QUALITY EVALUATION OF RAW WALNUT (*JUGLANS REGIA L*) SEEDS FLOUR

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Abstract
The walnuts (Juglansregia L) seeds flour used in this work were obtained from a single tree at Agbede camp along Eporo road in Owo local government area of Ondo state Nigeria. They were prepared for use by decoating, dehulling and sun drying the sample which was powdered in milling mill mesh size and stored in screw cap bottle at room temperature prior to the laboratory analysis. The proximate, mineral, antinutrients and vitamins were examined. The mean value of various parameters for proximate composition were analyzed and calculated as Moisture content (2.56±0.02), Ash content (3.50±0.11), Crude fiber (1.15±0.15), Crude fat (35.05±0.25), Crude protein (21.05±0.05) and Carbohydrate (36.69±0.05) respectively. The mineral elements such as Potassium (560.05±0.0), Phosphorous (455.10±0.11), Magnesium (145.38±0.03), Calcium (15.03±o.05), Zinc (3.20±0.02), Manganese (2.78±0.15) and Iron (2.54±0.13), were investigated as well. The macro and micronutrients present in this work is required for optimal functioning of physiological and biochemical process in the body. The result of the antinutrients revealed the following Flavonoids (3.25±0.02), Tannin (1.15±0.10), Oxalate (3.00±0.00), Saponin (3.43±0.123), Phytate (2.52±0.11) and Alkaloids (1.05±0.05) respectively. The findings also revealed the following vitamin values follow Vitamin A (0.35±0.41), Vitamin E (10.15±0.03), Niacin (1.10±0.10), Ascorbic acid (18.25±0.02) and Vitamin K (1.05±0.05) respectively. The study has established the prominent nutrients and vitamins of walnut seed flour.
Keywords: Walnut, Proximate, Minerals, Antinutrients, Atomic absorption spectrophotometer

1. Introduction

Plants are primary sources of medicines, fiber, food, shelter and other items of everyday use by human. The root, stem, leaves, flower, fruits and the seed provide food and shelter for animals and human beings (Hemingsway, 2004). Foods are primarily nutritive and calorific which make them necessary in diets (Odoemelam, 2005).

Walnut (*Juglansregia L)* has been in use globally by human for nutritions since ancient times, the quantity of protein and oil produced by this seed makes it indispensable when it cimes to human nutrition. Therefore, walnut is categorized as a unique specie for human nutrition and it has gain popularity among Africans and included in the FOA list of unique plant. (FOA, 2008). The seed part of the fruit is better consumed cooked, sometimes roasted, and mixed with other seeds, or blended when dried and fortified with other powders.

In the Middle East Walnut seeds are eaten alone or along with almond, date and raisin as a special pastry called mamoul. Walnut seeds are nutrient- rich food due to high content of fats, protein, vitamins and minerals. They are also a good source of flavonoids, sterols, pectin substances, phenolic acids and related polyphenols. (Gandev, 2007). Walnut has greatly contributed to the economic growth of many countries especially the development of West African countries where it is grown for commercial purpose (Oyedele and Oladipo, 2014). It is an evergreen tree that grows to a height o+25.38m and has a spread overhead that can cost deep shade. The leaves are not regular in size, hence 10-30cm long and 2-4cm broad with an entire margin and apex. The nut is an ellipsoidal drupe usually available from August to January. They have smooth textures and the seeds can be whitish in color, the kernel is hard and makes germination difficult. The nut is usually found beneath the mother trees (Ibrahim and Onwualu, 2005).

The benefit of walnut seeds on cholesterol in human diet has been proven. A balance consumption of walnut reduce cholesterol or low density lipo protein level in men and also effective in preventing heart diseases. Dried fruit nuts are often rich in unsaturated acid, while the nut of walnut is rich in unsaturated fatty acid with polyunsaturated bond which includes

linoleic and linoleic acid (Cerchiara*et al.*, 2010). So the significant of the study is primarily aimed to evaluate the nutritional composition of raw walnut (*Juglansregia L*) seed flour.

2. Materials and Methods

The walnut (*Juglansregia L*.) seeds used for this work were obtained on a single tree at Agbede camp along Eporo road in Owo local government area of Ondo state Nigeria. They were prepared for use by decoating, dehulling and sun drying .The sample was powdered in milling mill mesh size and stored in screw cap bottle at room temperature in preparation for laboratory nalysis (Jide*et al.*, 2023). The moisture content was determined by drying in an oven at 110 degree centigrade for 24 hours and was expressed on a percentage basis. Nitrogen content was estimated by micro kjehdal method and crude protein was calculated (NX6.25). The content of crude lipid, fiber, ash and carbohydrate was estimated by (AOAC, 2005) method. The minerals elements such as potassium, phosphorus, calcium, magnesium, zinc, manganese and iron and other were analyzed using atomic absorption spectrophotometer (Perkin Elmer model 500).

The vitamins such as vitamin A, riboflavin, niancin, vitamin C, and vitamin K were determined by method of Moorth and Padmaja (2002) while the phytochemical analysis was carried out by adopting the method described by Udensi and lwe (2008). Data were analyzed using the statistical table analysis system and analysis of variance and mean deviation were calculated.

3. Result and Discussion

Table 1 reveals the results of the proximate composition of flour sample of raw walnut seeds (*Juglansregia L*). The results of the investigations shows moisture content (2.56+_0.02), ash content (3.50+_0.11), crude fiber (1.15+_0.15), crude fat (35.05+_0.25), crude protein (21.05+_0.05) and carbohydrate (36.69+_0.05) respectively. The moisture content of walnut was extremely low and this will, therefore, enhance long shelf life and prevent growth and spoilage by microorganism (Jide*etal*, 2023). The ash content revealed that there are abundant minerals present in the sample. The ash content of 3.50+_0.11 comparable to 4.29% for soya bean seed (Ogbemudiaetal, 2017).

Fibre works by cleaning the digestive track and removing potential carcinogenic substances from the body and prevent the absorption of excess cholesterol. The fiber content of 1.15±0.15 is almost the same as 1.17% reported by (Adamuetal, 2011). The crude fat for the raw walnut seed is relatively high compared to adzuki beans seed flour. The high crude fat indicated, is a vital source of oil production (Jide*etal*, 2018). Fat could be used in improving the palatability of food and also considered as a potential source of vegetable oil for domestic and industrial purposes (Jide*etal*, 2023).

The protein content in this study suggests that it could be used in the management of protein deficiency diseases such as kwashiorkor. Some proteins are involved in bodily movement and defense while others are meant to support body structura (Balley, 2008). The three main energy sources of food are carbohydrate, protein and fat. Energy store as carbohydrate is released by a process of respiration which is a reaction between a glucose and oxygen to produce energy, carbon dioxide and water. The carbohydrate value recorded for walnut seed flour is very high (36.69+_0.05) but almost the same value of 37.62% when compare with lima bean seed (Adamuetal, 2016).

Table 1: Shows the results of the proximate composition of raw walnut seeds (*Juglansregia L*) flour sample.

PARAMETERS	**RESULT %**
Moisture content	2.56±0.02
Ash content	3.50±0.11
Crude fiber	1.15±0.15
Crude fat	35.05±0.25
Crude protein	21.05±0.05
Carbohydrate	36.69±0.05

Mean ±standard deviation of triplicate determination.

Walnut seed (*Juglansregia L*.) flour has higher potassium, phosphorus, magnesium and calcium content in comparism with other seeds (Srishti and Ekta, 2019). The results of the mineral investigation are as follows: potassium (560.05±0.01), phosphorus (455.10±0.11), magnesium (145.38±0.03), calcium (15.03±o.05), zinc (3.20±0.02), manganese (2.78±0.15) and iron (2.54±0.13) respectively. The presence of calcium and magnesium indicate that consumption could be a good source of minerals. The presence of calcium suggest that the flour seed could be used to

compliment food to build the bone and teeth, calcium is the main component of teeth, bone and play a significant role in blood clothing (Mehas and Roders 1997). The high Potassium content could be utilized beneficially in the diet of people who take diuretic hypertension and suffer from excessive excretion of potassium through body fluid (Siddhuraju and Becker, 2001).

The magnesium content of walnut (145.38±0.03) was found to be more when compared to magnesium content of that of RDA,S of NRC\NAS(1980) for infant and children and magnesium is involved in making protein and releasing energy to hold calcium in the enamel of the teeth (Mehas and Roders, 1997). Phosphorus combines with calcium to form calcium phosphate to bone their rigid structure (Jide*etal*, 2023). Zinc is required for optimal functioning of physiological and biochemical processes while iron is used in the management of iron deficiency "anemia". Iron is a vital part of red blood cells that carry and released oxygen (Ogbemudia*etal*, 2017).

Table 2: shows the results of the mineral composition of walnut seed (*Juglansregia L*) flour

PARAMETER	VALUES (mg/100g)
Potassium	560.05±0.01
Phosphorous	455.10±0.11
Magnesium	145.38±0.03
Calcium	15.03±o.05
Zinc	3.20±0.02
Manganese	2.78±0.15
Iron	2.54±0.13

Mean ± standard deviation of triplicated determination'

The concentration of some of the antinutrients were shown in the table 3. The results revealed low level of tannin (1.15±0.10 mg| 100) when compared with other plant seed *solanumnigrum* of 58.81mg|100 (Amechi, 2009). Tannin was quite low while saponin was a little bit higher. Saponin as an antinutrient has been reported to possess both beneficial and deleterious properties and exhibit structures dependent biological activity (savage, 1993). The phytate level of 2.25 ±0.11 mg|100 was revealed. the level of phytate in food need to be taken care of because high concentration could cause adverse effect on the digestibility, phytate forms stable complex with CU^{2+}, Zn^{2+},$C0^{2+}$,Mn^{2+} Fe^{2+} and Ca^{2+} (Akintayo and Bayex 2002). The oxalate concentration is very high (3.0±0.00), as compared to (1.05±0.02 mg/100g) of Buccholziacoricea (Ekpo, 2009). The presence of flavonoid concentration of (3.25±0.02 mg/100g) with saponin and tannin are known to have antimicrobial activities and other physiological activities (Evan, 2005).

Table 3: shows antinutrient values of raw walnut seed (*Juglansregia L*.) Flour sample

ANTINUTRIENTS	RESULTS (mg/100)
Flavonoids	3.25±0.02
Tannin	1.15±0.10
Oxalate	3.00±0.00
Saponin	3.43±0.123
Phytate	2.52±0.11
Alkaloids	1.05±0.05

Mean ± standard deviation of triplicate determination.

Table 4 shows the assessment of vitamin value of raw walnut seed (*Juglansregia L*) flour. The results of the vitamin are as follow: Vitamin A (0.35±0.41), Vitamin E (10.15±0.03), Niacin (1.10±0.10), Ascorbic acid (10.25±0.02) and Vitamin K (1.05±0.05) respectively. The data above shows that vitamin C has the highest value, followed by vitamin E while vitamin A has the lowest value. The vitamin C helps the body to build strong bones and teeth, contributes to faster wound healings, and converts foods to energy, repair cellular damage and help in anemia and indigestions (Lawaletal 2006).

Vitamin A is a soluble vitamin that is present naturally in many foods. It helps vision, immune system, growth and reproduction and development of other organs (WHO 2007). Though the vitamin K in this study is low but it serves in building of bones and also helps prothrombin a vitamin K dependent protein, directly involve in blood clothing (Ogunlesi et al, 2010). Walnut is very rich in vitamin E as compared to other nuts. It contains high level of a specific vitamin E called gamma tocopherol (MoorthPadmal 2002). While NNiacin helps to strengthen the immune system and support nerve health and deficiency can cause anemia (WHO 2007).

Table 4: The vitamin values of raw walnut seed (*Juglansregia L*) flour.

Vitamins	Values (mg/100g)
Vitamin A	0.35±0.41
Vitamin E	10.15±0.03
Niacin	1.10±0.10
Ascorbic Acid	10.25±0.02
Vitamin K	1.05±0.05

Mean ± standard deviation of triplicated determination'

Conclusion

This study has established the prominent nutrients of walnut seeds flour. The flour sample is rich in proteins, vitamin, fats, carbohydrate and are sources of minerals which can be used in intervention programs that aim at alleviating proteins and vitamin malnutrition. The flour could also be used to fortify flours with low proteins like corn flour and rice flour. The mineral content indicates that the flour is an important source of mineral for humans and animals

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