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## Nutrient contents and mineral composition of *Moringa oleifera* Seed

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### Abstract

*Moringa oleifera* Seeds were processed and analysed for its Proximate and Mineral Constituents with a view to evaluate its nutritional potentials using standard analytical procedures. The proximate analysis revealed; the Moisture Content;  $5.95 \pm 1.01$  mg/100g, Ash Content;  $3.38 \pm 8.00$  mg/100g, Crude Fat;  $43.60 \pm 5.00$  mg/100g, Crude fibre;  $17.60 \pm 2.00$  mg/100g, crude protein;  $43.71 \pm 1.64$  mg/100g while Nitrogen free extract is  $3.36 \pm 3.42$  mg/100g. The following values were obtained as the mineral contents of the Seed; Ca; 1.55mg/100g, Mg; 5.36mg/100g, Fe; 0.97mg/100g, Mn; 0.60mg/100g, Cu; 0.40mg/100g, Cr; 0.05mg/100g. Pb and Cd were also present in the Proportions of 0.04mg/100g, 0.04mg/100g respectively. The results obtained indicated that *Moringa oleifera* Seeds are of good dietary benefits to man and animal

**Keywords:** *Moringa oleifera* Seed, Mineral Nutrients, Proximate analysis, Mineral Composition

### 1. Introduction

Various plant species ranging from green vegetables, medicinal plants and some fruits and leaf have been evaluated as viable ingredients for food and other uses by man. The need for use of plant and plant resources as food for man and animals arise due to an accelerated food demand coupled with rapid population growth in most African countries (Kay 1979) <sup>[10]</sup>. Plant played a significant role in maintenance of human health to eliminate diseases such as cancer, cardiovascular diseases, age related muscular degeneration as well as malnutrition.

However, research interest has grown on the utilization of plant whose various parts can be used for various purposes by man. One of such plants is *Moringa oleifera*. This plant is most widely cultivated in Africa, India, Mexico, Malaysia, and Indonesia, central and south America (FAO 1999) <sup>[11]</sup>.

*Moringa oleifera* has been considered as one of the most useful trees as almost all parts of this plant has been used for various treatment of diseases such as rheumatism, Venomous bites, cardiac and circulatory stimulants (Caceres *et al.*, 1992) <sup>[2]</sup>. Some parts of *Moringa oleifera* Plants have been reported to show antitumor, antinuclear, antipyretic and anti-inflammatory effects (Sodamade *et al.*, 2013) <sup>[13]</sup>.

Moreover, another problem experienced in under developed countries of the world apart from epidemic and endemic diseases is malnutrition, (Lowell, 2006) <sup>[3]</sup> reported that malnutrition causes a great deal of human suffering and is associated with more than half of all deaths of children worldwide. He further stressed that malnutrition has severe impacts on the socio-economics development of a nation because a work force that is stunted both mentally and physically may have a reduce work capacity. The consequence of poverty, poor health and poor nutrition has a multiplier effect on the general welfare of the population and also contributes significantly towards trend of poverty and nutritional insecurity.

Interesting information about nutrient composition and medicinal potency of *Moringa oleifera* leaf and leaf protein concentrates, roots. (Broin *et al.*, 2002), pods (Faizi *et al.*, 1998), leafs (Dahot 1988, Caceres and Lopez 1991 Jahn 1988) <sup>[19, 18, 22, 20, 21]</sup>, several uses about the seed of *Moringa oleifera* could also be found in literature, but there are scanty information about the nutrient and mineral content of *Moringa* seed, this however is the basis of this research.

### 2. Materials and Methods

**2.1 Sample Collection:** The ripe pods of *Moringa oleifera* plants were collected from residential garden situated at Oroki area of Oyo west local government area of Oyo town, Oyo state.

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Nigeria. The seeds were obtained after cracking the pods and then sun dried for 8 to 10 days. The seeds were grinded into powder using mortar and pestle prior proximate and mineral analysis. Proximate Composition of the processed Moringa seeds were obtained using standard method described by Association of Official and Analytical Chemist (AOAC, 1995) [9].

## 2.2 Mineral Analysis

The Samples were weighed and subjected to drying in a well cleaned porcelain crucible at 550 °C in a muffle furnace. The resultant ash was dissolve in 5.0ml of HNO<sub>3</sub>/HCL/H<sub>2</sub>O(1:2:3) and heated gently on a heating muffle until brown fumes disappeared, 5.0ml of distilled water was added to each of the sample in crucible and heated until colourless solution was obtained. The Mineral solution was filtered into a 100ml volumetric flask through filter paper, and the volume was made to the mark with distilled water. The solution was analysed in triplicate for its elemental composition using parking Elmer 403 model of atomic absorption spectrophotometer (Adeyeye and Omotayo 2011) [4].

## 3. Results and Discussion

**Table 1:** Proximate Composition of *Moringa oleifera* seed (%)

Moisture	5.95±1.01
Ash	3.38± 8.00
Crude fat	43.60±5.00
Crude fibre	17.60 ±2.00
Crude protein	43.71 ±1.64
Carbohydrate	3.36±3.42

Table 1 showed the results of proximate analysis of *Moringa oleifera* seed protein concentrates. The result revealed that *Moringa oleifera* seed contained an appreciable amount of crude protein, (43.71±1.64), this value is higher than 39.13±0.16 reported for *Moringa oleifera* leaf by Sodamade, Bolaji and Adeboye (2013) [13], 17.0 ± 0.10 by Ogbeand John 2012 and 27.51 ±0.00 reported by Ibok *et al* 2008 [17]. The values were also found to be greater than 2.66± 0.282 reported for *Moringa oleifera* seed protein concentrate by Dalen *et al*, (2012) [1].

The Presence of significant quantity of crude protein in the seed means that *Moringa oleifera* seed has nutritionally valuable healthy ingredients to improve protein deficient of man or animal diet.

Moisture Value of *Moringa oleifera* seed was found to be 5.95 ± 1.01. This value was found to be higher than 9.00 ±2.30 reported value for *Moringa oleifera* leaf by (Sodamade *et al*, 2013) [13] but in range with 4.73 ± 0.25 reported for *Moringa oleifera* seed powder used as water Puritans (Dalen *et al* 2012) [1].

Moisture in food determines the rate of food absorption and assimilation within the body, it also determines the keeping quality of food. The reported value indicated that *Moringa oleifera* seed protein concentrates may not be stored at room temperature for a long period of time.

Ash Content of *Moringa oleifera* is 3.38±8.00. Ash on food determines largely the extent of mineral matters likely to be found on food substances. The value was higher than those reported for the seed of *Moringa oleifera* used as a water Puritans, 1.05±0.180 by (Dalen *et al*, 2012) [1]. The reported value of the ash content indicated that they are good source of mineral elements which are good in treating or proven in malnourishment.

Crude fat value of *Moringa oleifera* seed was 43.60 ±5.00 higher than 0.5% reported for *Moringa oleifera* powder (Mensah *et al* 2012) [5], 2.43±0.47% reported for *Moringa oleifera* leaf protein concentrates (Sodamade A *et al* 2013) [13]. Fat in food determine the amount of energy available. A diet providing 1-2% of its caloric energy as fat is said to be sufficient to human beings as excessive fat consumption yields certain Cardiovascular disorder such as atherosclerosis, cancer and aging (Davidson *et al* 1975) [6] and (Coral *et al* 2002).

The value of Crude fibre obtained for *Moringa oleifera* seed protein concentrates was 17.60± 2.00. The value was higher than 5.43 ±0.23, 9.25± 0.007, and 3% reported for *Moringa oleifera* leaf and *Moringa oleifera* Leaf used as leaf meal by Sodamade *et al* 2013 [13], Ibok *et al* 2008 and Elkhalfifa 2007 [17, 7] respectively. Fibre taken as part of diet cleanses the digestive tract by removing potential Carcinogenos from the body and hence prevents the absorption of excess cholesterol. Fibre also adds bulk to food and reduces the intake of excess starchy food which is the characteristics of the diets in Nigeria and hence guards against metabolic conditions such as hypertension and diabetics mellitus.

Carbohydrate Content of *Moringa oleifera* seed protein concentrates is 3.36±3.42. The Value was lower than that reported for Moringa leaf (Ibok *et al* 2008) [17]. The value is in the same range with the value for *Moringa oleifera* leaf (3.82 ±0.31) reported by Sodamade *et al* (2013) [13], But the proportion Observed for *Moringa oleifera* seed is adequate enough to meet the required energy. Carbohydrate and Lipids are the principal Sources of energy. The values of Carbohydrates Contents in these samples per100g can provide a lower caloric of energy.

**Table 2:** Mineral Contents of *Moringa oleifera* Seed.

Minerals	Concentration Mg/100g
Ca	1.55
Mg	5.36
Fe	0.97
Mn	0.60
Cu	0.40
Cr	0.05
Pb	0.04
Cd	0.04

Table II presents the mineral constituents of *Moringa oleifera* seed, Calcium Concentration of 1.55mg/100g was obtained for *Moringa oleifera* seed. High amount of calcium is required by children, pregnant and lactating woman for bones and teeth development. The value reported is lower than the recommended daily allowance of 800mg per day for children and adult (NRC 1989) [8] but can be assumed to a high considerable value as it can serve as calcium supplements in food for skeletal development. Calcium plays other roles in the body apart from skeletal development cell membrane integrity, regulation of ion transport, control of muscle action, transmission of nerve impulses, blood clotting and co-factor for several enzymes (Sodamade 2012) and as a result, foods that are high in calcium are needed in the body. However it must be noted that the choice of calcium rich foods must be done with care because approximately 85% of kidney stones are composed predominantly of Calcium compounds. Calcium stone can also be formed through low levels of citrate, high levels of oxalate and uric acids and inadequate urinary volume (kidney stones overview 2008) [12].

The concentration of Magnesium is 5.36mg/100g. The value contained in *Moringa oleifera* seed is lower than the literature value reported for *Moringa oleifera* leaf 677.00mg/100g by Sodamade *et al* (2013) [13]. Magnesium is very important in calcium metabolism in bones and also involved in prevention of circulation diseases it also help in regulating blood pressure and release of insulin.

The recommended daily allowance for magnesium in adult is 350mg/100g (NRC 1989) [8]. This shows that *Moringa oleifera* seed can supply about 1.5% of the needed magnesium in an adult.

The Iron concentration is found to be 0.97mg/100g. Iron required for the formation of haemoglobin and its deficiency leads to anaemia (Turan *et al* 2003) [23] the recommended daily allowance of iron in adult and children is 10mg and 15mg per day. The value obtained for this sample is lower than the recommended dietary allowance. The sample can however contribute to the available iron in our meal.

Copper concentration is 0.40mg/100g. Copper is required in the body for enzymes production and biological transfer of electron. The concentration of copper in this sample is lower than the value reported for *Moringa oleifera* leaf (55.00±0.08 by Sodamade *et al* 2013) [13]. This value obtained is however lower than the recommended dietary allowance which is 3mg per day for adult and 2mg per day for children (Oguntona, 1988) [16]. *Moringa oleifera* seed can contribute 13.3% and 20% to Adult and Children diet respectively.

Lead (Pb) concentration was also found to be 0.04mg/100g. Too much of Lead (Pb) in diet is not good as lead (Pb) can lead to metal poisoning; this value reveals that the seed of *Moringa oleifera* plant will not affect the body System negatively if consumed.

Cadmium and Chromium were also present in this sample in concentration of 0.04mg/100g and 0.05mg/100g respectively. Chromium Function as an insulin performance enhancer, it also involves in the Process of Metabolism and also have benefits when taken as a supplements.

However, the proportion of these two metals in *Moringa oleifera* seed is not present in the concentration that could impair health. Its consumption is safe.

#### 4. Conclusion

The seed of *Moringa oleifera* plant reveals nutritional and mineral content of considerable interest given the promising source of dietary minerals in most developing Countries. It is however important to stress that the seed protein concentrates is not food on their own but it contains nutritional potentials that could found application in food ingredients, Infants formula, food supplements and food formulation.

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