Department of Nutrition and Food Engineering

Project Report

On

Assessment of chips developed from cassava (*Manihot esculenta*) root with differentssss methods

Submitted By

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LETTER OF TRANSMITTAL

Date:

Professor Dr. Md. Bellal Hossain
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Subject: Submission of Project report

Dear Sir,

I would like to take this opportunity to thank you for the guidance and support you have provided me during the course of this report. Without your help, this report would have been impossible to complete. To prepare the report I collected what I believe to be most relevant information to make my report as analytical and reliable as possible. I have concentrated my best effort to achieve the objectives of the report and hope that my endeavor will serve the purpose. The practical knowledge and experience gathered during report preparation will help me in my future professional life. I request you to excuse me for any mistake that may occur in the report despite of my best effort. I would really appreciate if you enlighten me with your thoughts and views regarding the report.

I therefore, would like to place this report to your judgment and suggestion. Your kind advice will encourage me to perform better planning in future.

Sincerely Yours,
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DECLARATION

This Discourse entitled "Assessment of chips developed from cassava (Manihot esculenta) root with different methods" is being submitted to the Department of Nutrition and Food Engineering, Faculty of Allied Health Sciences, Daffodil International University Dhaka-1207, Bangladesh as a part of partial fulfillment of the requirements for the degree of Bachelor of Science in Nutrition & Food Engineering. This project report is unique and done by Md. Abdur Rahman Showrov authentic hard work.

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At introductory, I would like to express my gratitude to my creator the almighty Allah for enabling me the strength and opportunity to complete the report in time successfully. 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 Dean, Faculty of Allied Health Science, Professor Dr. Ahmed Ismail Mostafa for his kind cooperation and to accept this Degree.

I am deeply indebted to my supervisor Prof. Dr. Ahmed Ismail Mostafa, Dean of Allied Health Science, Daffodil International University for his whole-hearted supervision during my organizational attachment period.

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I dedicate this to my parents

ABSTRACT

Manihot esculenta (cassava) root is starchy root vegetable or tuber which is mostly found in South America. It is a major source of calories and carbs for people in developing countries. Root part is the most common consumed part of cassava and can be eaten as whole, grated or ground into flour to make bread and crackers. Bangladesh is an agricultural country but cassava is not an abundant consuming product in the country. It is available in some specific area of Bangladesh like sylhet, Modhupur, Rangamati etc. Due to the increasing demand of cassava root as ingredient of bakery products, confectioneries, canned products, glucose industry, commercial caramel, dextrose production, composite flours and cassava alcohols, it is becoming one of the best thing which can be taken into consideration in Bangladesh. Present study aimed to assess chips prepared from locally grown fresh cassava roots by blanching and non-blanching techniques followed by two drying techniques such as solar drying and oven drying. Four samples were obtained as blanched- oven drying, non-blanched- oven drying, blanched- solar drying and non-blanched- oven drying which were analyzed further to estimate moisture, ash, protein and fat content. Sample of non- blanched-solar drying analyzed as fat- 9.6%, ash- 1.43%, moisture- 1.68% and protein- 21%. Non-blanched-oven drying sample showed fat- 9.82%, ash- 1.68%, moisture- 1.128% and protein- 31.5%. Blanched- oven drying sample analyzed as fat- 10.6%, ash- 1.55%, moisture- 1.87% and protein- 29.75%. Blanched-solar drying contained fat- 9.2%, ash- 0.66%, moisture- 2.89% and protein- 24.5%. Sample obtained from solar drying contained high moisture content than sample obtained from oven drying whereas blanched sample had low moisture content than non-blanched sample. Ash content in non-blanched sample were lower than blanched sample but ash content of sample obtained from solar drying was less than that of oven drying. Samples did not show notable variation in their protein and fat content.

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Chapter-01
Introduction

Introduction

Cassava grown in tropical regions of the world because of its ability to withstand uncomforted growing conditions its South African agricultural treaties need to be completely exploited. It is believed that Cassava represents an important residence and cash crop in many countries, Cassava was introduced to Africa by the sixth-century Portuguese maid smiths and was cultivated in the rest of Africa for several hundred years. Cassava has a long history in Africa, but cassava is not a good crop in South Africa.

Cassava is the base of a multitude of products, including starch for food, flour, animal feed, alcohol, size papers and clothes, sugary, ready-made food and bio-degradable products. This product is made up of many forms of cassava, from fresh leaves and roots to improved cassava starch. Processing degree and technical requirements increase from the latest form to the improved starch farm.

All of the above products offer potential market development opportunities for Cassava. While some cassava is sold as fresh roots or leaves, these products usually get some special post-harvest management or treatment before use. As cassava usually requires processing prior to consumption or sale, the processing is of central importance in the future crop.

New roots and leaves are mainly used as human food, due to their destructiveness, most of the roots are usually consumed or sold from production centers. Traditional ways to protect new roots include extracting of packaging roots or root shelf in moisture lamps for two weeks before extracting two weeks

The indication is that if the cassava products are convenient and more useful then the tastes market can grow for fresh tears. Costa Rica has proved that there is a growing export market for fresh cages - if it is packaged in an attractive and useful manner, the possibility of a fresh turban in the developing countries represents development, firstly by detention, although Competitiveness and innovation are also important factors.

Origin of the study

Thesis or project report is a graduation requirement for all university students. Daffodil International University & Department of NFE provide thesis opportunity for students in the university laboratory.

Purpose of this study about Cassava are as follows:
1. To find out unique information about Cassava
2. To learn about kjeldahl method
3. To learn about Soxhlet method
4. To fulfill graduation requirements
5. To learn about apparatus related to this project
6. To learn how to use theoretical knowledge in practical
7. To become shelf-dependent.

Objective of the study

Two types of objectives are required for this study

1. General objectives
2. Specific objectives

General Objectives

It is a universal call to develop National Food Composition Database. National food Composition table of Bangladesh is incomplete. As a result food scientist works for several years to enrich the table. Cassava newly launched in Bangladesh. So study about it will help to fill up gaps of the food composition table. Lots of investigation about newly foods are organized by different institute. Cassava content will enrich the National Food composition table of Bangladesh.

Specific Objectives

Specific objectives of the study are following
1. To analyze proximate nutrient profile
2. To estimate protein and fat of Cassava
3. To know about freeze drying mechanism

Limitations of the Study

Everything has some limitations. So this study also has some limitations.

Main limitation was time. Because of insufficient time it was not enough to conduct the research properly. To make a perfect and clear research high-technology and machineries required which was not enough in the laboratory.

Technical support was not enough to conduct this research properly. Instruments and other necessary things were not enough for the present research.

CHAPTER-02

REVIEW OF LITERATURE

Manihot esculenta,[1] commonly **cassava, manioc**, **yucca**, **macaxeira**, **mandioca** and **aipim.** It is an annual crop in tropical and subtropical regions for its palatable starchy tuberous root, a major source of carbohydrates. However it is often called ***yucca*** in Latin American Spanish and in the United States, it is not related to yucca, a shrub in the family Asparagaceae. Cassava is superiorly consumed in boiled form, but substantial quantities are used to extract cassava starch, called tapioca, which is used for food, animal feed and industrial purposes. Brazilian farinha, and the associated *garri* of Western Africa, is an edible coarse flour obtained by grating cassava roots, Extreme moisture off the obtained grated pulp, and finally drying it (and roasting in the case of farinha).Manihot esculenta[2] is the third-largest source of food carbohydrates in the tropics, after rice and maize. It is a major staple food in the developing world, preparing a basic diet for over half a billion people. Cassava is one of the most drought-tolerant crops, capable of growing on marginal soils. Nigeria is the world's largest producer of this, Thailand is the largest exporter of cassava starch. It's classified as either sweet or bitter. Same to other roots and tubers, both bitter and sweet varieties of cassava contain anti nutritional factors and toxins, with the bitter varieties containing much larger amounts It must be properly prepared before consumption, as improper inappropriate preparation of cassava can leave enough residual cyanide to cause acute cyanide intoxication, goiters, and even ataxia, partial paralysis, or death. [5] This document examines the most important agronomic methods for cassava. Cassava production requires good soil preparation and especially soil drainage should be sufficient. Cuttings should be fresh and come from mature and healthy plants, of which the most lignified part of the basal bar is preferred. The planting plan can only be done in areas where root rot is not a serious risk. The most recommended sowing period is the beginning of the rainy season, but in areas where plant diseases are widespread, it is usually carried out at the end of the rainy season.

Nutritional Importance of Cassava

1. Cassava roots are good source of energy
2. Cassava leafs contain protein, vitamin, mineral
3. It fulfill our daily nutrients
4. Have antioxidant and anti-carcinogens also
5. Production is better than other crops
6. Can find out easily the starch from it

Regular food shortage in the Syonic quantity in the valley areas The development of criticism in limited solar supply diets is hypothyroidism, goiter and youth and adult population. The purpose of the study was to test the production of high-quality cassava flour (HCCF) to the appropriate processing technique, that there is available in the village of Mammogwa in the mtwara area. Acceptance of various types of cyanide mineral. The use of the grafting

technique was used to make the heat of soaked and dry cassava, while the technique of hiding created moist and dry cashew chips

Protein:

For daily calories we should eat 15-20% of protein food. Cassava can be a great source for protein proteins. Hair and nails are made up of most proteins. Your body uses proteins to make and repair tissues. You also use proteins to produce digestives, hormones and other body chemicals. Proteins are an important part of bone, muscle, cartilage, skin and blood.

Fat:

Fat is another essential nutrient we need to take every day for fat meals. We should use less than 30% or 30% calories daily. There are different types of fat such as saturated fat, polyunsaturated fat, and monacentric fat. Properized fatty blood increases the cholesterol level, which is bad for our health. Liquid vegetable oils, especially olive oil, such as monounsaturated fats can be healthy. These vegetable oils are the main source of vitamin E, an antioxidant that can fight free radicals and slow the aging process and may be able to prevent cancer

Carbohydrate

Carbohydrate provides our body with fuel and energy. It is important to pick up our daily activities. For carbohydrate, our body needs its work to work continuously. Cassava contain plenty of amounts of carbohydrate. So we should take it in a regular form. Carbohydrates are the main source of energy in the body: they help nourish the heart muscles, kidneys and central nervous system. For example, fiber is a carbohydrate that helps you to digest and maintain cholesterol levels in the blood.

Chapter-03

Methods & Materials

Collection of Sample

Research was conducted on Cassava grown in Bangladesh to estimate the proximate composition (Such as Moisture content, Protein, Fat). The experimental sample were collected from Modhupur, Bangladesh.

Sample: Cassava

Figure: Cassava

This sample was collected from the place of tangail, madhupur for sample preparation and analysis.

Preparation of Cassava chips

About 1.1 kg of Fresh Cassava sample was peeled to remove its outer membrane. Then it was washed properly and sliced into small pieces as 2, 5, 10 and 20 mm. Cassava slices of 2mm were taken for its better texture and thus passed through steam blanched. After steam blanching, steam blanched samples were cooled as soon as possible. Non-blanched samples were also taken. Both samples (2mm cassava slices) blanched and non-blanched were then

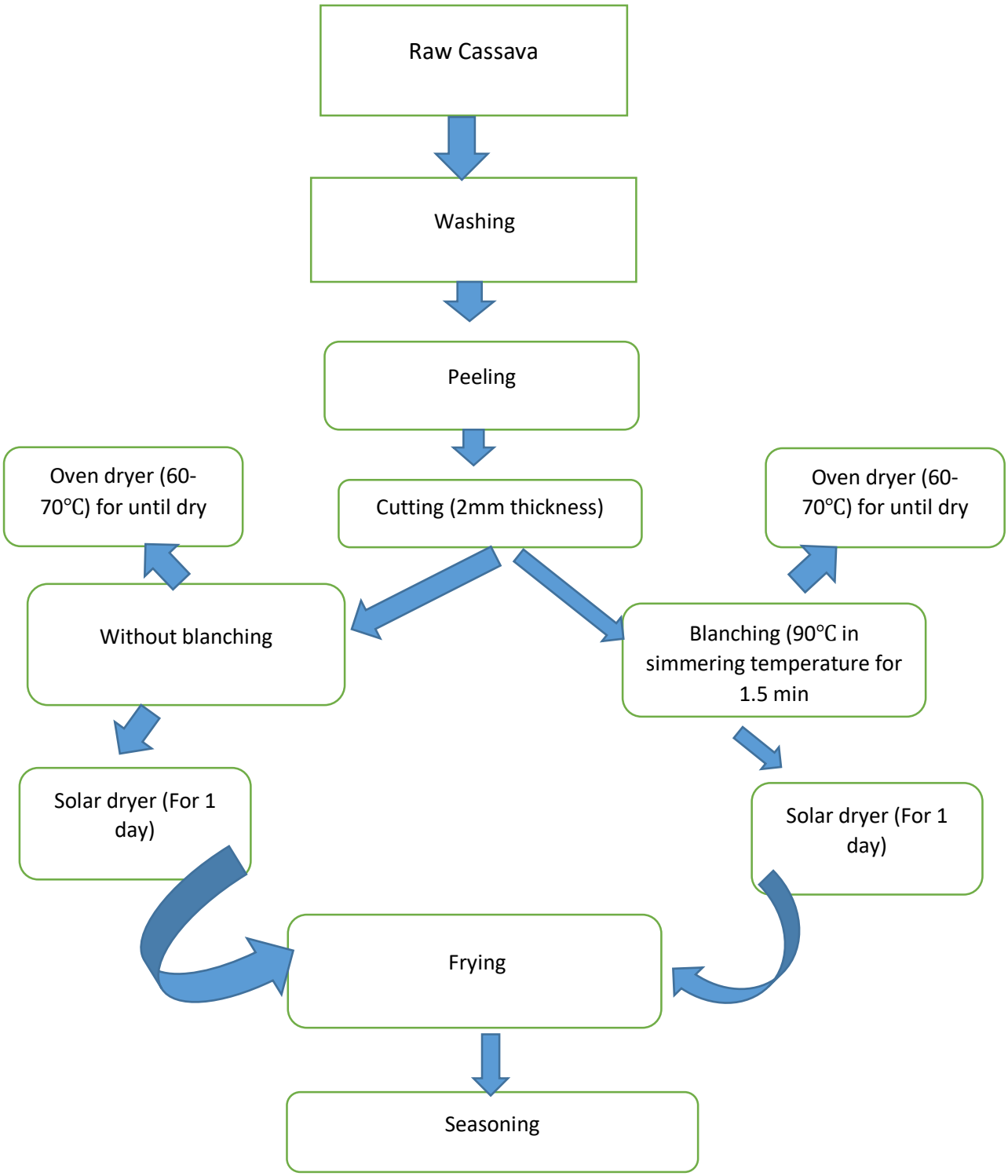
dried by using two different drying techniques such as solar drying for 12 hours and oven drying for 8 hours at 80°C. Four samples obtained as blanched- solar drying, blanched oven drying, non-blanched-solar drying and non-blanched oven drying which were then fried and seasoned with seasoning mixture to get cassava chips.

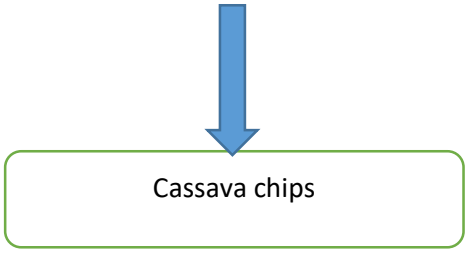
Picture of preparation of sample:

Non-blanching oven and sun dryer

Blanching oven and solar dryer

Flow chart of Cassava Chips making,





Estimation of Proximate Composition

According to the official methods of the Association of Official Analytical Chemist (AOAC, 1984) proximate analysis for moisture, protein, total fat were completed from Cassava.

For estimation of moisture freeze drying method was used Kjeldahl method was used to estimate protein from Cassava The estimation process was done at NFE laboratory.

Estimation of Fat was done at NFE Laboratory and Soxhlet method was used.

Estimation of Moisture

In plant foods moisture content vary from plant to plant. It is important to know moisture content in food because it effects the composition of food. Moisture content of Cassava was determined by measuring the amount of water removed from it. Oven drying method is used to remove the water.

Materials/Apparatus

1. Weighing balance
2. crucible
3. Refrigerator
4. Oven dryer

Figure: 3.2. Oven dryer

Procedure

- First of all set 105℃ temperature on the oven.
- Then weight crucible lid
- Then weight cassava chips
- Then weight crucible lid + sample
- Then heat sample 105℃ temperature on the oven in 1 hour
- After that sample cool in 30 minute on desiccator
- Then again weight crucible + sample
- Then calculate for a result

Moisture content was calculated by the following formula.

Initial weight = Sample weight + crucible weight (before heating)

Final weight = Sample weight + crucible weight (after heating)

Here for Non-blanching solar dryer

Sample weight = 5.991

Crucible weight =26.272

Initial weight = 32.263

Final weight = 32.162

Percentage of moisture= $\frac{32.263-32.162}{5.991} \times 100$

= 1.68%

Here for Non-blanching oven dryer

Crucible weight= 21.766

Sample weight= 6.735

Crucible + sample weight= (21.766 + 6.735)

After drying,

Sample + crucible weight= 28.425

% of moisture= $(28.501 - 28.425)/6.735 \times 100$

= 1.128%

Here for blanching oven dryer,

Crucible weight = 25.241gm
Sample weight =7.34gm
Crucible + sample weight = (25.241 – 7.34)
= 32.581gm
After drying,
Crucible + sample weight =32.437gm

% of moisture = $\frac{Y-q}{i} \times 100$

$=\frac{32.581-32.437}{7.34} \times 100$

= 1.87%

For blanching solar dryer,

Crucible weight = 26.284gm
Sample weight = 7.01gm
Sample + crucible weight = (26.285 + 7.01)

=32.313
After drying,

Crucible + sample weight = 32.110gm

% of moisture = $\frac{y-q}{i} \times 100$

$= \frac{32.313-32.110}{7.01} \times 100$

= 2.89%

ASH TEST

Apparatus

- Crucible lid
- Muffle furnace
- Measuring
- Desiccator

Procedure:

- First of all set 600℃ temperature on the muffle furnace
- Then weight crucible lid
- Then weight sample of cassava chips
- Then weight crucible lid + lid
- Then heat sample 600℃ temperature on the muffle furnace in 6 hours.
- After that sample cool in 1 hour in desiccator
- Then again weight crucible lid + sample
- Then calculate it for result

Ash content was calculated by the following formula:

Initial weight = Crucible lid + sample weight (Before heating)
Final weight =Crucible lid + sample weight (after heating)

Here for,

Non blanching solar dryer

Before heat

Crucible weight= 22.470

Sample Weight= 5.308

Crucible + sample weight= (22.470 – 5.308)
= 27.778

After heat,

Crucible lid + sample weight= 22.546

% of ash= (weight of ash – weight of crucible)

= (22.546 – 22.470)

= 0.076%

Calculation,

% Ash= $\frac{Weight\ of\ ash}{weight\ of\ sample} \times 100$

= 1.43%

Non-blanching oven dryer,

Before heat

Solar dryer blanching

Crucible weight= 21.881

Sample weight= 5g

Crucible + sample weight= 26.881

After heat or drying= 21.965

Ash= (Dry sample + crucible lid – crucible weight)

= (21.965 – 21.881)

= 0.084gm

% of Ash= $\frac{Ash\ sample}{main\ sample} \times 100$

$= \frac{0.084}{5} \times 100$

= 1.68%

For Blanching solar dryer,

Before heat

Crucible weight = 22.580
Sample weight = 5.387

Crucible + sample weight = (22.580 + 5.387)
= 27.967

After heat,
Crucible lid + sample weight = 22.664gm

So ash content is

Weight of sample – weight of sample = 22.664 – 22.580
= 0.084g

% of ash = $\frac{Weight\ of\ ash}{weight\ of\ sample} \times 100$

$= \frac{0.084}{5.387} \times 100$

= 1.55%

So 1.55% of cassava blanching solar dryer ash content.

For blanching oven dryer,

Before heat

Crucible weight = 22.162
Sample weight = 5.385

Crucible + sample weight = (22.162 +5.138)
= 27.3

After heat,
Crucible lid + sample weight =22.198gm

So ash content is

Weight of sample – weight of sample =22.198 – 22.162
= 0.036

% of ash = $\frac{Weight\ of\ ash}{weight\ of\ sample} \times 100$

$=\frac{0.036}{5.385} \times 100$

= 0.66%

So 0.66% of cassava blanching oven dryer ash content.

Estimation of Protein

To estimate total protein content in Cassava kjeldhal method was used. But it was an indirect method to estimate total protein content from the sample. Protein content of the sample was calculated by estimating total nitrogen in the sample. By multiplying the nitrogen using the respective factor as estimated by kjeldhal method, total protein content was calculated.

Principle

Protein estimation method which follows the principle that nitrogen content multiplied by the factor 6.25 provide the value of protein.

The nitrogen estimation method was made by modified kjeldahl methods (Gopalan, 1971). In this method organic nitrogen is digested with concentrated sulfuric acid in the presence of catalyst (K2SO4:CuSO4.5H2O =98:2). This solution was converted into ammonium sulphate [(NH4)2SO4]. Ammonia (NH3) enlightened by making the solution alkaline was condensed into known volume of standard acid (H2SO4) which was then back titrated with alkali (NaOH).

$$\text{Organic-N} \xrightarrow[\text{Catalyst}]{H_2SO_4} CO_2 + H_2O + NH_4HSO_4$$

Materials/Apparatus

1. Conical flask

2. Volumetric flask

3. Condenser/ Heater

4. Weighing balance

Reagents:

1. Digestion mixture (2g $CuSO_4$+ 98g K_2SO_4)

2. H_2SO_4

3. 40% NaOH

4. 0.1 N HCL

5. Methyl red indicator

6. 0.1 N NaOH

Procedure:

Kjeldhal method consists of 3 steps. They are as follows:

1. Digestion of sample
2. Distillation
3. Titration

Digestion of sample:

0.4g of sample was taken in a foil paper or a weighing paper. The sample was poured in a digestion flask. 10 ml of H_2SO_4 was added into it. Then 2g of digestion mixture was taken into the flask. Two digestion flask was used so that average value can be taken. The flasks were then heated in a kjeldahl digestion chamber. At first temperature was 40^0C. Later temperature increased to 60^0C. 3-4hours was waited for become the Solution colorless. Then the flasks were cooled and diluted with 100ml distilled water.

Distillation:

10 ml of solution from that flask was taken to the distillation flask. 150 ml of distilled water was taken into the flask. Then 10ml of 40% NaOH was added to the distillation flask. Solution was colorless.

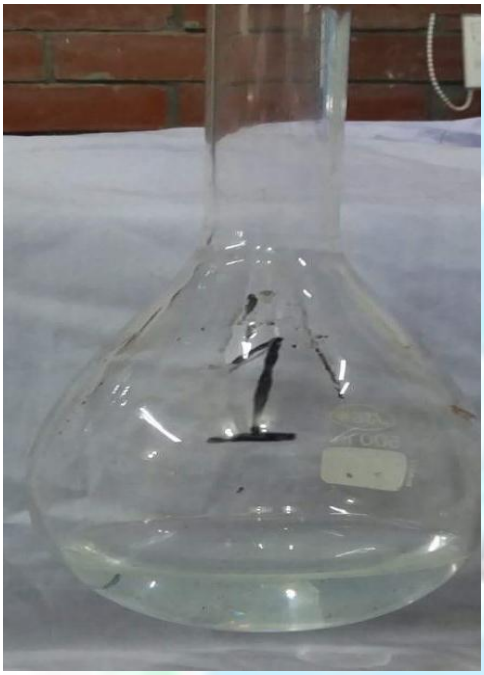


Figure: Distillation flask with colorless solution

Three distillation flasks was taken for this procedure where one of them was blank. In the 3rd distillation flask only reagents were taken and contained no sample. On the other hand 50 ml of distilled water and 10ml of 0.1N HCl was taken in a trapping conical flask. 2 drops of methyl red was taken into the trapping conical flask. The solution become pink color.

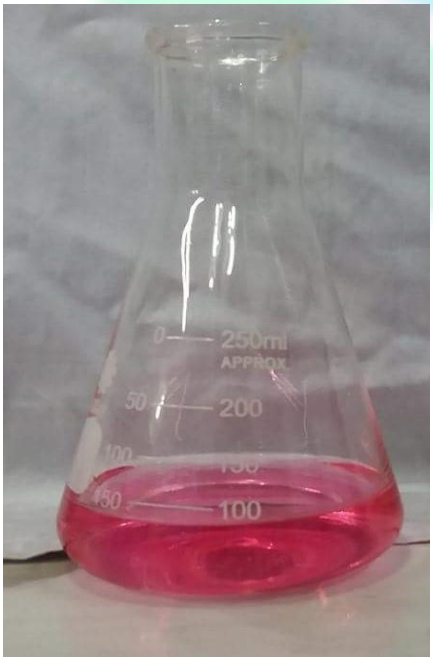


Figure: Conical flask with Pink color solution

Three trapping conical flasks were used and contained the same thing. Then condenser was run for 30 min to complete the distillation process. Then trapping conical flasks were removed and titrate with NaOH.

Titration:

For titration the burette was filled with 0.1N of NaOH. Then trapping conical flasks were set under the burette for titration. From the burette NaOH was added into trapping conical flask by drop-wise and conical flask was shaken gently. NaOH was added until color change. The end point was color change from pink to light yellow color.

Figure: End point of titration with light yellow color

Table: 3.2. Burette Reading for Titration

Content	Burette Reading		Average
	Initial	Final	
Sample-1	4.6	5.3	4.95
Sample-2	5.3	6.1	5.7
Blank	0	4.6	4.6

Calculation:

Percentage of crude protein was calculated by using the following formula

Percentage of protein: $\frac{(c-b)\times 14\times d\times 6.25\times 100}{a\times 1000}\times 100$

Where,

A= Sample weight

b= volume of NaOH required for titration for sample

c= volume of NaOH required for titration for Blank

d= normality of NaOH used for titration

6.25= the conversion factor of nitrogen to protein

14= the atomic weight of nitrogen

Here,

For Non-blanching solar dryer sample,

a= 5

b= 4

c= 5.2

d= 0.1

Percentage of protein= $\frac{(5.2-4)\times14\times0.1\times6.25\times100}{5\times1000}\times100$

= 21%

So the ratio of Non-blanching solar dryer is 21%

Here,

For Non-blanching oven dryer sample,

a= 5

b= 4

c= 5.8

d= 0.1

Percentage of protein= $\frac{(5.8-4)\times14\times0.1\times6.25\times100}{5\times1000}\times100$

= 31.5%

So the ratio of Non-blanching oven dryer is 31.5%

For blanching solar dryer sample,

a= 5

b= 4

c= 5.4

d= 0.1

Percentage of protein= $\frac{(5.4-4)\times14\times0.1\times6.25\times100}{5\times1000}\times100$

= 24.5%

So the ratio of blanching solar dryer is 24.5%

For blanching oven dryer sample,

a= 5

b= 4

c= 5.7

d= 0.1

Percentage of protein= $\frac{(5.7-4)\times14\times0.1\times6.25\times100}{5\times1000}\times100$

= 29.75%

So the ratio of blanching oven dryer is 29.75%

Estimation of Fat

Powdered form of sample is used to estimate fat by soxhlet method. n-Hexane was used with sample to extract sample.

Materials

1. Boiling flask
2. Soxhlet flask
3. Condenser/ Thermostat heater
4. Thimble
5. Weighing balance

Procedure

5 gram of pre-dried powdered sample was taken in a dried extraction thimble with porosity of rapid permitting n-Hexane. Weight of a dried boiling flask was taken. Then 200ml of nHexane was taken in a measuring cylinder. Boiling flask, Soxhlet flask and condenser were assembled properly. Sample containing thimble was placed into the soxhlet flask and nhexane was poured into it. n-Hexane was passed through the soxhlet flask to boiling flask. Then soxhlet flask was locked and set on the condenser for heating. Within 6hours all the fat was extracted.

Then soxhlet flask was removed and boiling flask was heated at 1000C for 30min. After that boiling flask was cooled and weight was taken. Fat of sample was calculated by using final weight of boiling flask and initial weight of boiling flask.

Calculation

To calculate fat content following formula was used

$$\text{Percentage of fat}=\frac{Final\ weight\ of\ flusk-previous\ weight\ of\ flusk}{weight\ of\ sample}\times 100$$

Here for solar Non blanching sample,

Weight of sample = 5.652gm

Initial weight of flask = 105.37gm

Final weight of flask = 105.823gm

% of fat=$\frac{105.823-105.37}{5} \times 100$

= 9.6%

So the ratio of fat for solar Non- blanching is 9.6%

Here

Solar Non blanching oven sample,

Weight of sample = 5gm

Thimble weight =5.752gm

Initial weight of flask = 107.75gm

Final weight of flask = 108.241gm

% of fat=$\frac{107.75-108.241}{5} \times 100$

= 9.82%

So the ratio of fat for solar non- blanching is 9.82%

Here for,

Blanching solar sample:

Weight of sample = 5gm

Thimble weight = 5.625gm

Initial weight of flask = 106.65gm

Final weight of flask = 107.11gm

% of fat = $\frac{106.65-107.11}{5} \times 100$

= 9.2%

So the ratio of fat for blanching solar sample is 9.2%

Here,

For blanching oven dryer sample:

Weight of sample = 5gm

Thimble weight = 5.621gm

Initial weight of flask = 105.75gm

Final weight of flask = 106.28gm

% of fat = $\frac{105.75-106.28}{5} \times 100$

= 10.6%

So the ratio of fat for blanching oven dryer is 10.6%

Chapter-04

Results & Discussion

Result:

Result of analysis of four cassava chips samples are tabulated in the Table 1

Table 1. Result of four samples of cassava chips

Sample	% of moisture	% of ash	% of protein	% of fat
Non- blanched solar drying sample	1.68%	1.43	21%	**9.6%**
Non blanching oven drying sample	1.1%	1.68	31.5%	9.82
Blanching oven drying sample	1.87%	1.55	29.75%	10.6
Blanching solar drying sample	2.89%	0.66	24.5%	9.2

From the above table, it can be suggested that cassava chips prepared from varying techniques showed different results in different parameters like moisture, ash, protein, and fat. Moisture contents of the four samples such as blanched- oven drying, blanched solar drying, non-blanched-oven drying, non-blanched solar drying were found as 1.87%, 2.89%, 1.1% and 1.68 %respectively. Moisture content of samples varied within the range 1.1 %- 2.89 %. Chips from non-blanched oven drying sample were of lower moisture content from other samples and it can be better sample as for finished product moisture level (1.3 %-1.5 %) is an important consideration [FDA–2013–D–0715]. Moisture content higher than 1.5 % may affect flavor, texture, and shelf life and some of these effects may be compensated by other changes, such as in packaging. Ash contents of the four samples such as blanched- oven drying, blanched solar drying, non-blanched-oven drying, non-blanched solar drying were found as 1.43%,1.68 %, 1.55% and 0.66 %respectively. Ash content of samples varied within the range 0.66 %- 1.68 %. Chips from blanched solar drying sample were of higher ash content from other samples and it can be better

sample as for finished product standard ash level is 2.55 %. Protein contents of the four samples such as blanched- oven drying, blanched solar drying, non-blanched- oven drying, non-blanched solar drying were found as 21%, 31.5 %, 29.75% and 24.5% respectively. Protein content of samples varied within the range 21-31.5%. Chips from blanched solar drying sample were of higher protein content from other samples and it can be better sample as for finished product protein level (21%-38%) is an important consideration. Fat contents of the four samples such as blanched- oven drying, blanched solar drying, non-blanched- oven drying, non-blanched solar drying were found as 9.6 %,9.82 %,10.6 % and 9.2%respectively. Fat content of samples varied within the range 9.2%- 10.6%. Chips from non-blanched solar drying sample were of lower fat content from other samples and it can be better sample as for finished product fat level (18 %) is an important consideration.

Local, English and Scientific Name of Cassava

The research was done to find out the chemical composition of Cassava in order to estimate its nutritional value.

The English name, Local name, and Scientific name of Cassava grown in Bangladesh.

English Name	Cassava
Local Name	শিমলা আলু
Scientific Name	Manihot esculenta

Proximate Composition of Cassava

Proximate Composition of cassava presented in table:

Name of content	Proximate nutrient (g/100g)
Moisture	59.4
Protein	0.7

Fat	0.2

Conclusion

Cassava is not popular as consuming raw material in processed foods in Bangladesh. It can be concluded from the present study that accept carbs cassava chips were of enough ash and protein content. In this study, Non-blanched oven drying and blanched oven drying samples contained higher amount of fat but that's the normal range. On the other hand Non-blanched oven drying and blanched oven drying contained higher amount of protein and that's the accurate range. The range of protein is (21-38). Cassava chips prepared in the study were of high minerals contents along with other nutritional value like fat, protein etc. So cassava chips can be considered for further analysis as it can be an alternative starchy snakes.

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