PREPARATION OF PALMYRA PALM BAR

A PROJECT REPORT BY

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Submitted to the Department of Nutrition of Food Engineering in the partial fulfillment of B.Sc. in Nutrition and Food Engineering.

Submitted to

Supervised By

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DAFFODIL INTERNATIONAL UNIVERSITY

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APPROVAL

This Project titled "**Preparation of Palmyra Palm Bar**", submitted by **Rubel Hasan** to the Department of Nutrition and Food Engineering, Daffodil International University, has been accepted as satisfactory for the partial fulfillment of the requirements for the degree of B.Sc. in Nutrition and Food Engineering and approved as to its style and contents. The presentation has been held on April 2024.

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DECLARATION

I hereby declare that, “Palmyra Palm bar Among Daffodil International University Students” this project has been done under the supervision of **Professor Dr. Md. Bellal Hossain, the respected Dean Department of NFE**, Daffodil International University. I 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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I would like to express my sincere gratitude to the almighty God for His divine blessings, which have enabled me to successfully complete my final year project.

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ABSTRACTS

To produce palmyra palm Kesar bar cv. (Mangifera indica L.) with more dried out coconut desiccated coconut milk, a two-factor treatment experiment was carried out. The first included an undesirable chemical preservative (i.e., no KMS application) and sulfate (i.e., administered with KMS treatment). For the second fortification, eight different configurations were employed. Palmyra palm bar was made from the pulp of a soft, mature palm. The fruits were washed, peeled, and crushed before cooking for two minutes at 85°C. Powdered cane sugar, 0.6% potassium sorbate, and 1000 parts per million SO2 were added to bring the pulp's total soluble solids content up to 30%. The information in this research is an average of three different investigations. After adding 5% palm stick, the pulp (Palmyra palm stick) was dried as is. According to preliminary testing, a drying temperature above 70°C resulted in darkening and drying issues, whereas a lower temperature hindered the drying process. Thus, 70 °C was determined to be the ideal drying temperature. The pulp or combination was equally spread out on 40 x 75 cm2 stainless steel trays (tray load 12.5 kg/m2) in order to determine the drying properties. The kinetics of dehydration were then studied over the course of 26 hours in an electrically controlled cross-flow drier at 70 °C. For both plain and fortified palm pith, changes in moisture content were found to be negligible after 14 and 16 hours. For the purpose of the sorption isotherm investigation, these time intervals were chosen in order to create smooth and reinforced Palmyra palm sticks. The bar was packaged in a polyethylene bag and kept in an ambient environment. Up to six months of storage, the bar's physicochemical parameters—such as Assessments were conducted at the start and monthly intervals for TSS, acidity, total sugar, reducing sugar, non-reducing sugar, potassium sorbate, and organoleptic quality. Apart from cutting back on sugar, where considerably higher values were recorded, the results indicated that the bar made by processing was significantly better in terms of physical-chemical characteristics. During storage Ascorbic acid, TSS, total sugar, and non-reducing sugar decreased, whereas acidity and reducing sugar increased. The interaction and fortification did not exhibit any noteworthy physicochemical properties. After six months of storage, the treatment received the best score and enhanced quality when the organoleptic assessment of the Palm bar was considered.

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CHAPTER 1

OVERVIEW

1.1 Introduction:

Palmyra One member of this family is (Mangifera indica L.). This fruit—also known as the "King of Fruits"—is adored by Indians. Food from palm trees has a lot of health benefits. This fruit's pulp contains 16 grams of carbs, 0.7 grams of protein, 0.4 grams of fat, and 0.1 grams of fiber per 100 grams. Here you may also find antioxidants, minerals, β-carotene, and vitamins A, C, and B complex (Bose and Mitra, 2001; Ravani and Joshi, 2013). Raw palm cannot be stored for extended periods of time due to its short shelf life. Palm pulp may be used to make a variety of products, including soft drinks, juice, nectar, gourd, RTS drinks, jam, jelly, powder, palm sticks, and preserved mango pieces (Hashmi et al., 2007; Hussain et al., 2003; Pruthi, 1992; Kalra and Tandon, 1985). Fruit bars are prepared meals that are flavorful, thick, and dry. They are made from fruit juice. Some of the best vitamins and minerals can be found in them. Adding nutrients in powder or liquid form can make food healthier. Food should be better in many ways, such as its color, taste, smell, texture and ability to stay fresh longer after storage. A study was conducted to determine how the chemical and sensory properties of a Palm bar mixed with DCP (Dedicated Coconut Powder) changed during storage.

The tree of life, or Palmyra palm (Borassus flabellifer L.), is a member of the Palmae family. Several businesses, including as the food and beverage, textile, wood, and medical sectors, may benefit from it (PC et al., 2017). According to Borassus antiopium Mart., Palmyra is situated in the savannah areas of Cameroon. It is essential to both the economy and society. In times when food is scarce, people often eat seed s to stay healthy. Each year, more than 60% of preserved fruit spoils in the first ten days after harvest (Assoil et al., 2016). 100 grams of ripe palmyra palm contain 87 kcal of nutritional energy, 77.2 grams of water, 0.5 grams of fiber, 0.7 grams of protein, 20.7 grams of carbohydrates, and 9 grams of calcium (J. Rao et al., 2009). You will benefit greatly from the nutrients included in palmyra palm, including calcium, iron, and vitamin B. According to Assoil et al. (2016), it protects against deficiency disorders, cancer, dental decay, and other problems. It's also good for your brain.

The Palmyra palm fruit tree needs a lot of space to grow. Many fruits go to waste after harvest, which is a major problem (Srinivas et al. 1997). Most of the time, palm sticks are made by drying the ripe palm pulp and cutting it into leaves or sticks that look like leather. This item is really important. Moisture from outside air during storage and non-enzyme browning are the two main problems. For this reason, it is important to use the right packaging and let them dry completely.

Many people dry the pulp of ripe palm fruits in the sun before making Palmyra Palm sticks (CFTRI 1990). Sun drying is messy, takes a long time, and turns things dark brown because palmyra fruits ripen at the same time each year (Rameshwar 1979). The best way to dry Mir and Nath (1995) and Heikal et al. (1972) discovered palmyra palm sticks in a box. Because enhanced palm pulp bars are manufactured with roasted Bengal gram flour (RBF), they may dry differently from bars made with conventional palm pulp. So, research was done to see what happens when you dry both normal palm pith and enriched palm pith to make sticks.

Palmyra Palm feed has lots of minerals and vitamins. The fruit that has the most vitamin C, vitamin A, potassium, thiamin, folic acid, riboflavin, iron and niacin is the palm tree. There are only 32 kcal in 100 g of fruit, which is great for people trying to lose weight (Liebman, 1992). People all over the world eat sapotes raw or cooked into jam, juice or dried fruit. Feliciano et al. (2010) say that sapotes can help protect against many types of cancer, including liver, heart and digestive system cancers. In addition, they can help people who have asthma or other breathing problems to feel better.

Palmyra has nutrients that are good for you and taste good. After much thought, it was decided to make a stick from a mature Palmyra palm. These palmyra palm sweets can contain a lot of fiber, minerals and vitamins. They taste good too. We can get what we want without harming our health because these sweets can taste great and be better for you than regular ones. There are chemicals called antioxidants that can stop or reduce cell damage. They can be made in a laboratory or found in nature. According to Bartosz (1997) and Nack and Shahidi (2006), apples contain many chemicals that prevent cell damage. Tocopherols, phenolic molecules, carotenoids and anthocyanins are some of these chemicals.

Antioxidants can also be produced in a lab and ingested orally. Free radicals have the ability to harm neighboring cells and initiate a domino effect. One of the body's first lines of defense against them is antioxidants. Instead of having to take electrons from nearby, unsuspecting cells, stable free radicals can "donate" electrons from substances that shield cells. Antioxidants can aid in repairing cell damage caused by flavonoids.

Many good studies have been done on the link between the number of antioxidants in the body and disease. Thanks for that it has taught us a lot more about why many diseases occur and how to possibly stop them. It's best to keep a cool head and not get too excited about antioxidants, even though they could help a lot... Palm (Mangifera indica L.) according to Ribeiro et al. (2007), is a very important crop for the world economy. Asia, in places like Bangladesh, India and Pakistan, is home to the palm tree. It grows all over the world, mostly in warm places.

Seibert et al. (2000) found that phenolic molecules, ascorbic acid and carotenoids are just some of the antioxidants found in palm. One fruit that is often used for food, drink, sticks, chutneys and dyes is the palm tree. It can be found in many healthy foods, including what are sometimes called "super fruits." It is not always possible to get palm fruits and it does not take long. During the busy season, many palm trees are often lost in Bangladesh because they are not properly handled, processed and stored. Farmers and companies could keep the surplus mangoes that grow each year if processed and stored properly. There are several good ways for farmers to utilize the many foods that are available during the peak season (Bose, 2000). One way to get rid of excess vegetables is to turn them into drinks or bars. Juices and pulps are the best way to deal with food because they are easy to use and store (Ahmed, 2014).

1.2 The study's purpose:

The following goals guided the work that was done.

- One of the main objectives of Palmyra palm stick production is to preserve the beneficial properties of the herb for a longer period of time.
- How to convert a palmyra palm into a rod and evaluate the result.
- Have knowledge about nutrients.
- To study the sensory evaluation of Palmyra palm bar at field level.

CHAPTER 2

LITERATURE REVIEW

Bars known as palmyra palms, often referred to as toddy shops or taverns, provide beverages made from the sap of the palmyra palm (Borassus flabellifer., 2016). This study looks into palmyra sticks' cultural importance, financial ramifications, health benefits, and environmental effects.

Palmyra bars are a type of dessert or snack that usually consist of a crumbly base (often made from ingredients such as butter, sugar and sometimes oats or nuts) and a delicious palm flavored filling. The base is usually pressed into a baking pan to form a crust and then topped with a layer of palm puree or palm filling before baking. After baking and cooling, they are cut into sticks or squares, which offer a delicious combination of a buttery, crunchy base and a fruity, often spicy palm topping. These bars can vary in sweetness and texture depending on the recipe used, but generally provide a wonderful tropical flavor.

The palmyra palm (Borassus antiopium Mart., 2017) is a prioritized socio-economic tree in the Savanna areas of Cameroon. Its fruits are used as food or supplemented with nutrients, especially in times of famine. Regretfully, within ten days after harvest, storage rot usually causes the loss of more than 60% of the annual fruit production. In this work, we examined the morphological and nutritional properties of fruits from Palmyra cultivars that are indigenous to the ago-climatic zones of Cameroon. There were significant differences in fruit form per 100 g of fresh mass, but there were also commonalities in the nutritional makeup (> 4.47 g of sugars, 5.18 g of fiber, > 26 mg of provitamin A, and > 134.82 mg of vitamin C). About 35% of the total fruit mass was made up of flesh (PC et al., 2017).

Palm pulp was combined with sugar at 10, 15, 20, and 25% to find the ideal concentration for making a fruit bar of high quality. At 65°C, the mixture was dried until a leathery texture developed. The sensory characteristics of palm sticks made with varying sugar concentrations are shown in Table 2. The fruit bars' primary flavor comes from sugar, which also somewhat affects the fruit bar's texture. The proper ratio of sugar to acids results in a pleasing flavor. As a result, it was discovered that as the sugar content increased, palm sticks' flavor improved. The results indicated that at sugar concentrations of 20 and 15%, palm sticks had the greatest score values for both flavor and overall acceptability. The findings are in line with those of Khalil (1997) and Parab et al. (2014).

The sensory attributes of palmyra palm sticks, such as color, flavor, taste, mouthfeel, and general acceptability at room temperature, were evaluated by semi-trained panelists using a 9-point hedonic scale (Amerine et al., 1965). The scores were then statistically analyzed using the methods described in Panse and Sukhumi, 1985.

The palm sticks of the Gotti type had the highest antioxidant content, whilst Asina had the lowest. Thus, it's plausible that the Gotti-style palm bar stopped other microorganisms from growing. On the other hand, the Asina variety's low antioxidant content meant that its ability to inhibit the growth of microorganisms was overlooked. Various antioxidants have been shown in numerous studies to have bactericidal activities (Nusrat, 2015). Jagtap et al. (2010) reported on the antioxidant capacity of palm pulp and showed how its elevated content contributed to its longer shelf life.

Palm sticks represent a promising category of products with a rich nutritional profile and versatile use. While they offer some health benefits, concerns remain about their environmental impact and saturated fat content. Continued research and development efforts are needed to optimize the composition of palm kernels, promote sustainable sourcing practices, and assess their long-term health implications.

CHAPTER 3

MATERIALS AND METHODS

3.1 Chemicals

I have not applied any chemical methods. I have not done any extraction process to analyze product composition.

3.1.2 Materials

- Palm pulp
- Palm Molasses
- Liquid Glucose
- Coconut Milk
- Condensed Milk
- Potassium Sorbate
- Sodium benzoate

All the ingredients have been collected from the local market as well and all the cooking procedures have been done in the NFE Lab.

Table 1: Ingredients & Amounts

Ingredients	**Amounts**	**percentage**
Palm pulp	165gm	55%
Palm Molasses	75 gm	25%
Coconut Milk	15gm	5%
Condensed Milk	30gm	10%
Potassium Sorbate	1.8gm	0.6%
Sodium benzoate	1.5gm	0.5%
Liquid Glucose	15gm	5%

3.2 Methods

Methodology: Flow Chart of palm bar

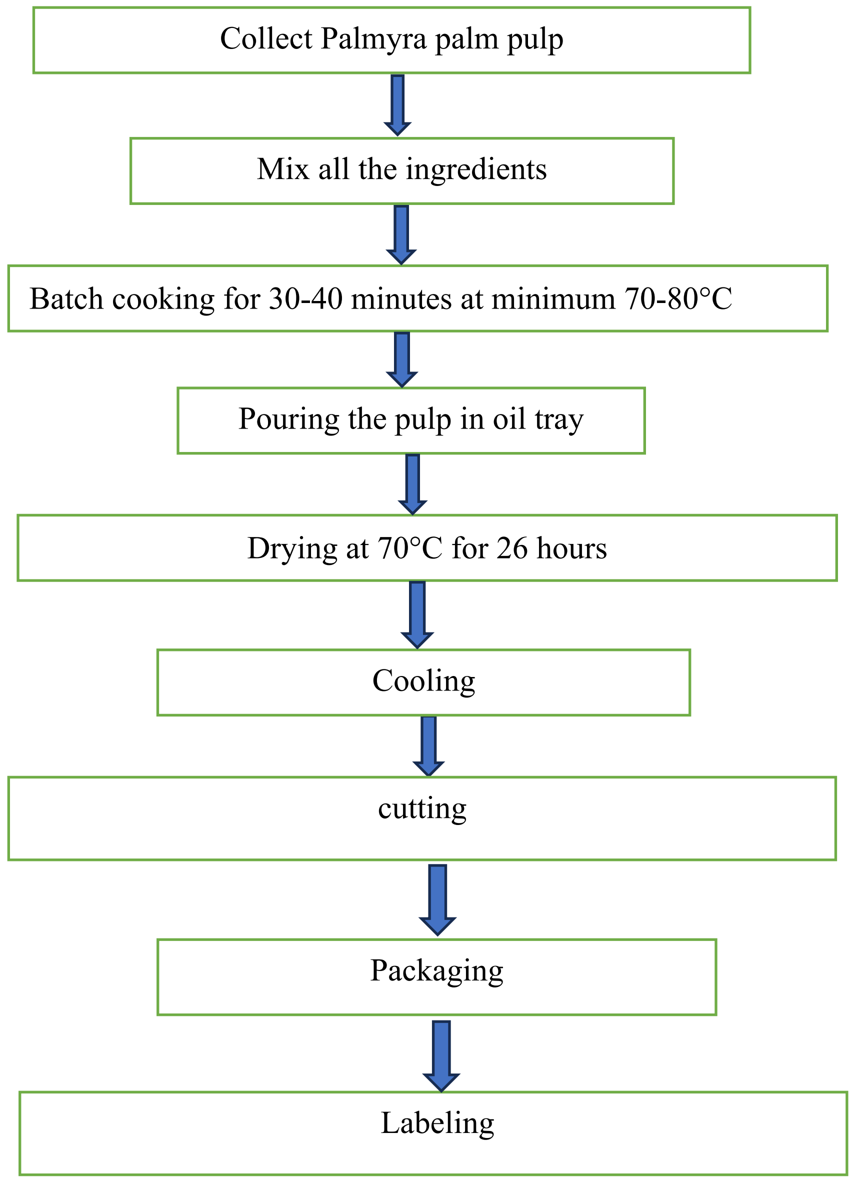

Figure 1: Mix Ingredients cooking

Figure 2: Final Palm bar Product

Figure 3: Final Palm bar Rapping Aluminum Foil

3.3 Physicochemical Properties

3.3.1 Determining of Moisture

Moisture analyzing materials

• Moisture analyzer

•Aluminum foil

• Sample

• Weight balancing procedure:

• The sample must first be weighed to determine its weight in grams.

• The measured sample then has to be properly transported to the digital moisture analyzer.

• You should hold off till the moisture analyzer's indication is finished.

• Finally, it is important to note the humidity measurement.

Figure 4: Moisture Analyzer

The following format may be used to represent the formula:
[Final sample weight (grams)/Gross sample weight (grams)] is the moisture content (%). multiply by 100.
Material value after adding the crucible is equal to the total of the dry and raw material quantities.

3.3.2 Ash determination

• Preheat the crucible for 30 minutes at 105°C in the oven.
• Weigh the crucible without the sample after allowing it to cool in a desiccator. Gather two grams of the sample. After moving the sample to a crucible, weigh the crucible and the sample jointly (noting both).
• Place the sample crucible in a muffle furnace and heat it to (600–620) °C for six hours.
• Lastly, determine the proportion of ash.

Figure 5: Muffle Furnace

The following is the calculating formula:
% ash = The sample's weight divided by 100 white dried ashes items' value

3.3.3. Brix Method

• Use distilled water to clean the prism of the brix analyzer (refractometer), starting with it.
• Fill the dropper with the sample.
• Apply a little amount of the specimen to that refractometer prismatic.
• Examine the information.
• Lastly, use distilled water to rinse the prism and a gentle, lint-free towel to dry it.

Figure 6: Refractometer

3.3.4 Determining the pH Level

• Use a known buffer solution to calibrate the pH meter before taking a measurement. Usually, the meter needs to be adjusted to determine the buffer solution's pH correctly.

• After that, fully immerse the electrode in the sugar solution and keep an eye on things until the pH level stabilizes. The digital display of the pH meter shows the ph.

• To get accurate outcomes, Replicate the tests many repeats, then determine the pH's average.

• Following each test, use purified water to wash the connector, and wipe Use a towel with no lint to dry.

• Check out the bar solution's overall ph.

Figure 7: Portable pH indicator

3.3.5 Determination of protein by the Kjeldahl method

The three phases that make up the Kjeldahl technique. They are listed below.

1. Disposition

2. The process of distillation

3. Measurement

Reagents and materials required:

1. Hydrogen sulfide

2. Digestion blend (98g K2SO4 + 2g CuSO4)

3. NaOH at 40%

4. 0.1 N hydrochloric acid

5. The Methyl Red Light

6. 0.1 N NaOH

7. Water that has been distilled

Method: About 10 mL of the sample and 10 mL of H 2 SO 4 were put to a digestion flask. The digestion mixture was then transferred in 2 g to a Kjeldahl flask. Next, the flask is heated to 40°C in a Kjeldahl digesting chamber. Heat the mixture for four to five hours, or until it turns crystal green, after letting the temperature reach 65°C. After cooling, the flasks were moved to a volumetric flask.

Figure 8: Flask for digestion

2. **The process of distillation**

A distillation flask was filled with 10 milliliters of the solution. Next, the flask was filled with 10 mL of 40% NaOH and 150 mL of distilled water. For half an hour, the flask was heated to a temperature of between 60 and 75 degrees Celsius. In collecting flasks with 10 ml of 0.1 M HCl solution and 1-2 drops of methyl red solution, the distillate was collected. Following the completion of the distillation process, the separatory flask was taken out and titrated using NaOH.

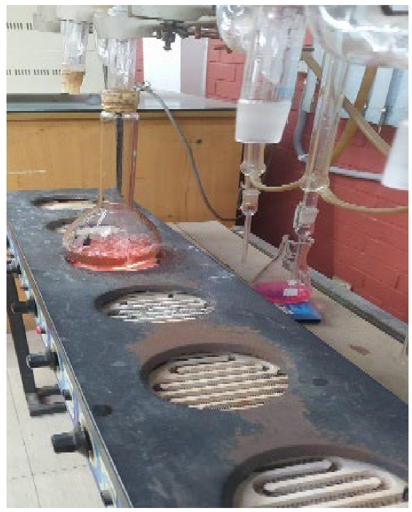

Figure 9: distillation flask

3. Titration: Using a 0.1N NaOH solution, the distillate extracted from the collecting flask was titrated. The distillate was subjected to a titration procedure that comprised progressively adding NaOH solution while agitating the mixture until the solution's color turned light yellow.

Figure 10: Titration endpoint in light yellow

Calculate:

Protein percentage ÷ sample weight = (B - S) × 1.4 × 10 × 5.95 × 0.1)

where the titration value of blank is B.
S = titration value of the sample
Sample weight and sample weight are same.

3.3.6 The experiment is called the Soxhlet fat test.

Tool:

1. Cotton swabs,
2. petroleum ether (60–80°C),
3. mass,
4. Soxhlet device,
5. drying oven,
6. thimble, heating mantle,
7. glass rod,
8. desiccator with silica gel,

Required Materials/Reagents:

1. A sample weighing 4.5 grams
2. N-hexane at 95%

PROCEDURE:

The complete glass equipment is kept in a desiccator after being thoroughly cleaned with petroleum ether and dried at 102 °C in an oven. Five grams of the dried and powdered material should be weighed out and put in a thimble. Place the thimble inside the extractor of Soxhlet. After cleaning a 150 ml round-bottom flask, add 90 ml of petroleum ether to it. After positioning the complete assembly onto the heating mantle, let the petroleum ether come to a boil. Proceed with the extraction procedure for approximately six hours. After removing the extraction unit's condensing unit, let the sample cool. Ultimately, all lipid is eliminated. Gather practically all of the solvent after distillation.

Figure 11: Fat Test by Soxhlet method

CALCULATION:

w1 = thimble empty

In terms of samples w2 = Thimble

Sample weight = p

Next, use $v = (w2-w1)/p \times 100$ to calculate the gross fat percentage.

This method does a good job of getting rid of all the fat in the meal. It is used in oil recovery systems to enhance oil recovery. This method is also applied to spunbonded, which is derived from screw impellers as a substitute for high-pressure extrusion. It is also utilized in the analysis of the specimen's fat composition.

3.3.7 Acidity test

Device:

1. Conical flask

2. Measuring cylinder

3. Pipette

4. Burette

Material/reagent needed:

1. Phenolphthalein indicator

2. 0.1 M NaOH

3. Sample

4. Distilled water

Method: 10 g of palm pulp in a beaker in weight. Add 25 milliliters of purified water. Using two Titrate 0.1 M sodium hydroxide with beads of a substance called as a marker.

Figure 12: before titration

Figure 13: after titration

Calculation:

The formula for calculating lactic acid percentage is {(0.1 M NaOH X volume of NaOH (in liters) X 90.08*)/weight of sample} x 100%.

3.3.8 Sensory evaluation:

The hedonic rate test can be used to gauge an individual's emotional state. Three of the most important senses are taste, smell, and color. People's emotions are gauged using the hedonic scale technique, which presents several triggers on a 9-point scale with the options "extremely dislike" to "extremely like." It is advantageous to many. To determine how enjoyable or likeable someone is, you can employ one or more techniques. They may watch how open customers are to the idea of a new product, for example, or how enticing well-known brands are to others who are not familiar with the same industry.

Method:

The hedonic scale is a term for orally expressing how much one likes or dislikes something.

• For younger audiences, use a nine-point Likes and Dislikes scale when including words, smileys, and facial emotions.

• Tasters are able to evaluate the look, flavor, texture, and scent of the product.

• To obtain the intended result, complete the data analysis.

Sensory Evaluation of "Palmyra palm bar"

Name:

Student ID:

Sample-1

➤ **9 Point Hedonic Scale:**

Preference	Color	Texture	Flavor	Taste	Softness	Overall
Like extremely						
Like very much						
Like moderately						
Like slightly						
Neither like nor dislike						
Dislike slightly						
Dislike moderately						
Dislike very much						
Dislike extremely						

CHAPTER 4

MEASUREMENTS AND ANALYSIS

4.1 Sensory Quality

4.1.1 Preference for Taste

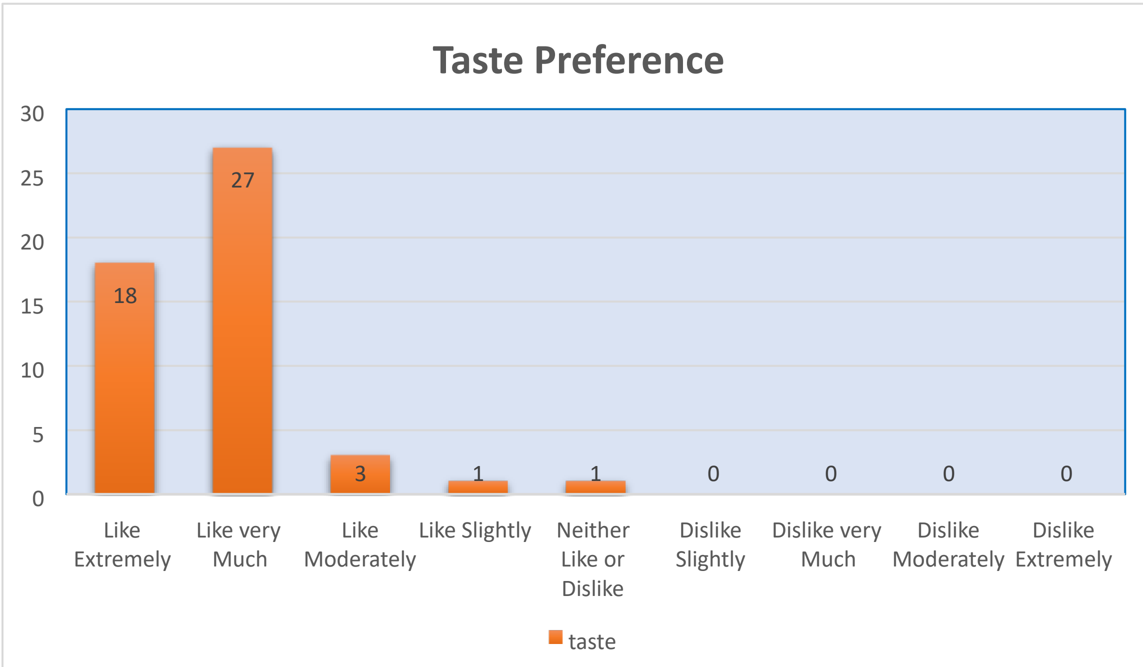

Figure 14: Taste preference

Figure 4.4 shows bar graphs showing the taste qualities of the Palm bar as measured on 9-point hedonic scales. A rating scale ranging from "Extremely Like" to "Extremely Dislike" was used to collect subjective taste assessments from 50 individuals in total. Out of 50 individuals, 54% expressed a strong liking for it. Furthermore, 36% of those surveyed thought it was really good. 2%, however, thought it was decent. Equal amounts of respondents (2%) were neutral or gave it a slight liking. The fact that neither of them was fond of the palm pole was the most important factor.

4.1.2 Flavor Preference

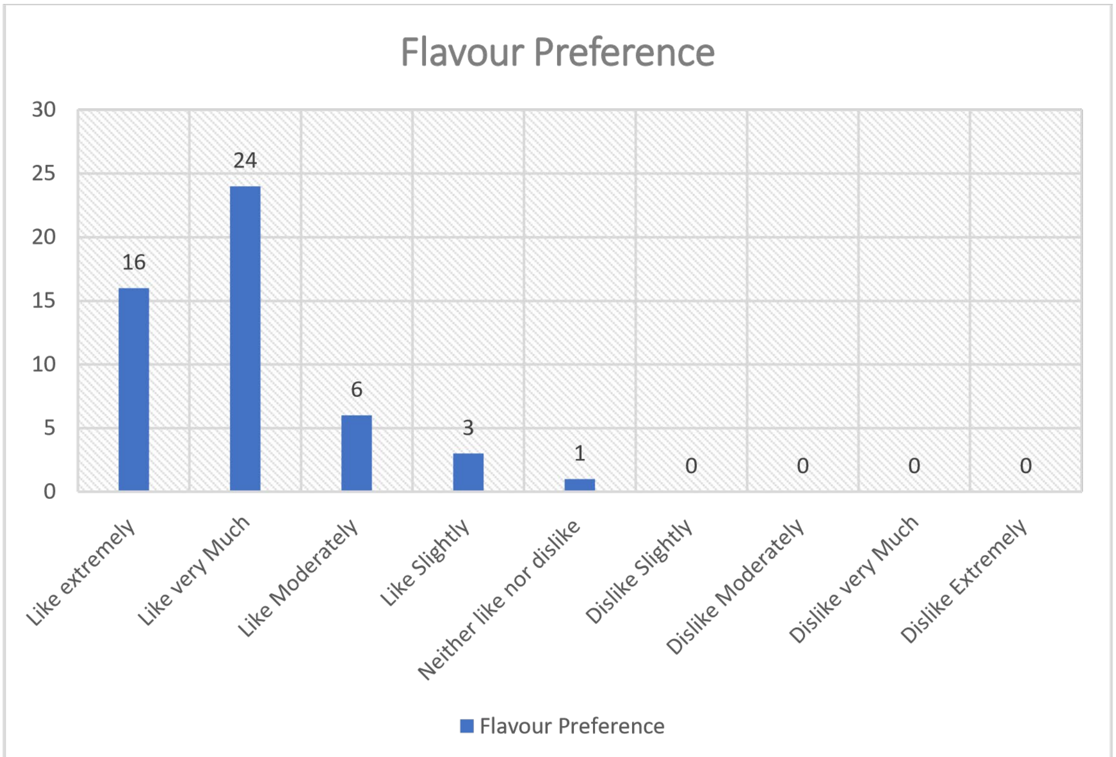

Figure 15: Flavor Preference

The bar graphs in Figure 4.5 show how the palm bar tastes determined by a hedonic system of nine. The majority that of participants in a study looking at taste preference data said they like the flavor of the Palm bar. Of the fifty participants, sixteen expressed a strong preference for the bars' flavor. Additionally, "I really like it" was picked by 24 respondents. Six respondents, on the other hand, chose "as average". The "like slightly" superior taste of the sweet was preferred by three respondents. The "like or dislike" response was provided by one respondent. However, none of the participants chose any of the other taste test alternatives.

4.1.3 Texture Preference

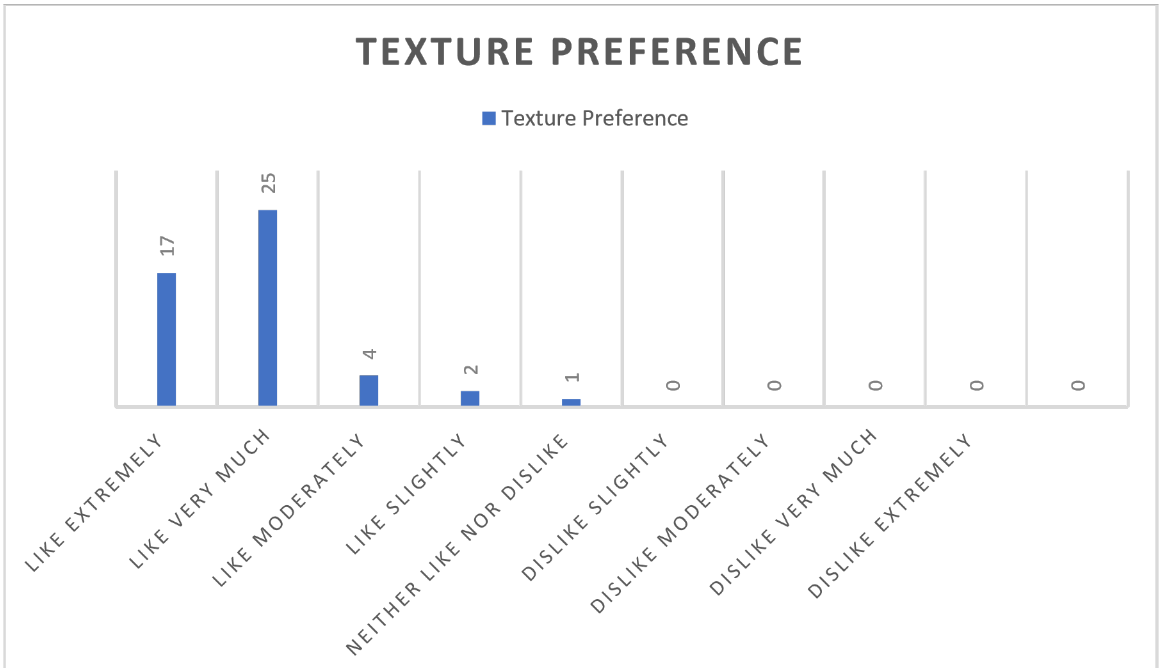

Figure 16: Texture Preset

Figure 4.6 uses bar graphs with nine-point hedonic scales to show the textural characteristics of a Palm column. A sample of fifty people was asked to use a Likert scale ranging from "Extremely like" to "Extremely dislike" to judge how subjectively they preferred texture. Based on nine criteria, each of the thirty participants ranked the texture that they liked best. The majority of the 25 participants stated that they really like the Palm stick's feel. Four individuals, on the other hand, indicated a little preference for the Palm stick texture. Furthermore, one person indicated that they preferred moderately textured as fine. Nobody loved or favored the remaining texture ratings for the Palm bar, nevertheless.

4.1.4 Color Preference

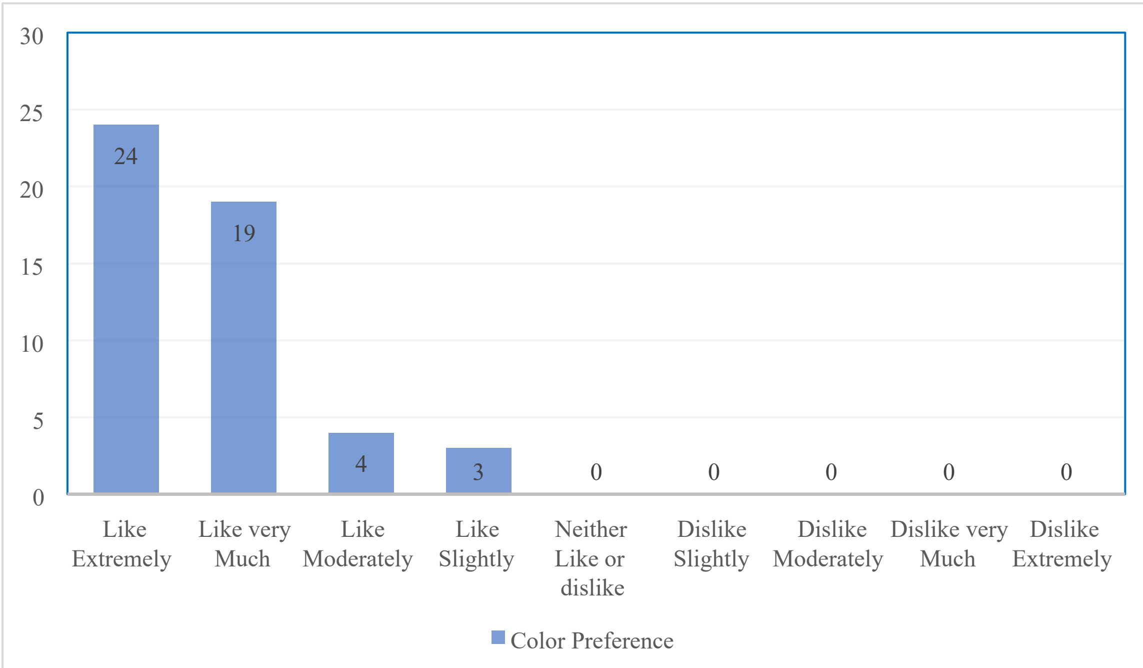

Figure 17: Color Preference

Figure 4.8 shows the color features of palm bars using bar graphs that use 9-point hedonic scales. The purpose of this data analysis research is to investigate people's preferences for a certain stripe color using a set of nine parameters. use a scale from "Extremely Like" to "Extremely Dislike". Out of the 50 reviewers, 48 percent said the color of the bar was very lovely, and 38 percent said it was very much. However, 8% thought it was decent, and 6% thought it was just a little fun. Still, nobody liked the color of the Palm bar.

4.1.5. Overall Sensory Perception

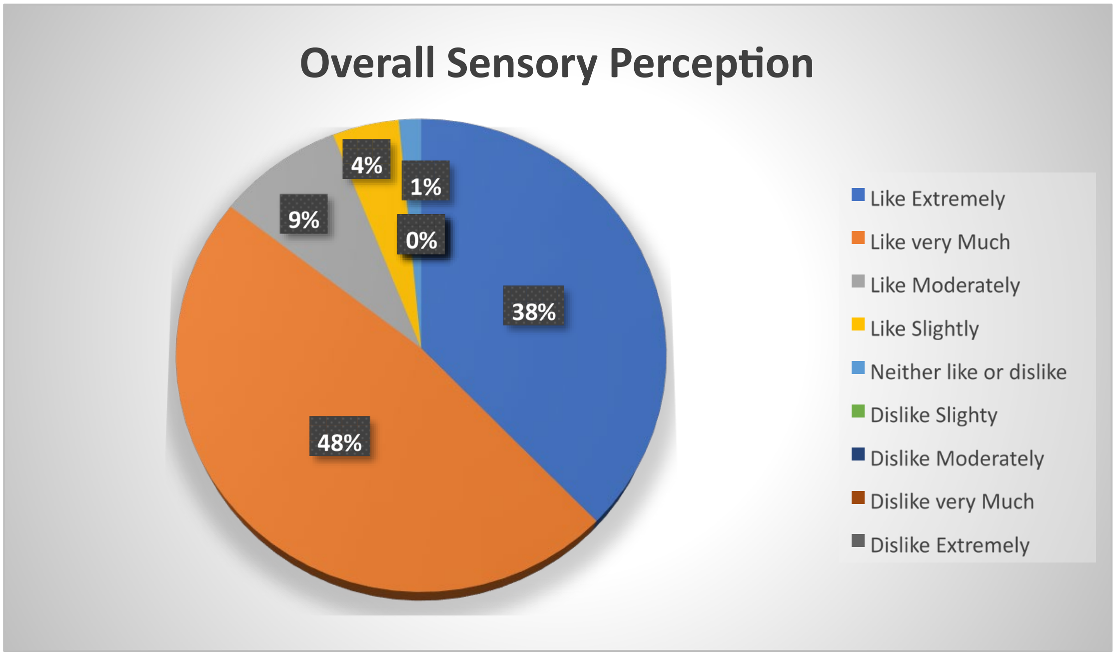

Figure 18: Total sensory perception

The total sensory perception of Palm bar is illustrated in this pie chart (Fig. 4.8). Among all participants, 38% of them liked it extremely. 48% of participants liked it very much. Among all the criteria, participants marked it the most. However, 9% liked it moderately as well as 4% liked it slightly. Only 1% neither like or dislike it. Most significantly, nobody disliked the Palm bars.

4.2.1 Physicochemical Properties of Palm bar

Table-3 Composition of Palm bar in terms of its constituents

Parameter	Palmyra palm bar
Protein%	4.9
Fat%	3.6
Ash%	0.73
Moisture%	7.86
Acidity%	0.27
pH	4.8
Brix degree	45.5

4.2.2 Discussion of proximate analysis

Protein:

The protein content of the Palm bar is 4.9%. This parameter indicates the amount of protein present in the product. Higher protein content may be desirable for certain consumers looking for protein-rich options.

Fat:

The fat content of the Palm bar is 3.6%. The fat contributes to the texture and richness of the product. This parameter indicates the presence of fats that can improve the taste and mouthfeel of the Palm bar.

Moisture content:

Palm sticks have a moisture content of about 7.86%. The offered mango sticks have a moisture content ranging from 5.60 to 11.87%.

Ash content:

The ash content of the Palm stick is around 0.73%.

Acidity:

The acidity of the Palm bar is measured at 0.27%. This parameter indicates the level of acidity present in the product. Acidity can affect the flavor profile and shelf life of a Palm bar

pH:

The palm stick has a pH of 4.8. An indicator of acidity or alkalinity is ph. The Palm bar's pH of 4.8 shows that it is quite acidic. The product's flavor, texture, and stability can all be impacted by ph.

Brix content:

A Palm bar contains approximately 45.5% sugar content. The presence of a significant amount of sugar effectively reduces the bitterness of the substance, resulting in a noticeable shift in taste towards sweetness.

CHAPTER 5

CONCLUSION

The results of the experiment and the analysis show that fruit sticks that are both delicious and storable may be made with palm pulp. After being stored for two months, there were noticeable alterations in the amount of moisture, acidity, and total suspended solids. The inclusion of sugar and liquid glucose made the fruit bar smoother. According to the study on palm sensory evaluation, sample S1 had the best flavor.

The palm-based fruit bar with the recipe yielded better results at the sensory level, even though the average rating of the evaluated criteria suggests that they can be improved at the color and aroma levels.

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