A PROJECT WORK REPORT

On

"Product Development of Instant Powder Drinks (IPD) from Hog-Plum Fruit of Bangladesh"

Submitted To:

Prof. Dr. Md. Bellal Hossain
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Department of Nutrition & Food Engineering
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Submitted by

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Date of Submission: 20/12/2018

LETTER OF TRANSMITTAL

Date: 20 December 2018

To

Professor Dr. Md. Bellal Hossain
Head of the
Department of Nutrition and Food Engineering
Daffodil International University

Subject: Submission of Project Report.

Dear Sir,

It is a great pleasure and honor for me to have the opportunity to submit the Project report as a part of the Nutrition and Food Engineering (NFE) program curriculum for partially fulfillment of under graduation degree., .

I have prepared this report based on the acquired taste knowledge during my Thesis period in our food lab. It is a great achievement to work under your active supervision. This Report is based on, "Studies on the Preparation of Hog plum in Instant Powder Drinks (IPD)."

I, therefore, would like to place this report to your judgment and suggestion. Your kind advice will encouragement performs better planning in the future.

Sincerely Yours,

Amanat Ullah
ID: 153-34-467
Department of Nutrition and Food Engineering
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LETTER OF AUTHORIZATION

Date: 20 December 2018

To

Professor Dr. Md. Bellal Hossain
Head
Department of Nutrition and Food Engineering
Daffodil International University

Subject: Declaration regarding the validity of the Project Report.

Dear Sir,

This is my truthful declaration that the **"**Project Report**",** I have prepared is not a copy of any thesis report previously made any other students.

I also express my honest confirmation in support to the fact that the said thesis report has neither been used before to fulfill my other course-related not it will be submitted to any other person an authority in future.

Sincerely Yours,

Amanat Ullah
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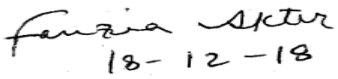
CERTIFICATION OF APPROVAL

I am pleased to certify that the project report on **"Product Development of Instant Powder Drinks (IPD) from Hog-Plum Fruit of Bangladesh"** conducted by Amanat Ullah, bearing ID No: 153-34-467 of the Department of Nutrition and Food Engineering has been approved for presentation and defense for the academic degree. I am pleased to hereby certify that the results and findings presented in the report are authentic of Amanat Ullah. I strongly recommend the report, have presented by researcher.
He bears a strong moral character and a very pleasant personality. It has indeed a great pleasure working with him.

.

I wish him all success in life.



Professor Dr.Md. Bellal Hossain
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Acknowledgment

In the preparation of this report, I would like to acknowledge the encouragement and assistance given to me by a number of people. At first, I would like to express my gratitude to Almighty Allah for enabling me the strength and opportunity to complete the report in the schedule times successfully. I am taking this privilege to deliver my gratefulness to each and every people who are involved with me in every phase of my lives.

I am grateful to my parents without whom I cannot be here. Without the support of my parents, I could not be able to achieve my objectives and goals.

My deep gratitude and sincere thanks to the honorable Head, Department of Nutrition and Food Engineering, Professor Dr. Md. Bellal Hossain for this kind cooperation and to accept this Degree. I am encouragement taking this privilege to deliver my gratefulness to each and every people who are involved with me in every phase of my lives.

I am deeply indebted to my Supervisor, Senior Lecturer; Fouzia Akter**,** Department of Nutrition and Food Engineering**,** and Daffodil International University for her whole-hearted supervision during my organizational attachment period. I would like to give thanks Senior Lecturer; Nasima Akter Mukta.
It would have been very difficult to prepare this report up to this mark without their guidance.

I would like to express my warmest thanks to NFE Faculty members for their countless inspiration and encouragement during the student life.

ABSTRACT

This study was conducted to process "Hog-Plum" and specify its quality parameters by different organoleptic and proximate analysis. The fruits were collected from the local market, washed, cut into pieces, then oven dry method use (80-85^{0}c for 3-4 hour). After the dry Hog-Plum pieces blend to powder. It contained dry powder 76% moisture, 6.8% fat, 4.6% Ash, 8.75% Protein and Hog-Plum Raw 85% moisture, 86.69%,Ash, 4.6%, Protein, 9.89% The powder was used to prepare Instant Powder drinks with 15% dry Hog-Plum powder with 84% sugar with citric acid .5% and .5% ascorbic acid and few amount of colour (S1) and 15% dry Hog-Plum powder with 80% sugar with citric acid 0.5% and ascorbic acid .5% with few amounts of colour and salt and xanthan gum (S2).
The sensory evaluation of Instant Powder Drinks of S1 Vs S2 was carried out by 30 panelists on a nine-point hedonic scale for different sensory parameters such as appearance, flavor, taste, texture and overall acceptability. In quality parameter test S1 showed a positive result and it was approved to be the best in all sensory attributes by the panelists. The study also revealed that S1 was more acceptable than S2 among the panelist. The quality and shelf life of the developed drinks with S1 & S2 were also studied.

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CHAPTER 1

INTRODUCTION

1.1 Introduction

Hog-plum (Amar) is an underutilized fruit in Bangladesh. Its scientific name is spondias mombin. It is used as food and medicine since time immemorial. Hog-plum is a fruit of mixed taste of sweet and sour which is familiar in botany as Droop. Hog-plum has gained much importance in modern medicine for their pharmacological values (Anoka et al. 2008). It is very useful for the treatment against bacillary dysentery, tuberculosis infection as it acts as a blood purifier. It helps to reduce serum cholesterol and high blood pressure and has antitumor property. Hog-plum is valuable health food, which is low in calories, high in vegetable proteins, zinc, chitin, fiber, vitamins, and minerals. It contains a very good amount of Vitamin C. The use of hog-plum is still unorganized and primitive. The use of hog-plum is still unorganized and primitive. Due to poor keeping quality and difficulties of transportation, preservation and marketing facilities, a huge quantity of these valuable fruits are being damaged, spoiled and wasted especially during the peak season. To reduce the wastage and to get a reasonable price by the producer of this fruit, preservation is necessary. [1-2]

1.2 Hog Plum in Bangladesh

Hog plum grows all over Bangladesh, especially in Barisal and Munshiganj are very popular and tasty and nutritious. The bunch of Amra will instantly create a feeling that those are some full bloomed flowers with nice petals all around. Besides, each fruit is mounted on a small bamboo or wooden stick that is not only convenient to eat the fruit but also prevents the eater from using unclean or tainted hands. [3-4]

1.3 Color Flavor and Size of Hog Plum

Generally, ripe Hog Plum has varied in size and tasted like a sweet sour. The fruits are about 4 cm (1.6 inches) in length.Ripens Hog Plum Color such as yellow-green and ripened Hog Plum color such as green. The large stone in each fruit bears many spines and is difficult to separate from the pulp[5].

Figure 1.1: Green Hog-Plum

1.4 Uses of Hog plum

There are lots of essential vitamins and nutrients present in hog plums that help fight against some free radicals that might be harmful to human health. This fruit, which is rich in Vitamin C, calcium, carotene, sugar and iron, can be naturally preserved for around two weeks[4].
The leaves serve as antiseptics as they are also used in making antiseptic soaps, treating sore throat, cough, malaria and another related sickness; the barks, the juice, and the fruit, in general, have therapeutic benefits that make them useful to traditional herbalists for alternative medicines.

1.5 Health Benefits of Hog-Plum Instant Powder Drinks

- Prevents Cancer**:** Antioxidant compounds in mango drinks have been protected against colon, breast, leukemia and prostate cancers.
- Improves Haemoglobin Production: It is a good source mineral such as iron which helps in the production of haemoglobin and myoglobin which transfer oxygen through the body system

- Contain High Amount Of Vitamin C: Contain good quantity of vitamin c which is important for overall health and function such as maintenance and repairing of bones and teeth and healing of several ailments. Vitamin C is one of the antioxidants which can be found in the fruits and acts naturally as an agent that inhibit harmful oxidation processes by free radicals in the body which could lead to damages of the body's vital organs and cells**.**
- Promotes Muscle Strength: Thiamine in one of the vitamins which could be found in Hog Plum, it has a lot of function it performs in the body with one of them being its ability to help in muscle contraction and conduction of nerve signals
- Rich in Antioxidants: Hog plums contain good quantities of vitamins, minerals phytochemical properties that perform oxidation functions on the body system.
- Prevent dehydration: Drinking Instant powder Drinks prevents the excessive loss of water from the body, and helps to prevent dehydration.

- Immune System**:** The generous amounts of vitamin C in Instant Powder Drinks keep your immune system healthy and strong.

- Remedy for Heat Stroke**:** Green Mango Drinks helps to cool down the body and prevent harm to the body.

- Good for Digestive Health: Hog plums are rich in dietary fibre which plays a key role in maintaining a healthy digestive system. The fibre content helps in improving the general functions of the digestive health, and as well prevents any form of issues which could arise as a result of poor digestion and other digestive health conditions like bloating and gas.
- Improves Haemoglobin Production: It is a good source mineral such as iron which helps in the production of haemoglobin and myoglobin which transfer oxygen throughout the body systems.
- Contain High Amount of Vitamin C: Contain good quantity of vitamin C which is important for overall health and body function such as maintenance and repairing of bones and teeth and healing of several ailments. Vitamin C is one of the antioxidants which can be found in the fruits and acts naturally as an agent that

inhibit harmful oxidation processes by free radicals in the body which could lead to damages of the body's vital organs and cells.

- Enhances Bone Health: It is a fat-free, sodium-free, cholesterol-free fruit and a good source of vitamin K that helps in proper bone health. The vitamin K does not only helps in blood clotting, but it also helps to improve the bones by making them strong, thereby helping in the prevention of bones health conditions like bone fractures etc., it effects on osteoporosis has not been proven medically, though most people take it for this cause.[4]

CHAPTER- 2
MATERIALS AND METHODS

2.1 Materials and Methods

The study was conducted in the Laboratories of the Department of Nutrition and Food Engineering, Daffodil International University, Dhaka.

2.2 Collection of Raw Materials

The fresh, mature hog plum was collected from the local market. The Powder of Hog plum was used to prepare Instant Powder Drinks.

2.3 Chemicals used in product development

- Citric Acid (Acidulate)
- Ascorbic Acid
- Sodium Citrate
- Color
- Xanthan Gum (Stabilizers)
- N-Hexogen
- H_2SO4
- 0.1N NaOH
- 40% NaOH Solution
- HCL
- Digestion Mixture
- Methyl Red
- Salt
- Distill Water

The Tetra packs were used in the Dry powder of Instant Powder drinks.

2.4 Instant Powder Drinks production

The study on the Development of Instant Powder Drinks was made using the following equipment, ingredients, and utensil.

2.5 Apparatus and Equipment

1. Blender
2. Oven
3. Electrical Balance
4. Juicer
5. pH Meter
6. Disc Bowl Centrifuge
7. Desiccators
8. Refractor Meter
9. Heater
10. Conical Flask
11. Kjeldahl Method
12. Measuring Flask
13. Spectrophotometric Method
14. Soxhlet apparatus method
15. Bikar
16. Tetra Pak
17. Plastic Bottles
18. Muffle Furnaces
19. Foil Paper

2.6 Instant Powder Drink Preparation

Instant powder drink Preparation used in two steps. First Step Raw Hog Plum And Powder oven drying method. And in Second Step This powder make in Instant Powder Drinks.The weight of Hog Plum (Without Peel) 500gm. After peeling and slicing the weight of the Hog Plum 300gm. The final product of dried Hog Plum Powder was 65gm.

2.7 First Step Raw Hog-Plum to Hog plum Powder

2.8 Fruit selection. Several requirements need to be met:

- Lack of insect infestation.
- Lack of mechanical injuries.
- Check the stage of maturity.
- Check color and texture.

2.9 Washing

Hog-Plum is washing by washing with clean water containing in order to reduce microbial load.

2.10 Peeling and cutting

The pulp is separated from the seed with knives, on a chopping board. But avoid to peeling the Hog-Plum. Then Mangoes are cut in similar small pieces are placed in clean plastic containers

2.11 Drying

This process is oven drying method. After dry and before dry

Figure 2.1 after dry and before dry

2.12 Powdering

Blender Machine helps to make it powder form Dry Hog-Plum. Uses of Blender Machine 3 to 4 times that can powder are making smoother. Then Colander is used to separate crystallization part of powder. Now put the powder into the Tetra Pak.

Figure 2:2 Hog-plum Powder

2.13 About Instant Powder Drinks

Citrus fruits in hog-plum are to be considered as instant functional powder drinks that are specially formulated to help rehydrate during or after the physical activity of people at different age level.The product usually rich in vitamin c i.e., the most efficient source of energy. As well as, Vitamin c is an important source of control energy level after exercise and activity performance.[5]

Figure 2:3 Instant Powder Drinks

2.14 General Objectives of Instant Powder Drinks

- To preparation of hog plum in instant powder drinks.

- To determine the general acceptability of - instant powder drinks in terms of sensory qualities (appearance, odor, taste, general acceptability).

- To evaluate the chemical characteristics of the ready-to- instant powder

2.16 INGREDIENTS

1. Hog Plum Powder …….. 15%
2. Sugar ……... 84%
3. Citric Acid ……. .5%
4. Ascorbic Acid ……. .5%
5. Color
6. Water

2.17 Flow chart of Instant Powder Drinks:

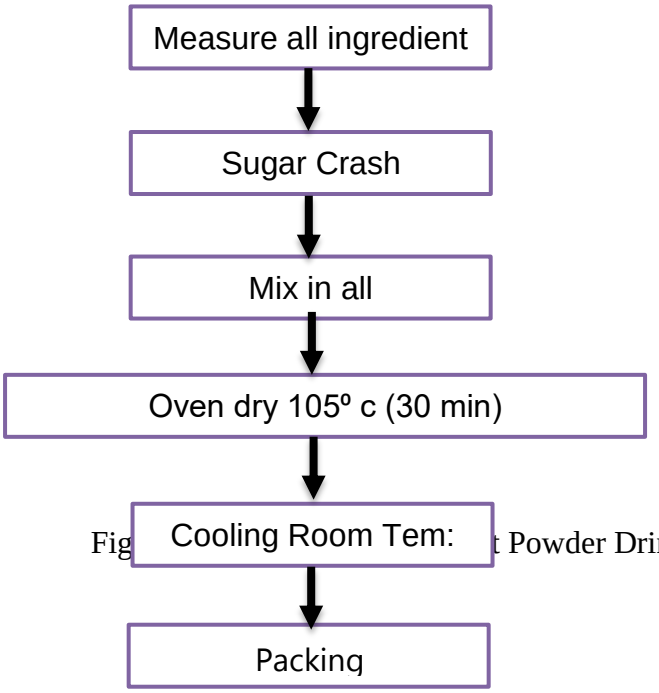


Fig t Powder Drinks

CHAPTER 3

PROXIMATE ANALYSIS OF INSTANT POWDER DRINKS

3.1 Proximate Analysis

Moisture, Ash, Fat%, Protein, Vitamin C of Hog-Plum Powder were determined by following methods described by; Moisture content by digital moisture analyzation method at 105°C for 1 hour; Ash content by muffle furnace ignition method at 600°C. Acidity, Protein test of the Kjeldahl method, Vitamin C test of Spectrophotometric process and pH of Instant Powder Drinks were determined by following methods described by; acidity by titration against 0.1N sodium hydroxide using phenolphthalein indicator; TSS by Refractometer as degree Brix (°B) and pH by pH meter.

3.2 Determination of Moisture Content of Hog-Plum Powder

The moisture content of the samples was determined using the hot oven method. Weight the empty crucible. Then (3gm) of each sample was put into a washed and dried crucible dish and weight it and placed in a Phoenix oven (Preiser model, New York, USA) at a 105°C for 1 hour until the weight is constant. The samples were cooled in a desiccator and weighed. The weight loss was obtained as the moisture content and was calculated as:

$$\% \text{ Moisture content} = \frac{W_2 - W_3 \ \mathbf{X}\ 100}{W_2 - W_1}$$

Here:
W_1 = initial weight of empty crucible;
W_2 = weight of crucible + sample before drying;
W_3 = final weight of crucible + sample after drying

3.3 pH Test

Chemicals & Equipment Required:

1. pH meter
2. Beaker

Procedure:

1. Take the Sample in a Beaker.
2. Keep the pH meter into it.
3. Note down the reading

3.4 Protein Test

Kjeldahl Method is used to Determine Protein content of Drinks was digested with a strong acid (H2SO4) so that it released nitrogen which could be defined by a suitable titration technique. The quantity of protein present was estimated from the nitrogen concentration.
A conversion factor of 6.25 (equivalent to 0.16 g nitrogen per gram of protein) was utilized for this application. This was just an intermediate value and each protein having a different conversion factor depending on its amino-acid composition.

The Kjeldahl method can conveniently be divided into three steps:

- Digestion
- Neutralization and
- Titration.

Anhydrous sodium sulfate and a catalyst (copper) were brought in to alleviate the boiling point of the medium (from 337°C to 373°C). The initially very dark-colored medium had become clear and colorless to indicate that the chemical degradation of the sample was completed [24, 25].

3.5 Determination of Ash Content of Hog-Plum Powder

Wet ashing is the simple procedure to get the result. A silica dish was heated at 60°C, cooled in a desiccator and weighed. 3gm of the sample was put into the silica dish and transferred to the furnace. The temperature of the furnace was then allowed to reach about 600°C after placing the dish in it. The temperature was maintained until the water was fully removed indicating that all the organic matter content of the sample has been destroyed. The dish was then brought out from the furnace and cooled in the desiccator and re-weighed.

Calculation:

% Ash content

$$= \frac{C - A \times 100}{B - A}$$

Here:

A = weight of empty dish
B = weight of empty dish + sample before ashing
C = weight dish + ash

Procedure:

1. Prepare the media in the same procedure and cooled it at 40 degree Celsius. Make serial dilution.
2. Take the specific amount of sample in Petridis.
3. About 15-20ml of media pours in Petridis and properly homogenized by clockwise & anticlockwise and allows solidifying.
4. Add 1 ml serial dilution sample at every petri dish.
5. After solidification incubates the plate at 27ºc in the inverted position for 24-48 hours.
6. After incubation counts the colony by colony counter.
7. All the steps should be done under laminar air flow to maintain aseptic condition.

3.6 Determination of Fat in Hog plum powder

Material required:

1. Weight balance
2. Drying Oven
3. Soxhlet apparatuses
4. Thimble
5. Heating mantle
6. Glass rod
7. Desiccator with silica gel
8. N-hexane 210 ml

Procedure:

- ✓ First of all, rinse the glass apparatus by petroleum enter and ether and dry it the oven at 102º c and after removing it keep in the desiccator
- ✓ Weigh 5 gm. of the grounded and dried sample and place it in the thimble
- ✓ Place the thimble in the soxhlet extractor
- ✓ Take a 100 ml round bottom flask clean it and flask with 210 ml N-hexane

- ✓ Place the whole set on a heating mantle and Continue the extraction process for several hours, almost 6 hours
- ✓ Collect almost all the solvent after distillation

Calculation:

Rounded flask weight after and before

$$= \frac{166.868 - 166.732}{2} x100$$

= 6.8% Dry sample

CHAPTER 5

RESULT AND DISCUSSION

5.1 Proximate Analysis of Hog-plum powder and Instant Powder Drinks and Raw Hog-plum

Sample	Moisture %	Protein %	Ash %	° Brix	pH	Ascorbic Acid%
S1	76%	8.75%	3.6%	14.06	3.01	7.1
S2	89.56%	6.8%	0.11%	15	3.54	6.9
S3	86.69%	9.89	4.6%	16	2.62	9.01

Figure 5.1: Table 1 – Result Analysis

S1: 15% Hog-Plum powder + 85% sugar.
S2: 20% Dry Hog-Plum powder + 80% sugar.
S3: Raw Hog-Plum

Table 5.1 shows the different types of quality parameters for S1 & S2. The moisture content of Instant powder drinks was Sample-1 & Sample-2, 76% & 89.56 %. S1 was little acidic than the S2. The content of protein in S1 (8.75%) is greater than the S2 (6.6%)

5.2 Sensory Evaluation:

I conducted a survey among 30 staff of Daffodil International University.
Total data are submitted below.

Name: Amanat Ullah	Product: Hog-Plum (IPD)
Panelist No :	Date :

Instructions:
Taste the given samples, then place a √ mark on the point in the scale which best describes your feeling.

SCORE	SAMPLE CODE									
	S1					S2				
	Appearance	Flavor	Taste	Texture	Overall Acceptance	Appearance	Flavor	Taste	Texture	Overall Acceptance
(9) Like extremely	6	3	5	8	13	9	14	16	9	17
(8) Like very much	4	8	12	15	8	16	6	4	8	11
(7) Like moderately	12	10	8	4	7	5	8	7	11	2
(6) Like slightly	8	9	5	3	2		2	3	2	
(5) Neither like nor dislike										
(4) Dislike slightly										
(3) Dislike moderately										
(2) Dislike very much										
(1) Dislike extremely										

Figure 5.2: Table - Sensory Evaluation

Total Respondent = 30

In s1 Used 20% of Dry Mango Powder with 80% sugar
In s2 Used 15% of Dry Mango Powder with 85% sugar

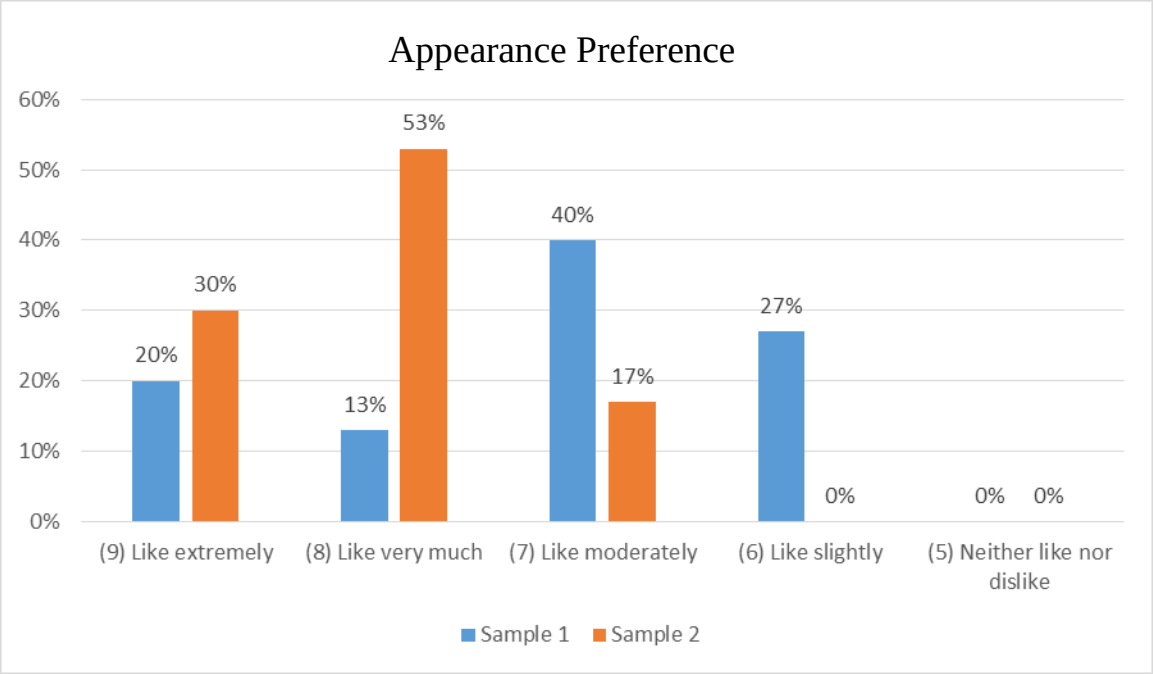
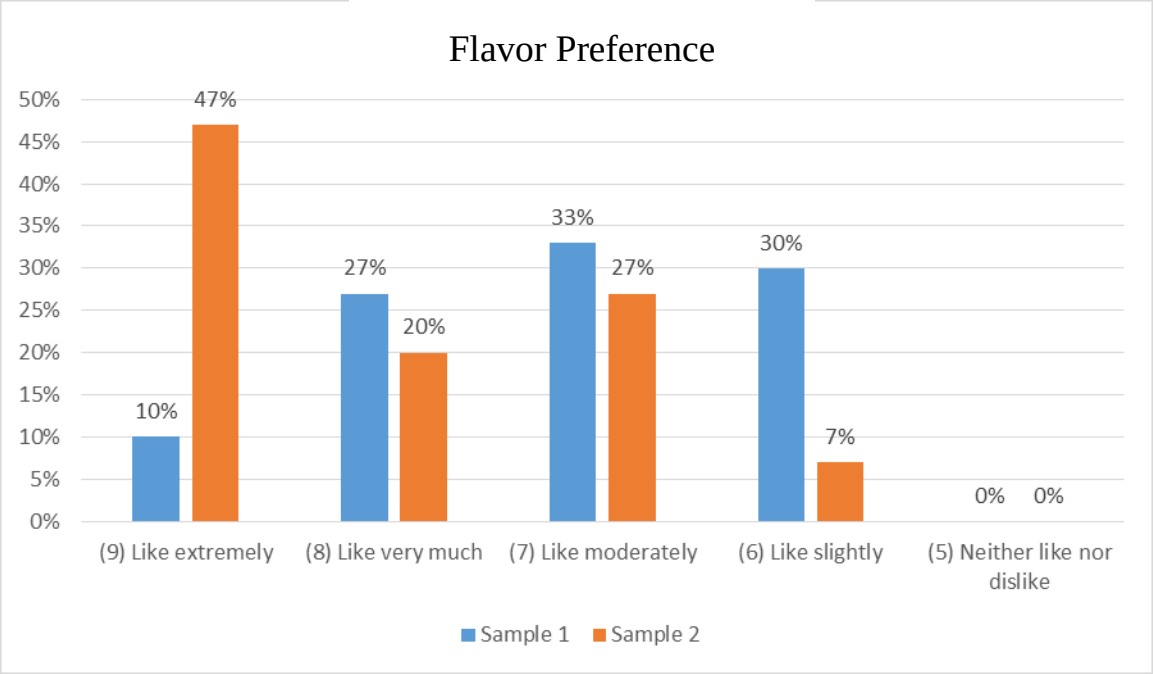


Figure.5:3 bar chart of sensory evaluation-Appearance

Figure 5.3: Shows the appearance attributes of instant powder drinks in bar charts in 9 point hedonic scales. The bars showed that sample-1 containing 20% Hog-Plum powder with 80% sugar got the highest score as liked very much.



Taste Preference

Figure 5.4: Bar chart of sensory evaluation- Flavor preference

Figure 5:4 Shows the appearance attributes of instant powder drinks in bar charts in 9 point hedonic scales. The bars showed that sample-1 containing 20% Hog-Plum powder with 80% sugar got the highest score as liked very much.

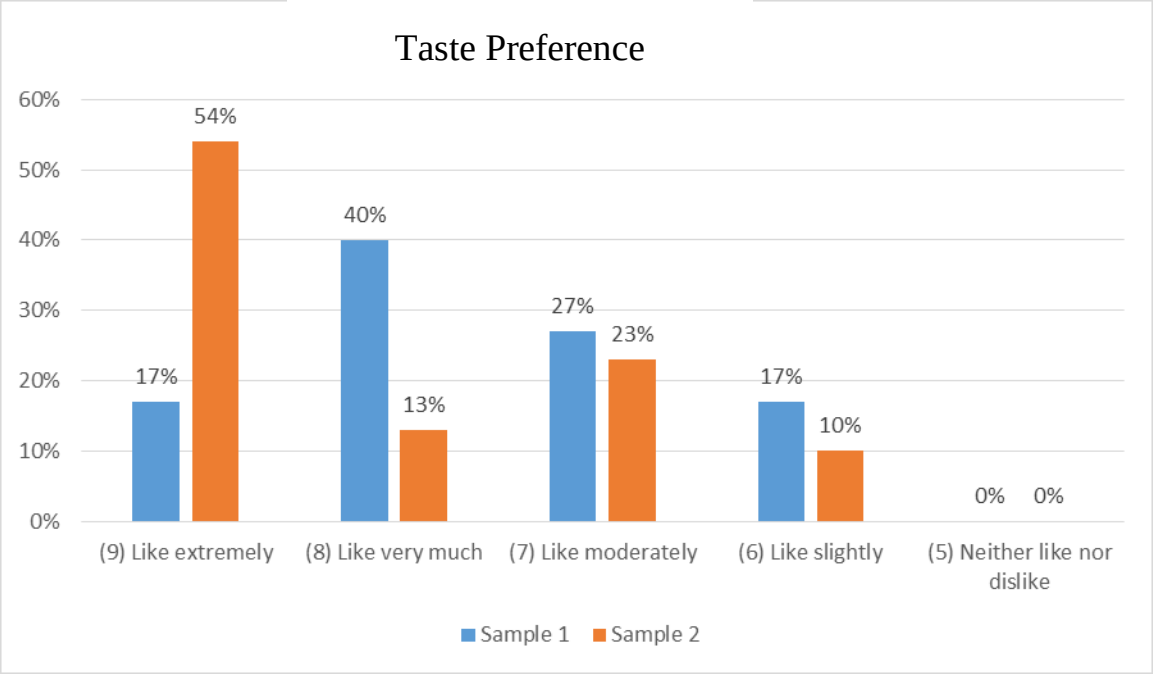


Figure 5:5 Bar chart of sensory evaluation- Taste preference

Figure 5:5 Shows the appearance attributes of instant powder drinks in bar charts in 9 point hedonic scales. The bars showed that sample-2 containing 15% Hog-Plum powder with 85% sugar got the highest score as liked very much.

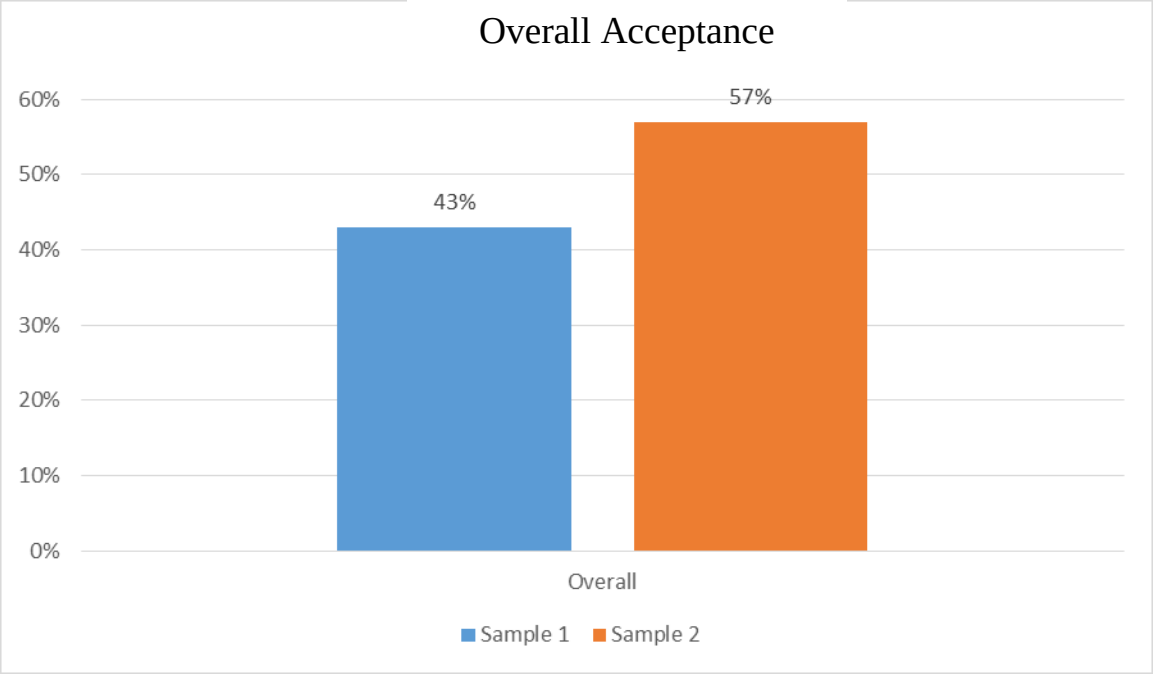


Figure 5.6: Bar chart of sensory evaluation- Overall preference

Figure 5.6: Shows the appearance attributes of instant powder drinks in bar charts in 9 point hedonic scales. The bars showed that sample-2 containing 15% Hog-Plum powder with 85% sugar got the highest score as liked very much.

CHAPTER 6

Conclusions

The result of the study showed that Instant Powder drinks prepared with 20% dry Hog-Plum powder with 18% sugar showed a positive result and was approved to be the best in all sensory attributes by the panelists. This study also revealed that s1 was higher in protein content and little acidic than s2. The content of ascorbic acid in s1 (7.1%) is greater than s2 (6.9). Hence there is a great scope to develop & popularize Instant Powder drinks in Bangladesh. The varieties of tank are available in the global market but Hog-plum instant powder drinks are not available in market where uses Chemical powder. Keeping in view all above results, the production of Hog-Plum Instant powder drinks at commercial level is recommended.

REFERENCES

1) Ahmed, K. U. 1966. “phul Fol abong shak- shobji” Usha printers, 31/3, saiyed Aoulad Hossain lane, Dhaka, Bangladesh.
2) Ali keramat, S. S.; Malek, M. A.; Islam, K.; Salamatullah, K. 1977. The food values of indigenous foods Institute of food and Nutrition, Dhaka University, Bangladesh.
3) P.15 Heikal, H. A.; EI-Sanafiri, N.Y.; and Shooman, M.A. 1972. Some factors affecting quality of dried mango sheets. Agricultural Research Review, 50: 185-194.
4) Islam, M. W. 2004. Studies on jam from hog-plum (Amra). A Project Report, Department of Food Technology and Rural Industries, Bangladesh Agricultural University. Mymensingh.
5) Mir, M. A. and Nath, N. 1995. Loss of moisture and sulphur dioxide during air cabinet drying of mango puree, Journal of Food Science and Technology. 32, 391-394.