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PROXIMATE ANALYSIS OF MORINGA OLEIFERA LEAVES PART CULTIVATED IN COLLEGE FARM, JERE BOWL, JERE, NIGERIA

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Abstract

Some edible plants and plants' part material are very good, and contain nutritional and medicinal. Food security and biosecurity management have to be a source of concerned when considering food production and its management. This research study was conducted on the evaluation of proximate analysis of Moringa oleifera Leaf Part Cultivated in College Farm, Jere Bowl, Nigeria. Materials used were of analytical g

KEYWORDS:
College Farm, Evaluation, Food and Biosecurity, Leaves Part, Moringa oleifera, Proximate analysis.

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rade and conducted under cleaned, hygienic environment. Standard operation procedures thoroughly followed. The method being applied were the methods described by Gwana et al., (2014); Ayoola et al., (2012); AOA C, (1990). The analyses were done in triplicate and the parameters were given percentage. The results obtained revealed that, the moisture content was 7.43 %, ash content (9.73 %), fat content (3 .9 %), protein content (28.06 %), crude fibre content (11.83 %), carbohydrate content (37.8 %) and dry matter was 92.57 % respectively. There are the needs to carry out intensive research on the all parts of the Moringa oleifera plant including the roots, leaves, stems, stem barks, flowers and seeds in order to evaluate the nutritive and non-nutritive compositions of the plant.

INTRODUCTION

Moringa plant (drumstick or horseradish tree) is a tropical multipurpose tree that said to be native to, originated and naturally grows well in India, Sub – Saharan Africa, south Asia and South America and other part of the world (Gwana *et al*., 2021; Vinoth *et al*., 2012; Oluduro and Aderiye, 2009; Fahey, 2005). The plant commonly called 'Miracle plant or Horseradish' belong to a Monogerie family of shrubs and trees, and considered to have originated from North – west of India. The plant *Moringa* is a plant that is highly demand for its nutritional and medicinal, which is the most widely in the Monringaceae family and cultivated for its nutrients and medicinal purposes, all parts of the Moringa tree are edible and have long been consumed by human-being and animals, for example, the leaves of *Moringa* plant are eaten in African countries, such as Nigeria, Ghana, Ethiopia, East Africa and Malawi, etc. (Gwana *et al*., 2016; Choudhury and Sinha, 2015; Okafor *et al*., 2014; Olson, 1999).

The plant, scientific name is *Moringa oleifera (M. oleifera),* is commonly called in Nigeria as drumstick or horseradish or miracle tree or wonderful tree in English, while locally called *Zogale* in Hausa and *Allam* in Kanuri, Galagangi in Fulani, Kabe or Tsahausa in Margi, Eweigbale in Yoruba, Hallum in Babur - Bura and Okweoyibo in Igbo languages, few to be mentioned (Gwana *et al*., 2021; Idris *et al*., 2020; Gwana *et al*., 2016). It is the only genus

of the family of Moringaceae related to Brassicaceae, comprises of 13 to 14 species of which eight are endemic to the horn of Africa. Among the eight, three of genus Moringa species are; *Moringa oleifera* which is closely related to *Moringa concanensis* (found mostly in India) and *Moringa peregrine.* These three species share a slender tree habit and the zygomorphic flowers (Gwana *et al*., 2022; Kosolo *et al*., 2010; Farombi, 2000). The plant 'Miracle plant' belong to the; Kingdom: Plantae, they are unranked: Angiosperm and are Eudicots, Order: Brassicales, Family: Moringaceae, Genus: Moringa, and Specie: oleifera. Thus the terms; *Moringa oleifera* (*Moringa oleifera*) (Kadashi, 2008; FAO / UN, 2006; Farooq and Bhanger, 2003; Booth and Wicker, 1988).

M. oleifera plant share a slender tree habit and the zygomorphic flowers, growth and development; germination rate for fresh seeds are around 80 % going down to about 50 % after 12 months of storage, but do not survive after 2 years of storage. Initially, the tree grows at a remarkable rate of 3 – 4 m a year. Young trees raised from seed start flowering after 2 years. Trees grown from cutting the first fruit may be expected from 6 – 12 months after planting, flowering often proceed but coincides with the formation of new leaves formation. In Nigeria, flowering occurs throughout the year (Azuonwu *et al*., 2016; Kosolo *et al*., 2010; FAO / UN, 2006; Farooq and Bhanger, 2003).

The plant *M. oleifera* is a deciduous to semi – evergreen shrub or small tree with a length from 1 – 10 m tall, and the trunk is up to 25 cm in diameter. The bark of the tree is whitish grey or pale bluff, smooth, corky and the young shoots are purplish or greenish white. The leaves of *M. oleifera* are alternate; 6.0 – 6.5 cm long, leaflets are elliptical to obviate, 0.5 – 3 cm x 0.3- 1.3 cm^2, rounded to cone at base, apex rounded and flowered panicle of 8 – 30 cm long. The flowers of plant are bisexual, zygomorphic, 5 numerous sepals free, 7 – 14 mm long, often unequal petals free, oblong – spatulate, 1 – 2 cm long, unequal, the largest erect, velvety pubescent, white or cream; stamen are 5, filaments are 7 – 8 cm long, anthers are waxy yellow in colour, fruits are 10 – 50 cm long with 9 ribbed, brown when ripe, many seeded. Seed globes are 1.0 – 1.5 cm in diameter with 3 thin wings of 0.5 – 2.5 cm long

respectively (Yameogo *et al*., 2011; Kosolo *et al*., 2010; Farooq and Bhanger, 2003; Farombi, 2000).

The plant *M. oleifera* is a plant that is highly demand for its nutritional and medicinal, which is the most widely in the Monringaceae family and cultivated for its nutrients and medicinal purposes, all parts of the Moringa tree are edible and have long been consumed by human-being and animals, for example, the leaves of *M. oleifera* are eaten in African countries, such Nigeria, Ghana, Ethiopia, East Africa and Malawi, etc (Gwana *et al*., 2016; Choudhury and Sinha, 2015; Okafor *et al*., 2014; Olson, 1999). It has an impressive range medicinal uses with high nutritional value. Different part of the plant contained a profile of important minerals and are good sources of protein, vitamins (e.g. β - carotene) and amino acids. Nutritionally, the leaves have been found to be a valuable source of both macro and micronutrients, such as calcium and potassium. The plant, Moringa tree provides a rich and rare combination of the zeatin, quercetin, β - sitosterol, caffeonylquinic acid and kaempferol. In addition to its compelling water purifying powers and high nutritional value which also contain high content of highly digestible protein, carotenoids, minerals and vitamin especially vitamin C. Hence it can be used as an ideal nutritional supplement which have been used to combat malnutrition, especially among infants and nursing mothers. *M. oleifera* is very important for its medicinal value as well (Okiki *et al*., 2015; Oluduro and Aderiye, 2009; Farooq *et al*., 2006; Fletcher, 1998). This plant is used in the preparation of cosmetics, mechanical lubricant, and biofuel production. It has many potential uses both in agricultural and industrial (Siddhuraju and Becker, 2003). The leaves are completely safe for consumption and have no known negative side effects or toxic element (Siddhuraju and Becker, 2003; Bhauger and Anwar, 2003).

When considering food security and biosecurity in the issues balance food production and health management is paramount. The cost of balance food that is rich in balance nutritional composition has becoming scarce and vital problems nowadays and not affordable by the most communities. As such *M. oleifera* leaves has being established that contains some nutrients that maintain the body metabolism and regulate osmoregulation in both man and animal wellbeing. All the plant parts are consuming for mineral as part

of nutrient, as food and its very available at all seasons and this solves the problems concerned. The aims and objectives of this study to evaluate some of the nutritional (proximate analysis) content of *M. oleifera* leaf part of the plant that are obtained from college farm.

METHODOLOGY

Study area

Jere Bowl is situated below 305 m above sea level, north of Maiduguri (Nyanganji, 2002). It is located between latitude 110° 48' – 110° 58' N and longitude 130° 06' – 130° 20' E in the Sudan – savannah transition zone. Jere Bowl covers an area of about 22,000 ha, out of which a gross area of 15,850 ha was identified as suitable for irrigated agriculture (Jibirin, 2010). Jere bowl fall within Jere LGA and it shares boundaries with some local government areas; to the northeast shares border with Nganzai and Mafa, while to the north-west and south-east shares border with Maiduguri and Konduga. The study area was selected based on its proximity, accessibility, relevance of the study and familiarity with the environment. Intensive irrigation activities take place all year round at the banks of the river (Musa *et al*., 2019; Gwana *et al*., 2013).

Materials

Materials

All materials used in this research study were of highly grade and hygienically cleaned. The following standard apparatus were required and used in cause of this scientific research study. Apparatus such as protective wears, plastic tray, plastic bucket, plastic knifes, plastic spatula, clean and sterile white cloth, sterile absorbable cotton wool, plastic sieves, crucible dish, reagent bottles (various types), measuring cylinder (25 ml, 50 ml, 100 ml, 250 ml, 500mland 1000 ml), volumetric flask (25 ml, 50 ml, 100 ml, 250 ml, 500mland 1000 ml), largemouth brown bottles, sample polythene bags, Whatman filter paper (No.1), hot air oven, muffle furnace, weighing balance and analytical balance.

Reagents

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Reagents used in this research study were of analytical grade in terms of quality, and standard operation procedures (SOP) were absolutely being observed in cause of this scientific research study. Reagents such as hydrogen hypochlorite bleaching solution (H_2Cl_2), Kheldahl tablets (HCl and KOH of known molarity and concentration), AOAC standard reagents, tap water, distilled water and deionised water.

Methods

All reagents and apparatus used in the course carrying out the research study are of analytical grade and conducted under cleaned and hygienic environment. Standard operation procedures thoroughly followed. The method used in this research study were as that of the methods applied by Gwana *et al*., (2021) and the methods described by AOAC, (1990).

Sampling and Sample Collection

Procedures: - At about 6.30 AM, in the early morning hours, the sample of leaves part of the plant of *Moringa specie* was collected and obtained by purchasing from the farmers directly, by plugging the stalk of leaves compound on the main plant, from the *Moringa* plantation of the College Farm, Mohamet Lawan College of Agriculture, Maiduguri. The fresh-green leaves part sample of *Moringa specie* that was collected packed in polythene bags and was transported Laboratory Unit, Department of Animal Health and Production Technology, Mohamet Lawan College of Agriculture. Maiduguri, Nigeria. The sample was unpacked and placed on a plastic mat on top of examination table. A little out of the whole sampled were collected into a polythene bag and was taken to the Department of Forestry Technology, of the same Institute for the identification and authentication of the plant part sample.

Authentication and Identification of the Leaves Part of *Moringa specie*

The age of the plant was said to be 7 years old as the time of carrying out this study. The leaves part of plant was identified and authenticated as the leaves part of *Moringa oleifera* by Abubakar Aliyu of department of Forestry Technology, MOLCA, Maiduguri. The leaves part of the *M. oleifera (M.*

oleifera) were given authentication and identification with reference to the herbarium sheets (Voucher Number: *MOL-0028-20*). It was then kept, Stored and placed at Herbarium of the Department of Forestry Technology, Mohamet Lawan College of Agriculture, Maiduguri. The name of the plant, plant part, time, date and the year in which it was plugged written on the container as or for feature reference.

Natural Dehydration of the Leaves Part Sample

Procedures: - In laboratory, the sample was placed on to the table, and the leaves were destalked from the compound part. It was collected and transferred in to large plastic bowl, washed with tap water several times in order to remove any dust and insects waste (if any). Then rinsed with distilled water and later with deionised water, drained and dried in order to remove any traces of water. This was done in order to avoid the contamination of the leaves sample with any element if present. The drained and dried leaves sample was weighed on digital weighing machine for three times, the mean weight was taken and recorded. It was then spread on the polythene mat, air dried under average room temperature (22 ^{O}C – 32 ^{O}C) to a constant weight and to remove its moisture for 14 days, as described in the methods applied by Gwana *et al.,* (2021); Idris *et al.*, (2020); Gwana *et al*., (2016); Bamishaiye *el al*., (2011). The dried plant material (leaves part of *M. oleifera*) was collected and packed into plastic container and was ready for next processing as described in the methods applied by Gwana *et al.*, (2021).

Pulverization of leaves parts of *M. oleifera*

Procedures: - The dried leaves sample (dried plant part sample) was placed in to mortar and blended in to fine powder with pestle for 15 minutes, in order to have a powder of leaves plant part of *M. oleifera*. The *M. oleifera* leaves powder (MOLP) obtained was transferred in to large mouth plastic containers, screwed cap to cover. The containers containing the MOLP were labelled with following information; name and type of plant, plant part material, nature, and date with time, and person who prepared it were recorded. It was stored in cool and dry environment, away from light, and

placed on the shelve for further usage as described in the methods applied by Gwana *et al.,* (2021); Idris *et al.*, (2020). The fine powder was then used in the analysis.

Proximate Analysis of Sample of leaves parts of *M. oleifera*

Proximate analysis was conducted on the powdered *Moringa oleifera* leaves to determine the parameters; The presence of moisture content was determined by subtracting the weight of dried sample from the weight of sample before drying, the percentage of moisture was determined by drying the leaf sample at 105 ^{O}C in an oven, the ash content was determined by igniting the leaf sample at 550 ^{O}C in muffle furnace for 6 hours. The fat content extraction was determined by Soxhlet extraction techniques with methyl – ether, the protein content was determined by the Kheldahl techniques (using catalyst – Kheldahl tablets), the crude fibre content estimation was determined by the acid – alkaline digestion methods as described in the methods of AOAC (1990).

The carbohydrate content was determined by estimating difference, subtracting from the sum of water or moisture content, ash content, fat content, protein content and crude fibre percentage from 100 as described by Ayoola *et al*., (2012); and by using standard analytical method as described by the official method of AOAC (1990).

Determination Moisture Content

The moisture content was determined by subtracting the weight of dried leaf sample from the weight of leaf sample before drying as described by Ayoola *et al*., (2012).

Mathematically expression was as followed;

Moisture = weight of sample before drying – weight of dried sample.

Determination Percentage Moisture Content

Drying the leaf sample at 105 ^{O}C in an oven, and weight of the dried sample was taken. The percentage of moisture was determined by 1 multiply by 100 and divide by the weight of the dried sample as described by Ayoola *et al*., (2012).

Mathematically expression was as followed;

$$\% \text{ moisture} = 1 \left(\frac{\text{moisture}}{\text{Weight of sample}} \times 100\right)$$

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Determination of Ash Content

The ash content was determined by igniting the leaf sample at 550 ^{O}C in muffle furnace for 6 hours as described by Ayoola *et al*., (2012).

Mathematically expression was as followed;

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

Determination of Fat Content Extraction

The fat content extraction was determined by Soxhlet extraction techniques with methyl – ether as described by Ayoola *et al*., (2012).

Determination of Protein Content

The protein content was determined by the Kheldahl – Nitrogen techniques (using catalyst – Kheldahl tablets) as described in the methods of AOAC (1990).

Mathematically expression was as followed;

$$\% \text{ Nitrogen} = 100 \times \frac{V_2 - V_1 \times ca \times 0.014 \times 100}{\text{Weight of sample} \times 10 \text{ (ml of sample)}}$$

Where;

V_1 = Initial volume,

V_2 = Final volume,

The molecular weight of Nitrogen is 0.014 x 100. (14.007)

Determination of Crude Fibre Content

The crude fibre content estimation was determined by the acid – alkaline digestion methods as described in the methods of AOAC (1990).

Mathematically expression was as followed;

$$\% \text{ Crude fibre} = \text{weight of sample} - \frac{(\text{weight of sample} + \text{weight of crucible})}{\text{Weight of leaf sample}} \times 100$$

Determination of Carbohydrate Content

The carbohydrate content was determined by estimating difference (subtracting) from the sum of water or moisture content, ash content, fat

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content, protein content and crude fibre percentage from 100 as described by Ayoola *et al*., (2012) and by using standard analytical method as described by the official method of AOAC (1990).
Mathematically expression was as followed;
% Carbohydrate content = 100 – content of (moisture + ash + fat + protein +crude fibre).

Data Analysis

Data obtained from this research study was subjected to statistical tools of analysis using mean for the measurement of central tendency, standard deviation for measurement of dispersion and or discrepancy within the variables being obtained and its' significance, as in method described by Stroud and Booth, (2001).

RESULTS

The results obtained from proximate analysis of the powdered *M. oleifera* leaves was been conducted and determined in triplicate. The parameters observed were moisture content, percentage of moisture content, ash content, fat content, protein content, crude fibre content and carbohydrate content and dry matter and the unit of measurement used was in percentage: -

Table 1 showed the mean results of the proximate analysis of the powdered *M. oleifera* leaves compositions determined. The results obtained from the analysis of the parameters were in mean percentage as followed; moisture content was 7.43 ± 0.61, ash content (9.73 ± 0.15), fat content (3.9 ± 0.3), protein content (28.06 ± 0.21), crude fibre content (11.83 ± 0.15), carbohydrate content (37.8 ± 0.3) and dry matter was 92.57 ± 0.5 respectively.

TABLE 1: Proximate Analysis of Powdered *M. oleifera* Leaves

Parameter Evaluate	Number of Test	Readings in Percentage			Mean ± SD
		1st	2nd	3rd	
Moisture content	x 3	6.9	8.1	7.3	7.43 ± 0.61

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Ash content	x 3	9.7	9.6	9.9	9.73 ± 0.15
Fat content	x 3	3.7	3.9	4.1	3.9 ± 0.3
Protein content	x 3	27.9	28.0	28.3	28.06 ± 0.21
Crude fibre content	x 3	11.7	12.0	11.8	11.83 ± 0.15
Carbohydrate content	x 3	37.0	37.8	38.1	37.8 ± 0.3
Dry matter	x 3	92.57	91.98	92.49	92.68 ± 0.32

Keys: ± = plus or minus (equal or less than or greater), SD = Standard Deviation, x3 = Times th

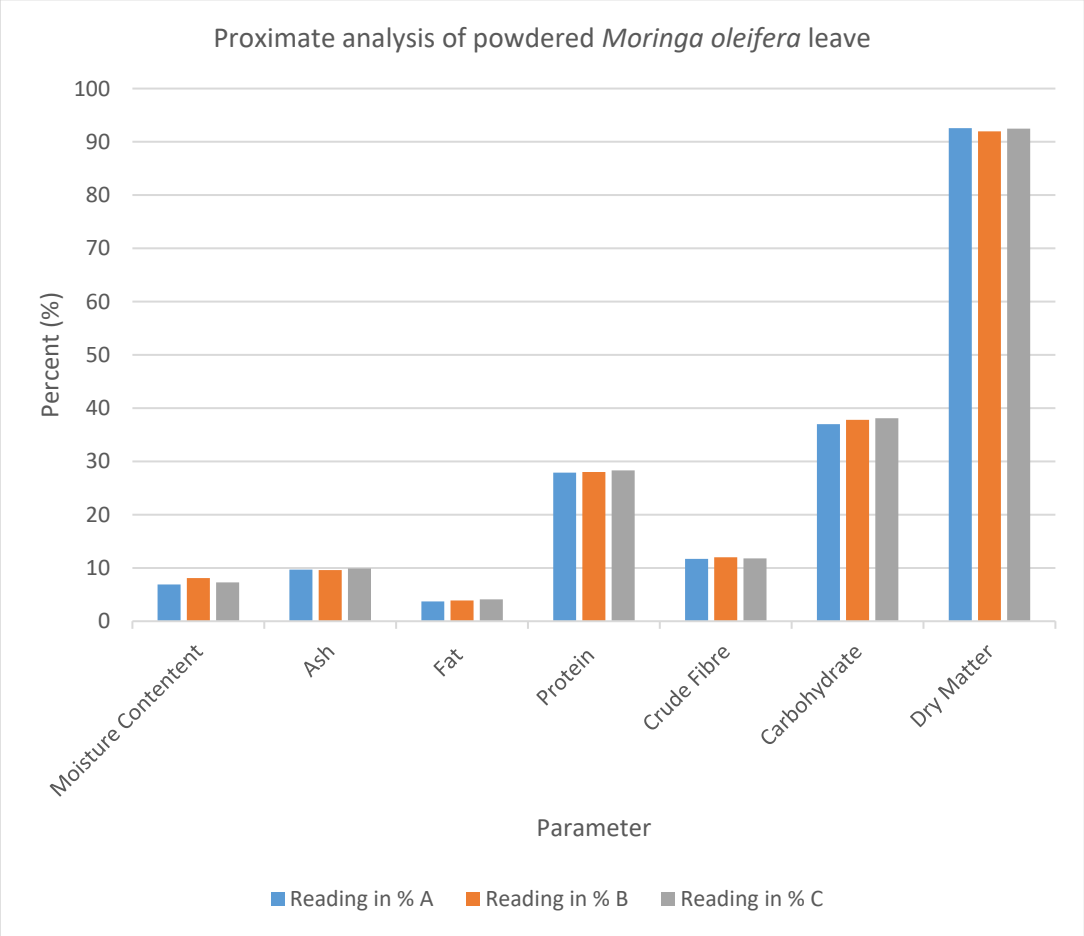

Figure 1: Proximate Analysis of Powdered *Moringa oleifera* Leaves cultivated in Jere, Borno, Nigeria

DISCUSSION

Food security and biosecurity managements measures have to be a source of concerned in food production and technological aspects. According to Idris *et al*., 2020; Gwana *et al*., (2016); and Kosolo *et a*l., (2010) who stated

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that quality and large scale food production and health management are paramount issues to be born in mind and should be highly emphasised for the wellbeing of human and animal needs. Previous research studies have been reported that some plants are edible to both human and some animals, because of their possession of rich nutrient and medicinal properties. Okiki *et al*., (2015) and Fahey, (2005) also stated that in the last few years, the plant *Moringa oleifera* has been in the limelight of research and many researchers have reported that it is a potential source of outstanding and highly digestible protein, mineral (both micro and micro), vitamin C and carotenoids suitable for exploitation in many of the developing countries globally, where undernourishment is a major concern; basically for its nutritional, prophylactic, and therapeutic potentials which has been reported in various experimental studies in humans and animals although in limited number.

Plants that their various plants' parts possess rich nutrient and medicinal properties especially, the leaf part of *M. species*. That the reason the proximate–analysis of the powdered *M. oleifera* leaves was been conducted and determined, its' the nutritional composition potentials was assessed in this research study. The parameters being observed were moisture content, percentage of moisture content, ash content, fat content, protein content, crude fibre content and carbohydrate content and dry matter and the unit of measurement used was in percentage.

The moisture content of *M. oleifera* leaf mean value was found to be 7.43 % (approximately 7 %) and the composition of the dry matter mean value was found to be 92.68 % (93 %), and is within the expected range values. The low moisture content of the leaves will reduce the possibility of susceptible to microbial spoilage during storage. This result that was obtained in this research study support the works of most authors especially, Okiki et al., (2015), who stated that high moisture contents in leaves make them highly perishable and susceptible to microbial spoilage during storage. The results are also in conformity with works of Bamishaiye *et al*., (2011) and Adeyeye and Ayejuyo, (1994) who stated that the low moisture content of the leaves would hinder the growth of micro-organisms and the storage life would be high.

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In another finding in this scientific research study, ash content of *M. oleifera* leaf mean value was found to be 9.73 % (approximately 10 %). This result of the analysis revealed that the ash content mean value of *M. oleifera* leaf is relatively lower than some other leafy vegetable plants when compared. This values that are been obtained support the work of Valdez-Solana *et al*., (2015) and Okiki *et al*., (2015) who stated that the ash value obtained in this study suggests that the *M. oleifera* are a good source of inorganic minerals. Also Akpabio *et al*., (2012) stated that high ash content in food is a measure of high deposit of mineral contents. The result obtained in this study is in conformity with the works of Bamishaiye *et al*., (2011) and that of Akindahunsi and Salawu, (2005) who both stated that the ash content of the leaves are lower than that of some leafy vegetables commonly consumed in Nigeria such as *Talinum triangulare* (20.05 %), *Acaypha marginata* (15 68 %), but they compare favourable with some other vegetables such as *Occimum graticimim I(8.0 %)* and *Hibiscus esculentus* (8.0 %).

Considering the fat content of *M. oleifera* leaf in this study, the mean value was found to be 3.9 %, almost approximately 4 %. The result that were obtained from the analysis of *M. oleifera* leaf revealed a lesser amount of plant fat content when compared to leafy vegetables such as *Amaranthus hybridus* which has about 4.8 % of plant fat content. The result obtained from this study is conformity with the works of Bamishaiye *et al*., (2011), Anwar and Rashid (2007)who both stated that the moderate amount of fat at each stage of maturity indicates that the vegetable is not a source of lipid accumulation which can cause arteriosclerosis, aging.

In addition, the mean value of the protein content was found to be 28.06, %, almost approximately 28%. From this research study, it revealed that there is a high plant protein content in *M. oleifera* leaf. This has been reported by many researchers in the related fields. Abbas and Ahmed, (2012) reported that the high protein and the low fat contents are the characteristic of *M. oleifera*. These result that were obtained from the analysis of *M. oleifera* leaf in this research work are similar to the work of Bamishaiye *et al*., (2011); Oduro *et al*., (2008); and Baker, (2009) report that the protein value obtained from *M. oleifera* leaf sampled suggest that are proteins of good

quality and as such are suitable for animal feeds and human diet and can effectively contribute to the daily protein needed.

In another development, the mean value of the crude fibre content in *M. oleifera* leaf was found to be 11.83 % in this evaluation. This value obtained in *M. oleifera* leaf is higher in crude fibre content than some leafy vegetables such as *Caidoscolus chayamansu* (0.92 %) and *Solanium nodiflorum,* just few to be mentioned.

The among the components nutrient analysed, carbohydrate in *Moringa oleifera* leaf powder had the highest mean value of 37.8 % (38 % approximately). This indicated that the leaves of *Moringa oleifera* has higher carbohydrate content when compared to other components of the leaf and those from other plants leaves. This finding is in conformity with the work of Azuonwu *et al*., (2016); Okiki *et al*., (2015) and Compaore *et al*., (2011) who both stated that the carbohydrate content of *Moringa oleifera* is high compared to that reported by some authors and suggests that it could be a good source supplement as well as a source of energy and structural materials. Eze and Ernest, (2014) stated that generally, carbohydrates add to the bulk of the diets, they play a pivotal role as they provide energy to cells such as brain, muscles and blood, and they contribute to fat metabolism and laxative for human beings.

Conclusion

Food security and biosecurity management have to be a source of concerned in food production and its management. Plants that their various parts possess rich nutrient and medicinal properties especially, the leaf part of *M. species,* necessitate the evaluations of the proximate composition analysis of the powdered *M. oleifera* leaves which has been conducted and determined under good hygienically cleaned environment, in Jere Bowl, north of Maiduguri. All materials and reagents used in this research study were of analytical grade in terms of quality, and standard operation procedures (SOP) were absolutely being observed. The parameters observed were;

The moisture content of *M. oleifera* leaf mean value was found

approximately 7 % and the composition of the dry matter mean value was 93 %, and is within the expected range values and the low moisture content of the leaves will reduce the possibility of susceptible to microbial spoilage during storage. The ash content mean value was 10 %. This result revealed that the ash content of is relatively lower than some other leafy vegetable plants when compared. The fat content the mean value of *M. oleifera* leaf in this study, was found to be 4 %, which revealed a lesser amount of plant fat content when compared to leafy vegetables such as *Amaranthus hybridus* which has about 4.8 % of plant fat content. The protein content was found to be 28%, and revealed that there is a high plant protein content in *M. oleifera* leaf, and has been reported by many researchers in the related fields. The crude fibre content in was found to be 12 % in this evaluation, revealed a higher in crude fibre content than some leafy vegetables. Carbohydrate in *Moringa oleifera* leaf powder had the highest mean value of 38 % approximately. This indicated that the leaves of *Moringa oleifera* has higher carbohydrate content when compared to other components of the leaf and those from other plants leaves. Conclusively, *M. oleifera* leaf is rich nutrients, it contained higher amount of dry matter, carbohydrates, protein, crude fibre and ash content, but lesser amount of moisture and plant fat.

Recommendations

Based on the findings of this research study, we recommend the followings:
- That there are the needs to carry out research on the proximate analysis of all parts of the plant *Moringa oleifera*, including the roots, leaves, stems, stem barks, flowers and seeds in order to evaluate the nutritive compositions of the plant. That peoples should always consume the leaves part of *M. oleifera* in form of soup or it salad. It has a low fat content, high and plant protein content and suggest that are proteins of good quality and as such are suitable for animal feeds and human diet and can effectively contribute to the daily protein needed. Also contains higher amount of carbohydrates and suggests that it could be a good source supplement, source of energy and structural materials as well as add to the bulk of the

diets, they play a pivotal role as they provide energy to cells such as brain, muscles and blood, and they contribute to fat metabolism and laxative for human beings. The leaves part of *M. oleifera* should be added to animal feeds as meal supplement level, this is because much plant nutrient and non-nutritive properties.

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