A COMPARATIVE STUDY ON PHYSIO CHEMICAL COMPOSITION BETWEEN MORINGA LEAF OF PHILIPPINE AND BANGLADESH -(2 TYPES) AS FUNCTIONAL FOOD INGREDIENTS

A Dissertation submitted to the Department Nutrition & Food Engineering, Daffodil International University Dhaka,
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Bachelor of Science (B.Sc.)
In
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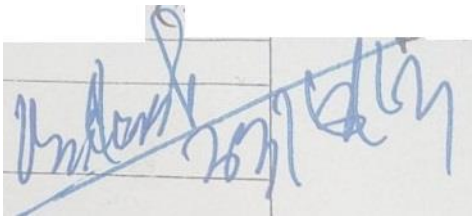
June 2019

DECLARATION

This is to certify that the thesis entitled "PHYSIO CHEMICAL COMPOSITION BETWEEN MORINGA LEAF OF PHILIPPINE AND BANGLADESH -(2 TYPES) AS FUNCTIONAL FOOD INGREDIENTS"

Submitted by Umma Hasanat Tripty has been carried out under our supervision. This is further to certify that it is our original work and suitable in partial fulfillment for the degree of Beachelor of Science (B.Sc.) in Nutrition & Food Engineering, Daffodil International University, Dhaka.



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TO

MY PARENTS

ACKNOWLEDGEMENT

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Last but not least, I would like to thank my parents for their moral encouragement.

The Author
June, 2019

ABSTRACT

Moringa rich sources of proteins, vitamins and minerals. Moringa are fast taking the place of especially with children and even with old people where nutrition is important. So I test edit for analysis nutritional value. To elucidate the results I used many biochemical methods in IFST Lab. The aim of this study was to analyze the proximate (fat, protein, moisture, ash, fiber, carbohydrate, energy, and mineral composition of Bangladeshi Moringa (12 Month and seasonally) and Philippine Moringa was collected from locally two typical analysis includes: Moisture (water) by loss of mass at 105°C, Protein by

Analysis of total nitrogen, by Kjeldahl methods, Total fat, traditionally by a solvent extraction, Crude ash (total inorganic matter) by combustion at 700C, Estimated dietary fiber by various AOA Methods, Sodium (and there by Salt) by flame photometry, Total sugars by acid digestion method, Carbohydrates and energy values are normally calculated from these analytical values.

The total energy content in was 474.8728 kcal/100g. Major macronutrient in commercial biscuits 75.8454g/100g the protein content was found in the sample (7.6531g/100g). Fat content lay in the rangeof15.6532g/100g. The major minerals detected in biscuits were sodium, followed by potassium, calcium and iron..

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TITLE

LIST OF ABBREVIATIONS

BCSIR Bangladesh Council of Scientific and Industrial Research

IFST Institute of Food Science and Technology

et al. et alii/alia = and other people

etc. etcetera = and the others

ml Milliliter

gm Gram

°C Degree Celsius

HCL Hydrochloric Acid

NaOH Sodium Hydroxide

H_2SO_4 Sulfuric Acid

AOAC Association of Official Analytical Chemists

CHAPTER ONE

INTRODUCTION

INTRODUCTION

Moringa oliefera ,this plant basically called drumstick tree.it used for centuries medicals properties and health benifits. It also has antiviral, antifungal, antidepressant, anti inflammatory properties. it contains vitamin A, vitamin B1,B2,B3 flote and ascorbic acid. Also has Na,K,Fe,Ca.it has many benefits health and benefits.Moringa seed oil helps protect

hair from free redicals. Morigan,s protein helps protecting our skin cell from damage. Moringa boost skin and hair by the hydrating and detoxifying elements. Moringa also helpful for edema.it also protect our liver from many disease. Moringa extracts contains properties that helps preventing cancer developing day by day. It contains niazimicin, this compound suppresses the development of cancer cells.it also helpful for our stomach. As like as constipation, gastric, uncreative colitis are not affect human body.Moringas vitamin B very helpful digestion. Moringa also fighting against bacterial disease.calcium and phosphorus make bones healthier.And strong.anti-inflammatory properties free from damage bones.moringa also helpful other purpose like depression anexity, and fatigue are most commonly decrease. It also keepin a big role cardiovascular system.its powerful antioxidant free from cardic damage.it also reduce appreance of scars.Moringa reduce glucose in blood and it improve hemoglomin level and it also helpful for diabetics.it also helpful lung function and breathing system.it also reduce high blood pressure.

Nowadays Moringa are becoming very popular in Bangladesh in rural as well as urban areas among all the age groups due to its several attractive features, including wider consumption, low cost among other processed foods, varied taste, easy availability and good eating quality, and relatively Long shelf life .

Generally local 12 month Moringa have –per 100 gm Energy (311.5) Protein(20.91), Fat(3.26), Carbohydrate(49.63). Total dietary fiber (10.42,) Ash (6.87), moisture(8.91) ,Na (140.154), k (1109.24) ,Fe(15.62), ca (277.43)
Generally local seasonal Moringa have –per 100 gm Energy (306), Protein(26.28), Fat(13.5), Carbohydrate (39.25). Total dietary fiber(13.5), Ash (8.47), moisture (8.3) ,Na (278.16) k (1967.81), Fe(21.57) , ca (170.41)
Generally Philipine Moringa have –per 100 gm Energy (320), Protein(8.82), Fat(8.57), Carbohydrate (36.71). Total dietary fiber(13.41), Ash (8.42), moisture (8.82) ,Na (426.52) k (1146.51), Fe(36.49) , ca (148.31)

Moringa were analyzed for proximate composition including moisture, fat, protein, fiber and ash following procedures. Moisture (by air oven method) . Crude fat (Soxhlet method) total protein (by Kjeldahl method, using digestion & distillation assembly) and total ash (by Direct method).Total carbohydrates were determined by the difference method, free fatty acid
Protein repairs the tissues and is needed for growth. The ICMR recommends 60 gm protein for men and 50 gm for women per day

CHAPTER TOW

MATERIALS AND METHODS

MATERIALS AND METHODS

2.1 Location of Experiment

The study was carried out in the laboratory of Quality Control research section, Institute of Food Science & Technology, Bangladesh Council of Scientific & Industrial Research (BCSIR), Dr. Kudrat-E-Khuda Road, Dhanmondi, Dhaka - 1205.

2.2 Materials

2.2 Materials 1.philipino Moringa leaves of DIU Agro Germ plasm center Gojeria

2. Bangladesh origin Moringa leaves,Local Sources

Figure.1: 3smple of Moringa

2.3 Design of experiment

Experiment design was done to step by step.

Where,
S1= Local Moringa (seasonal)

S2= Local Moringa (12 month)

S3 = Phillipine Moring

2.4 Moringa powder Making:

After collection of the samples, dehydration will be done into the multi head commodity solar drier NFE Lab, Ashulia.

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2.6 Methods

2.6.1 Determination of Moisture Content:

2.6.1.1 Principle

The change of weight is estimated under certain temperature. Generally, the moisture content is determined by drying a sample at an elevated temperature and reporting the loss in weight as moisture (AOAC, 2005).

2.6.1.2 Apparatus

Analytical balance, crucibles, laboratory grinder, drying oven, Desiccators

2.6.1.3 Procedure

Weight of crucible was measured and noted. 5 gm of sample was taken in the crucible. Again the weight of crucible and sample was taken and noted. Then the sample in the crucible was kept in oven at 105°C. Oven was started and continued for 5-6 hours. After heating, the dried sample was cooled to room temperature in desiccators. Then the weight of the dried sample was measured until the weight became stable.

2.6.1.4 Calculation

$$\% \text{ of moisture} = \frac{W1 - W2}{W} \times 100$$

W1= Initial Weight
W2= Final Weight
W = Weight of sample taken

2.6.2 Determination of Ash

2.6.2.1 Principle

The ash content is determined by ignition of a known weight of the food at 600°C until all carbon has been removed. The residue is the ash and is taken to represent the inorganic constituents of food (AOAC, 2005).

2.6.2.2 Apparatus

Porcelain crucible, Analytical balance, Desiccators, Muffle Furnace

2.6.2.3 Procedure

Weight of crucible was measured and noted. 5 gm of sample was taken in the crucible. Again the weight of crucible and sample was taken and noted. Then the crucible was placed on a burner and heated first over a low flame fill all the material charmed. Then the crucible was put in a Muffle furnace for 6-7 hours at 600°C. Crucible was then cooled in desiccators and weighted. To assure the completion of ashing, the crucible was again heated in the muffle furnace for

0.5 hour and weighted. This procedure was repeated until two consecutive weights were same and the ash was almost white/ grayish in color.

Procedure for mineral solution:

The ash in the crucible was taken and added 3ml of HCl. After heating until the color becomes white, the solution was taken into a 100ml volumetric flask. Di-ionised water was used to volume the solution. Thus, we got our desired mineral solution.

Determination of Sodium Potassium Iron Calcium content from ash content:

From that mineral solution we have taken 1ml to make 100times dilution. Then we used Flame Photometer to measure sodium potassium content from that mineral solution.

Figure 2.5: Flame Photometer

2.6.2.4 Calculation

$$\% \text{ of Ash} = \frac{W2 - Wc}{W} \times 100$$

Where,
Wc= Weight of the crucible
W2= Final Weight
W = Weight of sample taken

2.6.3 Determination of Protein content

2.6.3.1 Principle

Micro-Kjeldahl method is acceptable method for determining total nitrogen of crude protein in biological samples. This involves the oxidation of organic matter with sulphuric acid in presence of catalyst and then formation of ammonium salts and amines from the nitrogen components of samples (AOAC, 2005).

Figure 2.6: Protein distillation process

2.6.3.2 Reagents

Reagents used in Micro-Kjeldahl method were:

0.01 N HCL: The concentration of the final solution was checked against pure sodium bi carbonate.

0.01 N NaOH: The concentration of the final solution was checked against pure sodium bicarbonate.40% Sodium Hydroxide: 100 gm sodium hydroxide was dissolved to 250 ml of distilled water. Then the solution was stored in a bottle closed with a robber stopper.Catalyst for digestion: 2.5 gm powder selenium di oxide, 100.0 gm of K2SO4 and 20.0 gm of copper sulphate were mixed.

2.6.3.3 Procedure

0.4-0.5 gm sample was taken in a cleaned and dried digestion tube to which digestion mixture and 10 ml of concentrated sulphuric acid were added. The mixture was digested by continues heating till the mixture become clear (in "Kjeldahl nitrogen and distillation and distillation apparatus"). After digestion, solution was cooled and the volume was made to 100 ml with distilled water. Then10 ml of diluted sample and 40% NaOH were transferred in Kjeldahl distillation flask. Then the essence was collected through distillation in conical flask where 10 ml 0.1 N HCl was taken and 1-2 drop of methyl red was added. Finally, the sample was titrated by 0.1 N Na OH.

2.6.3.4 Calculation

% of protein = Difference between blank and sample titration result×1.4×6.25×strength of NaOH×10Original weight of sample

2.6.4 Determination of Fat

2.6.4.1 Principle

Fat was estimated as crude ether extract of dry material (AOAC, 2003).

2.6.4.2 Apparatus

Analytical balance, Sox let, Drying oven, conical flask, Desiccators

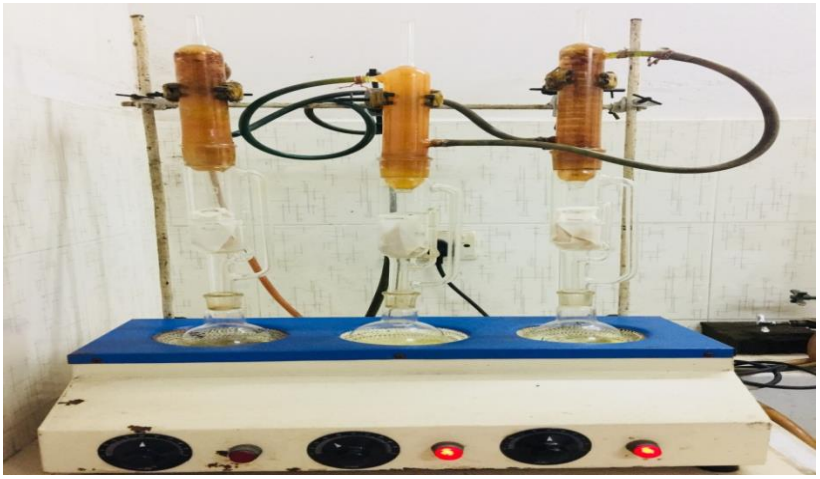

Figure 2.7: Reflux of Fat

2.6.4.3 Reagents

Petroleum ether.

2.6.4.4 Procedure

20 gm sample was taken in thimble. The sample was refluxed in a soxhlet with petroleum ether for 2 days. Then sample was distillated. Weight of a small conical flask was taken. The sample was poured into conical flask and petroleum ether was evaporated from sample with a hot plate. It was placed into an electric oven until the smell of petroleum ether was completely removed. Finally, the sample was cooled in desiccators and then weight of sample was taken.

2.6.4.5 Calculation

$$\% \text{ of Fat} = \frac{W2 - W1}{W} \times 100$$

Where,

W1= Weight of the empty container

W2= Weight of the container with fat

W= Original weight of sample

2.6.5 Determination of Crude Fiber

2.6.5.1 Principle

Crude Fiber was determined by using the official method of analysis (AOAC, 2005).

2.6.5.2 Reagents

Reagents used to determine crude fiber content were:

i. H2SO4 Solution: 13.2 ml of H2SO4 was taken in a 2-liter volumetric flask containing about 1 liter distilled water. After mixing well the volumetric flask was made to 2 liters.

ii. $NaOH$ Solution: 25 gm of NaOH was taken in a 2-liter volumetric flask containing about 1 liter distilled water. After mixing well the volumetric flask was made to 2 liters.

2.6.5.3 Procedure

About 20 gm of crushed sample was taken and the sample was made free from fat by fat extraction method. The sample was dried and transferred to a 500 ml flask.

200 ml of H2SO4 was added and refluxed for 30 minutes with occasional rotation. The content of flask was filtered and after complete digestion washed with boiling water through a liner cloth. Wash residue was transferred back to flask by spatula.

200 ml of NaOH was added and refluxed for 30 minutes with occasional rotation. Then it was filtered through the same cloth and washed with boiling water. The residue was transferred to a crucible and dried at 110°C to a constant weight. The crucible containing dried residue was transferred to a muffle furnace and burnt at 600°C for 20 minutes. Weight of burnt sample was taken.

2.6.5.4 Calculation

$$\% \text{ of crude fiber} = \frac{\text{Weight after drying at } 110^{\circ}\text{C} - \text{weight after drying at } 600^{\circ}\text{C}}{\text{Weight of sample taken}}$$

2.6.6 Determination of carbohydrate content

2.6.6.1 Principle

Carbohydrate content of sample was calculated by difference rather than direct analysis. Under this approach, the other constituents in the sample (Protein, fat, moisture, ash) were determined individually, summed and subtracted from the total weight of the sample (FAO, 1998; Pearson, 1976).

2.6.6.2 Calculation

% of carbohydrate= 100-(Moisture + Ash + Protein + Fat + Crude fiber)

2.6.7 Determination of Energy

2.6.7.1 Principle

Energy content of sample was calculated by Atwater's conversion factor rather than direct analysis. Under this approach, the other constituents in the sample (Protein, fat, carbohydrate) were determined individually, multiplied with conversion factors (AOAC, 2005).

2.6.7.2 Calculation

Energy content (Kcal) = (Carbohydrate×4+Fat×9+Protein×4)

Cooking time is very important to characterize a product like noodles. Minimum cooking time of mushroom fortified noodles is given in Table 4.3. Dried noodle strips (10cm long) of known weight were cooked in boiling water about 10 time's weight of dried noodles. First, cooking time was determined by put strips into boiling water and checked the disappearance of opaque center of the strip. The time of disappearance of opaque center was recorded as cooking time.

CHAPTER THREE

RESULTS AND DISCUSSION

Result and Discussion

Local moringa (seasonal) proximate analysis:

SL	Para meter	Local moringa
1	Moisture (%)	8.03
2	Ash (%)	8.47
3	Protein (%)	26.28
4	Fat (%)	4.92
5	Fiber (%)	13.05
6	Carbohydrate (%)	39.25
7	Energy (%)	306
8	Na	278.16
9	K	1967.81
10	Fe	21.57
11	CA	170.41

Local Moringa (12 month) proximate analysis:

SL	Para meter	Local moringa (12 Month)
1	Moisture (%)	8.91
2	Ash (%)	6.87
3	Protein (%)	20.91
4	Fat (%)	3.26
5	Fiber (%)	10.42
6	Carbohydrate (%)	49.63
7	Energy (%)	311.5
8	Na	140.154
9	K	1109.24

10	Fe	15.62
11	CA	277.83

Philippine Moringa proximate analysis:

SL	Para meter	Philippine moringa
1	Moisture (%)	8.82
2	Ash (%)	8.42
3	Protein (%)	
4	Fat (%)	8.57
5	Fiber (%)	13.41
6	Carbohydrate (%)	36.71
7	Energy (%)	320
8	Na	426.52
9	K	1146.51
10	Fe	36.49
11	CA	148.31

3.1 Proximate analysis of 3 types Moringa:

SL	Para meter	Local moringa	Local moringa (12 Month)	Philippine moringa
1	Moisture (%)	8.03	8.91	8.82
2	Ash (%)	8.47	6.87	8.42
3	Protein (%)	26.28	20.91	24.07
4	Fat (%)	4.92	3.26	8.57
5	Fiber (%)	13.05	10.42	13.41
6	Carbohydrate (%)	39.25	49.63	36.71
7	Energy (%)	306	311.5	320
8	Na	278.16	140.154	426.52
9	K	1967.81	1109.24	1146.51
10	Fe	21.57	15.62	36.49
11	CA	170.41	277.83	148.31

Proximate analysis of 3 types Moringa in Dry basis:

SL	Para meter	Local moringa Dry basis	Local moringa (12 Month) Dry basis	Philippine moringa Dry basis
1	Moisture (%)			
2	Ash (%)	9.20	7.54	9.23
3	Protien (%)	2.57	3.58	2 .39
4	Fat (%)	5.34	3.57	9.39
5	Fiber (%)	14.18	11.44	14.70
6	Carbohydrate (%)	42.71	54.49	40.29
7	Energy (%)	333	342	341
8	Na	278.16	140.154	426.52
9	K	1967.81	1109.24	1146.51
10	Fe	21.54	15.6265	36.49
11	CA	170.41	277.83	148.31

3.1.1 Moisture Content

The moisture content of Moringa per 100 gm:

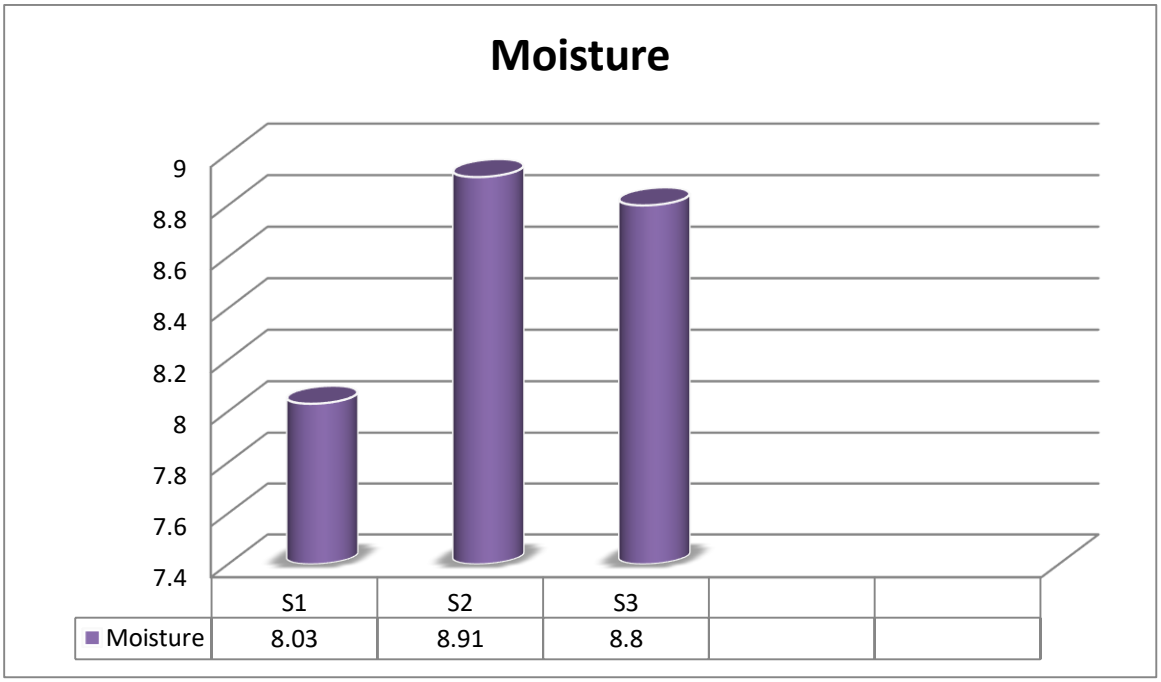

Figure 3.1: Moisture content of different Moringa

Moistur content of these Moringa on dry basis are ranked as follows:
S1<S3<S2

3.1.2 Ash content

The moisture content of Moringa per 100 gm:

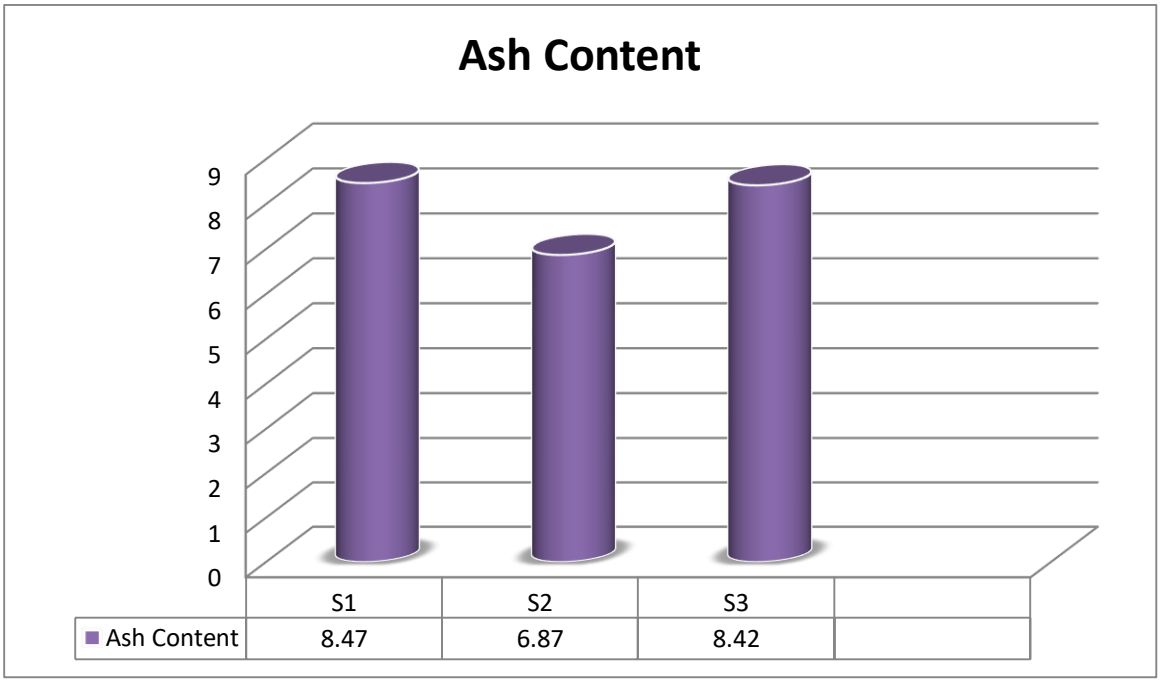

Figure 3.2: Ash content of different Moringa

Protein content of these Moringa on dry basis are ranked as follows: S1>S3>S2

3.1.3 Protein Content

The Protein content of Moringa per 100 gm:

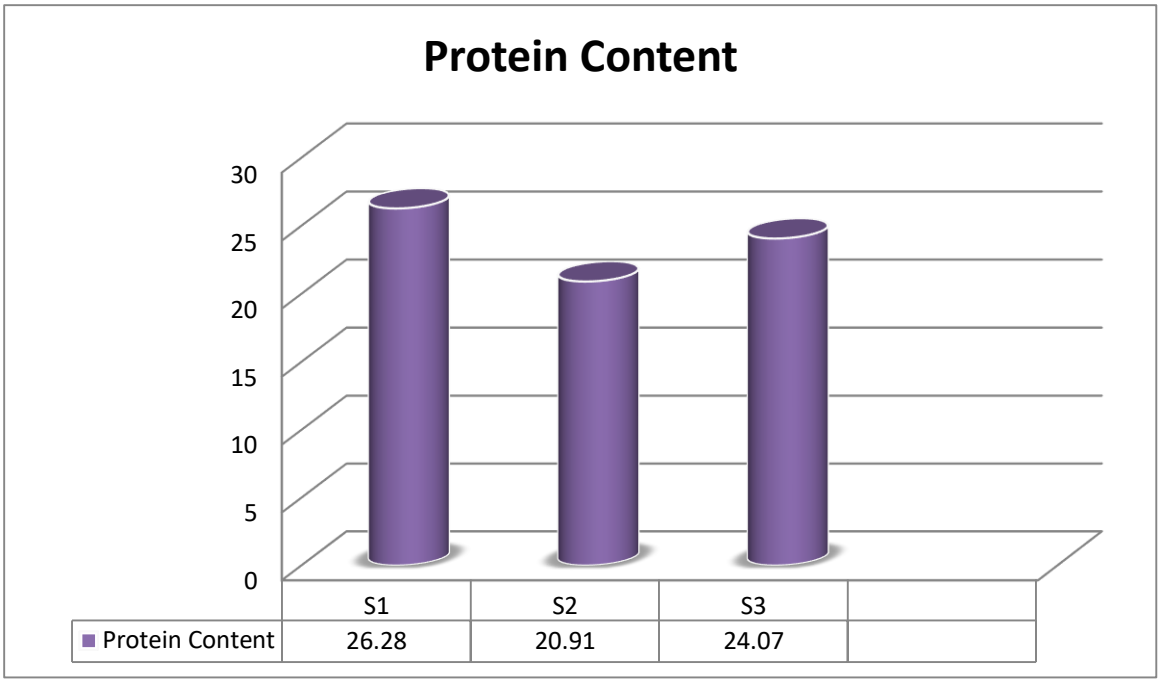

Figure 3.3: Protein content of Moringa.

Protein content of these Moringa on dry basis are ranked as follows:
S1>S3>S2

3.1.4 Fat Content

The Fat content of Moringa per 100 gm:

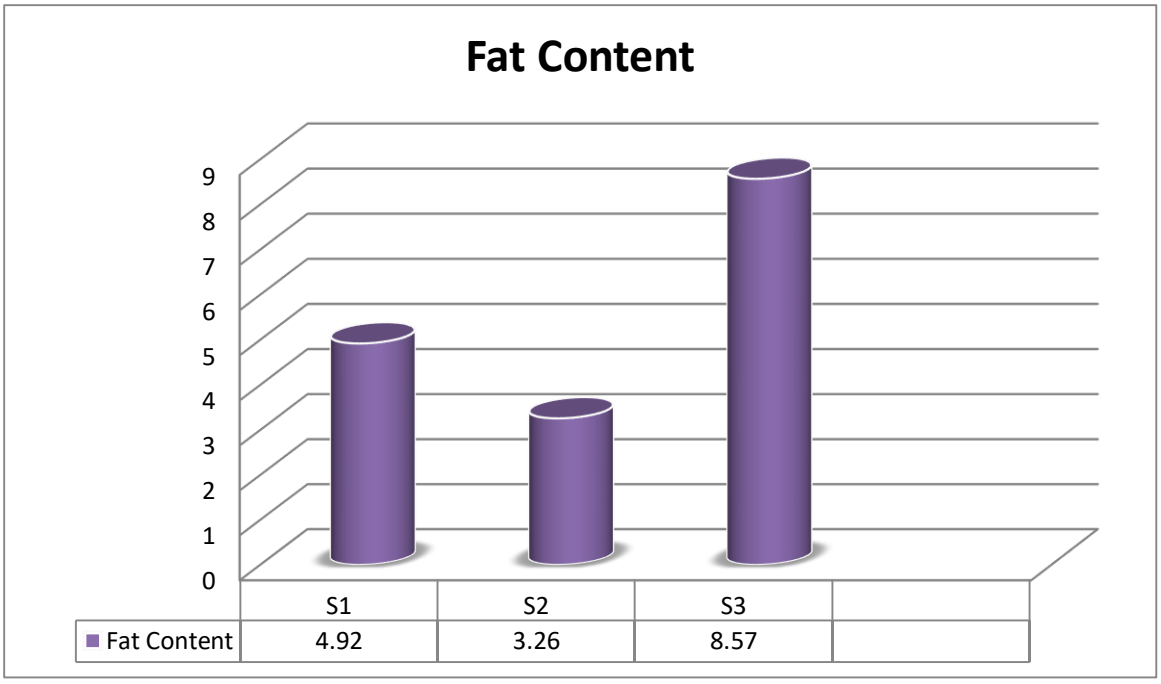

Figure 3.4: Fat content in different Moringa.

Fat content of these Moringa on dry basis are ranked as follows:

S2<S1<S3

3.1.5 Fiber Content

The Fiber content of Moringa per 100 gm:

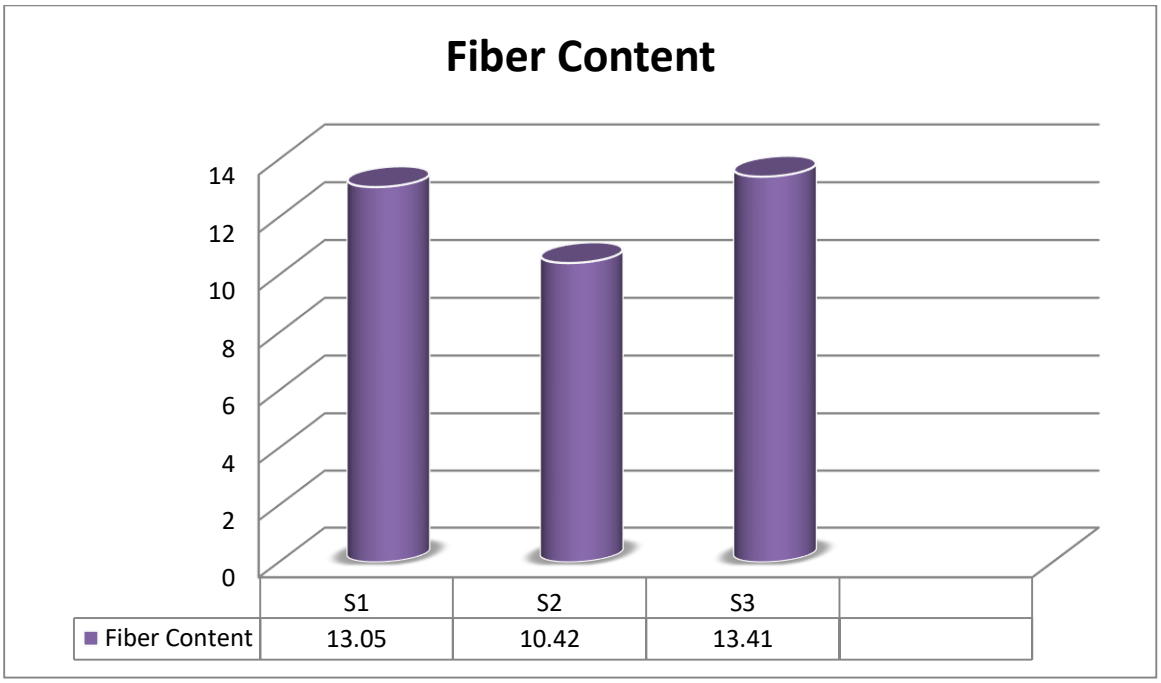

Figure 3.5: Fiber content in different Moringa.

Calcium content of these Moringa on dry basis are ranked as follows:

S2>S1>S3

3.1.6 Carbohydrate Content

The moisture content of Moringa per 100 gm:

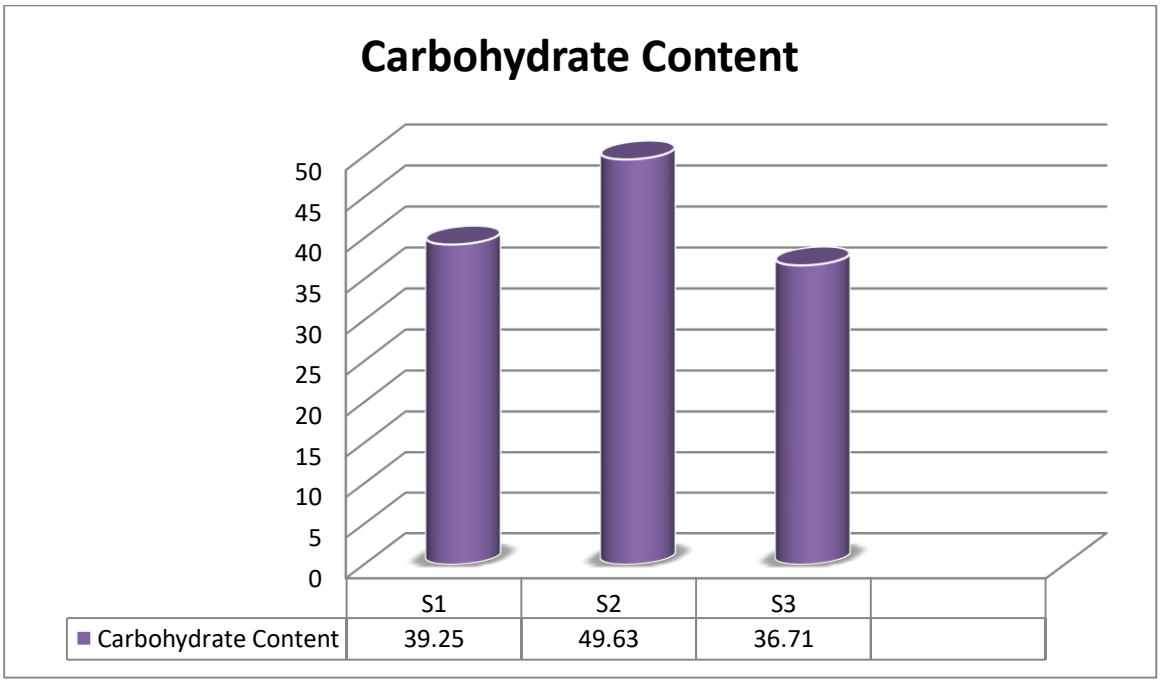

Figure 3.6: Carbohydrate content in different Moringa.

Calcium content of these Moringa on dry basis are ranked as follows:

S2>S1>S3

3.1.7 Energy Content

The Energy content of Moringa per 100 gm:

3 types of Moringa	Energy (Kcal/100gm)
S1	333
S2	342
S3	351

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3.1.8 Calcium Content

The Calcium content of Moringa per 100 gm

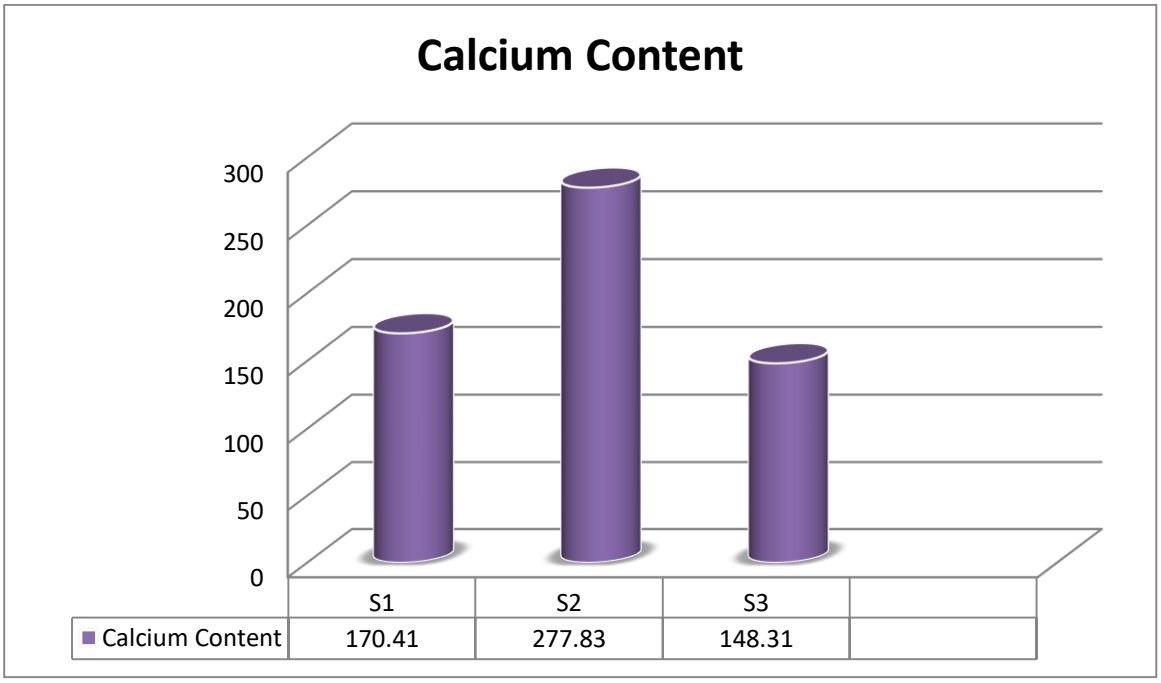

Figure 3.7: Calcium content in different Moringa

Calcium content of these Moringa on dry basis are ranked as follows:

S2>S1>S3

3.1.9 Iron Content

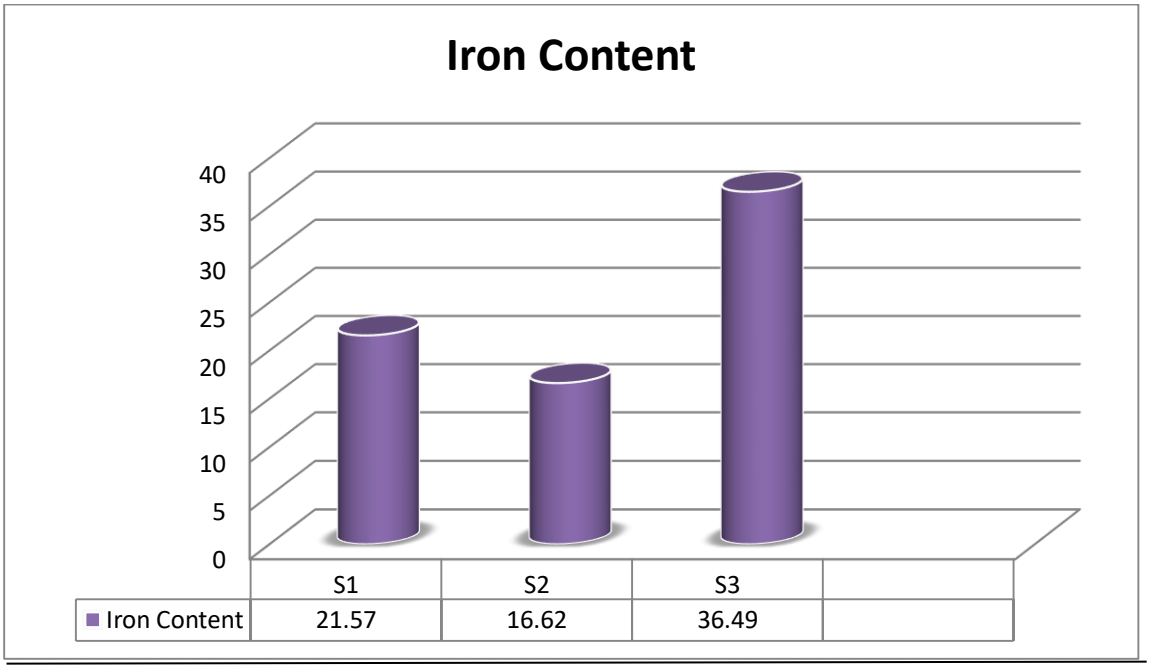

Figure 3.8: Iron content in different Moringa.

Iron content of these Moringa on dry basis are ranked as follows:

S3>S1>S2

3.1.10 Sodium Content

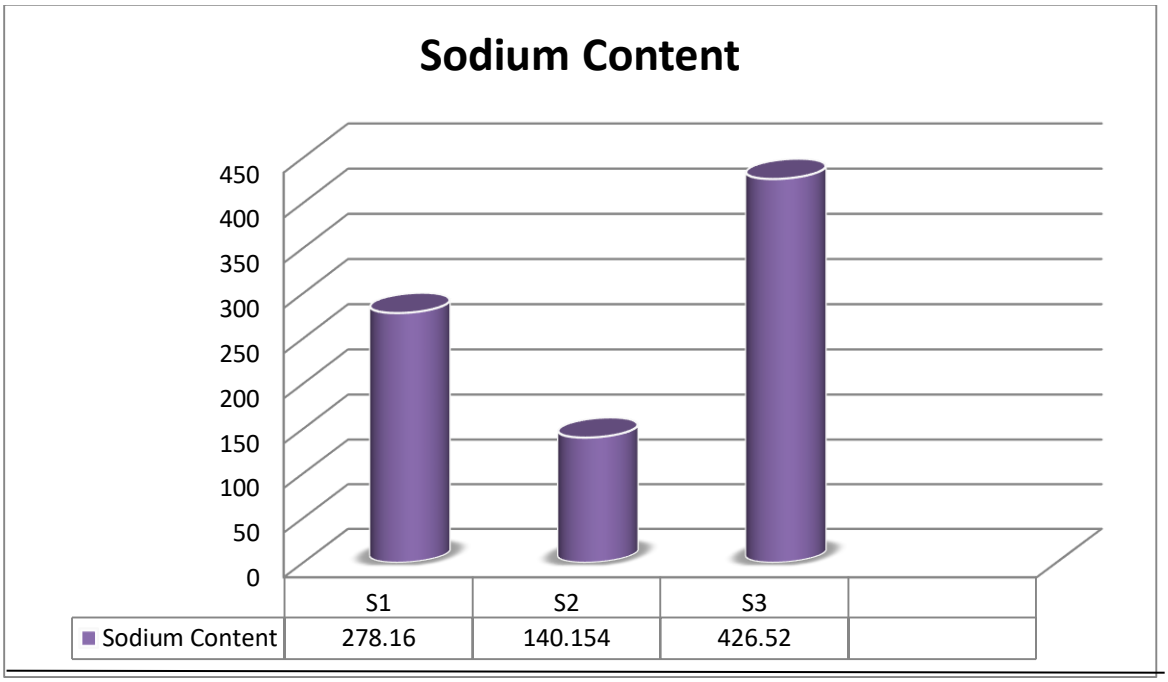

Figure 3.9: Sodium content in different Moringa

Sodium content of these Moringa on dry basis are ranked as follows:

S1>S2< S3

3.1.11 Potassium Content

The Potassium content of Moringa per 100 gm

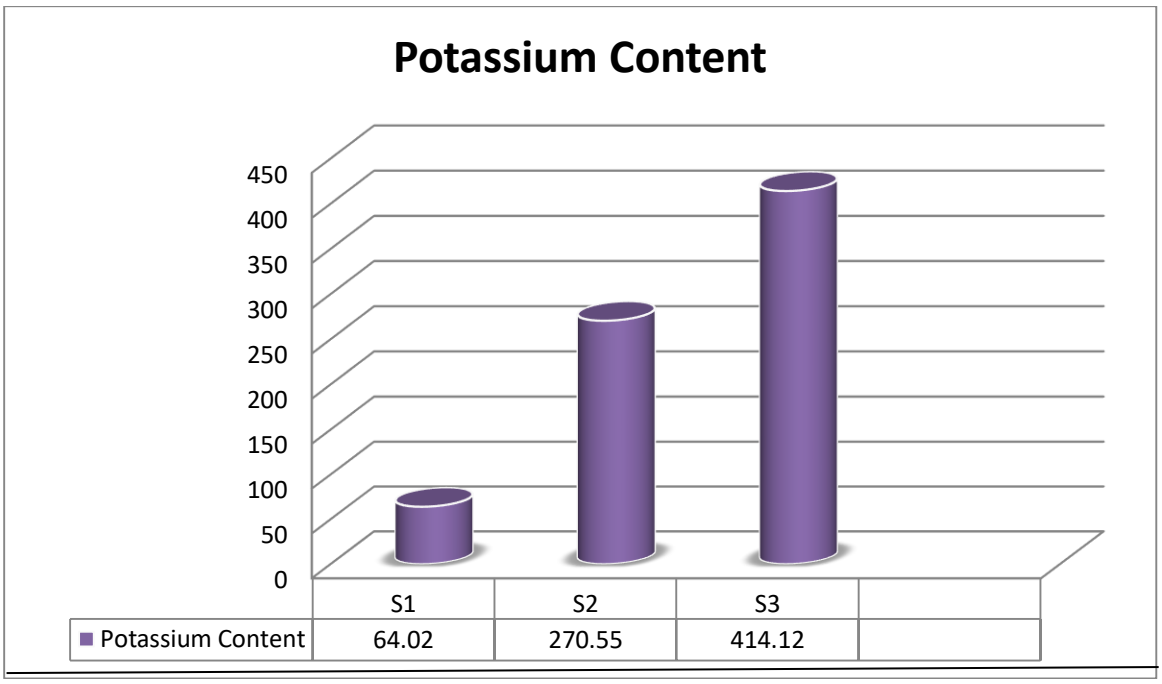

Figure 3.10: Potassium content in different Moringa.

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Potassium content of these Moringa on dry basis are ranked as follows:

S1> S2> S3

CONCLUSION

In this study traditional proximate analysis of Moringa , amon the Bangladeshin Moringa and Philippine Moringa.Protein percentage in local moringa (seasonal) and Phillipine Moringa are samu but Local Moringa (12 month are more in 100 gm sample weight.. The Ash content in 3 type Moringa Local Moringa (seasonal) are same but Local Moringa (12 month) are more. Phillipine Fat content are more than other two types Moringa.Fiber content local (seasonal Moringa) 14.18 and Local Moringa (12 Month) 11.44 and phillipine Moringa 14.70. that the result big amount of Fat in phillipine Moringa.Carbohydrate Percentage are Local Moringa (Seasonal) 42.71 Local Moringa(12 Month) 54.49 and Phillipine Moringa 40.29 so different Range of carbohydrate.Energy level 333,342,341 are mostly same. Na -278.16, 140.154, 426.52 here Philippine Moringa are more than other tow local Moringa .k 1967.81 , 1109.24 , 1146.51 here local (seasonal)moringa more than other 2 types Moringa. Fe – (21.54) ,(15.6265), (36.49) more amount of Fe are in Philippine Moringa. Ca – (170.41), (277.83), (148.31) here Local Moringa (12 month are more than other 2 types of Moringa.

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