon fruits peel contributes significantly to the high-calorie content of peel. The amount of fiber present in these cookies is 18.6g. The primary nutrient of peel is fiber, which also acts as a primary source of energy. Protein is an important element, which acts as an energy source.

Proximate Analysis	Peel Powder (sample 3)	Cookies (Sample)	Cookies (Control)
Moisture	6.39 %	10.63 %	4.5 %
Ash	1.663 %	8.597 %	2.17 %
Protein	11.97 %	11.4057 %	6.73 %
Crude fiber	18.86 %	2.88 %	0.07 %
Microbial	100 cfu /g	80 cfu/ g	50 cfu/g
Fat	-----	30 %	26.63 %



## **Conclusion**

To get the ideal product composition, cookies were prepared in the study using varied amounts of banana powder and other ingredients. Products that had been produced were tested for a variety of properties, including moisture percentage, ash content, protein percentage, and fat percentage. As a consequence, prior to completing market research for commercialization, an extra study may be done to look at all of the required aspects for the items. Product development may be an excellent content replacement.

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