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Determination of some Essentials Element in Baobab Powder from Damaturu Local Government area of Yobe State Nigeria

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Abstract: *The African baobab (Adansonia digitata L.), a remarkable multipurpose tree of the Malvaceae family, holds immense ecological, nutritional, and medicinal significance, particularly in Africa. This study investigates the essential elements—Calcium (Ca), Magnesium (Mg), Potassium (K), Phosphorus (P), and Zinc (Zn)—in baobab powder and seeds sourced from Maiduguri Monday Market and Damaturu Kuka-Reta, comparing them with WHO permissible limits. Analytical results reveal variable elemental concentrations across samples, with notable differences in nutritional content. Zinc and Magnesium were below WHO limits in all samples, highlighting potential dietary insufficiencies. Calcium and Manganese, though present, also exhibited concentrations lower than permissible standards.The findings emphasize the nutritional value of baobab powder and seeds as vital sources of essential nutrients, offering significant health benefits. This research underscores the need for enhanced utilization of baobab products to mitigate nutrient deficiencies, particularly among vulnerable populations such as pregnant women. Recommendations include further investigations into the digestibility, bioavailability, and processing effects on baobab's nutritional properties. Expanding research and development efforts could unlock the full potential of baobab as a superfood, contributing to improved public health and economic growth.*

Keywords: *Baobab powder, Essential nutrients, WHO permissible limits and superfood.*

INTRODUCTION

A. digitata L. Malvaceae is a multipurpose tree termed African baobab by both the English and the French (Kaboré et al., 2015). The tree belongs to the Malvaceae family (Bremer et al., 2003) with great ecological tolerance which makes it valuable in both hot and dry cultivating conditions (Buchmann et al., 2017). This beneficial tolerance is attributed to the thick fire-resistant bark, shedding of leaves, as well as possession of a trunk that can absorb water in the rainy season and contracts in the dry season (Sidibe and Williams, 2012). The genre Adansonia was coined from AdansonMicheal, (1727– 1806) a French botanist name, who discovered a specimen on the islands of Sor, Senegal (Adanson, 1771), while the term digitate (digitals of the hand or hand-like) was about the shape of the leaves of the African baobab tree (Kamatou et al., 2011; Du Plessis and Doep, 2011) with a usual range of 5–7 leaflets. However, concerning physiological attributes, several other names have been ascribed to the African baobab, including “magic tree”, “chemist tree”, “symbol of the earth”, “monkey bread of Africa” (Vermaak et al., 2011) “dead rat tree”,

"cream of tartar", etc. (Rahul et al., 2015). African baobab is indigenous to the Savannah regions of Africa (16° N and 26° S), whilst several others have been identified in other tropical regions of the world (Wickens, 2018). African baobab is an angiosperm - having flowers and producing seeds covered by a carpel, they are pachycauls, with thick stems. Records have shown that the African baobab tree is the oldest and largest surviving angiosperm (Patrut et al., 2018) where some of them including the Panke of Zimbabwe (a sacred tree in Matabeleland North), Chapman of Botswana (a historic African baobab tree), are now dead. Initial growth of the African baobab tree is characterized by single stems which consequently develops to several other stems as a result of its characteristic ability to produce stems periodically. Importantly, a recent study (Patrut et al., 2018) has highlighted the wood volume of the African baobab to range between 300 and 500 m3, aside the Platland tree (501 m3), previously known to be the most advocated African baobab found the Limpopo province of South Africa (Patrut et al., 2018). Seed production has been recorded to begin between the ages of 8– 23, while the mature tree (> 60 years) produces about 160–250 fruits annually (UNCTAD, 2005). Physiological examination of A. digitata reveals that it is a massive deciduous tree growing up to about 20–30 m (m) tall with a gigantic girth ranging between 20 and 35.10 m, with a circumference varying from 14.3 to 32.0 m, having a lifespan of up to 450 years (Patrut et al., 2018). The smooth, reddish-brown or gray bark, possesses longitudinal fibers. The tree is substantially branched, producing a lateral system of about 50 m from the trunk (Rahul et al., 2015). The root tips are usually in the form of tubers. (Sidibe and Williams, 2012).

Several parts of the plant are food sources especially for the rural dwellers (Muok, 2019) and have also found use in traditional medicine for the treatment of several diseases (Sidibe and Williams, 2012). Recently, the dried fruits were approved by the European Commission as a novel food ingredient (Vassiliou, 2018). More so, the seeds can be eaten raw or in the processed form either roasted or otherwise (Nnam and Obiakor, 2013). The seeds have a characteristic nutty flavor and are a very good source of energy and protein (Murray et al., 2011).

Baobab fruits is edible, and baobab seed powder is used in foods because of his nutrients, possible health benefits and as a natural preservatives. It is a good source of Vitamin C, Potassium, carbohydrates and phosphorus. The fruits is found inside hard pods that hang upside down from the tree. It has a citrus flavour. Baobab is "Wild-Harvested". It is taken from its natural environment and dried naturally. The seeds are removed and ground into a powder that can be added to food products. It is also known as (Adansoniadigitata) is a tree native to Africa, Madagascar, Austria and the Arabian Penisula. Its commonly used as a source of water and food. The wood of the baobab tree and trunk has a water content of up to 79%, the fruit and leaves are highly risks in many nutrients and are used as food content.

The flowers situated in the axils near the tips of the reproductive branches are white, large, pendulous, or solitary. (Rahul et al., 2015). The large oval-shaped fruits are filled with pulpsthat are usually dry, hard and fragmented, looking like chunks of powdery dry bread. The seeds on the other hand are kidney-shaped, dark-brown or black, and usually hard (Hankey, 2014). Several parts of the plant are food sources especially for the rural dwellers (Muok, 2019) and have also found use in traditional medicine for the treatment of several diseases (Sidibe and Williams, 2012). Recently, the dried fruits were approved by the European Commission as a novel food ingredient (Vassiliou, 2008). More so, the seeds can be eaten raw or in the processed form either roasted or otherwise (Nnam and Obiakor, 2013). The seeds have a characteristic nutty flavor and are a very good source of energy and protein (Murray et al., 2011).

Statement of the Problem

In Africa, the baobab fruit has been used medicinally for centuries to treat everything from fevers, malaria and gastro-intestinal problems to Vitamin C deficiency. These research try to find out the remarkable essential element and health benefits of the baobab fruit emerges, people across the world are beginning to show interest on products made from this up and coming super food (pure baobab fruit powder made from the dried fruit and baobab seeds).

Aim and Objectives of the Study

The aim of this research is to determine the essential element in Baobab Powder and Seeds in Maiduguri Monday Market ad DamaturuKuka-Reta (*Adansoniadigitata*). The specific objective of the study was to:

to determine the essential elements in baobab powder and seeds.
to investigate the level of essential elements in baobab powder and seeds and to compare with the permissible limits
to make recommendations based on the result obtain.

Scope and Limitation of the Study

The study is limited to Baobab fruits powder and seeds purchase particularly in Maiduguri Monday Market and DamaturuKuka-Reta area. Due to sometime factor, and financial constraints the study is will be limited to determine Calcium (Ca), Magnesium (Mg), Potassium (k), Phosphorus (p) and Zinc (Zn) respectively.

Significance of the Study

The significance of this study is to draw logically, conclusion and to advice specifically on the importance of baobab powder and seeds and if the elements Ca, Mg, k, P, and Zn are found present it will reduce the number of illness cause by it deficiency such as Calcium (Ka) that attacks about 70% of pregnant women within the scope of the study.

RESULTS AND DISCUSSION

The table below shows the different concentration of essential element in differet types of Baobab powder, such elements are Calcium (Ca), Magnesium (Mg), Potassium (k), Phosphorus (P), and Zinc (Zn).

S/N	Sample	Zn (mg/l)	Mg (Mg/l)	Ca (Mg/l)	Mn (Mg/l)	Na (mg/l)	K (mg/l)
1	A	1.36	1.14	2.53	1.21	2.73	2.22
2	B	1.41	1.00	3.35	2.11	2.95	1.90
3	WHO	10.00	1.05	30	2.3	3.51	5

Discussion

The analysis was carried out and the result were obtained which shows that sample B (Baobab seed in Monday Market Maiduguri) has highly nutrition than that of Sample A (Baobab seed in Monday Market Maiduguri) Zinc which has the value of 1.41mg/l is higher than zinc in sample A which is 1.36mg/l but all are below the permissible unit of WHO which is 10.00mg/l.

Zinc is an important component of a healthy diet and a mineral necessary for life. Since plays a role in building stronger, denser bones early in life and keeping bone strong and healthy in life.

Magnesium which has the value of 1.14mg/l is slightly higher than that of sample B which is 1.00mg/l but the value of sample A is the higher while the the value of sample B is lower than WHO with the value of 1.05mg/l. magnesium are essential to all cells of all known living organisms. Low levels of magnesium in the body have been associated with the development of a number of human illness such as thomadiabetes etc.

Calcium in Saple B has the value of 3.35mg/l is higher than that of sample A which is 2.53mg/l but all are below the standard level of WHO which is 30mg/l. calcium saves as a sample inexpensive and triticate tools for treating malaria.

Manganese which has the value of 2.11 is higher than that of Sample A which is 1.21mg/l but all below the permissible unit of WHO with the value of 2.3mg/l.

Summary

Baobab powder in Sample A is highly nutritive than that of Sample B (Monday Market Maiduguri). Because all the element in Sample A have higher concentration than that of Sample B except phosphorus which have low concentration in Sample A and high concentration in Sample B.

Conclusion

Base on the research work of this project and with respect to result from the analysis of baobab powder sample collected from Monday Market Maiduguri where compared with others and WHO, it was discovered that Baobab powder/seed produce in Maiduguri Monday Market has very low concentration than that of others and WHO which is high in concentration. Baobab seeds have been found to contained various elements, the seeds also been found to have a high protein content and contained various mineral elements. Further research is needed to fully understand the elementary composition of baobab seeds and their potential health benefits. The major findings in this research indicated that baobab (Adansoniadigitata) pulp had low fat and protein content. The pulp also had low fat and moisture contents, indicating that it had good keeping qualities. It is also a good source of macronutrients, specially carbohydrate, crude fiber and micronutrients especially Vitamin C and beta-carotene. This could be useful in value addition and product development hence promoting the use of non-timber forest products. Functional properties for baobab pulp indicates can be used for various food products companies in recipe development, as it has good gelation properties which is a significant attribute for food processing.

In conclusion, the benefit of the African baobab tree cannot be overemphasized, ranging from the local uses as foods to the international uses in cosmetology or pharmacology. The edible parts of the African baobab tree are greatly nutritious and have found so many uses not just in enhancing nutritional diets but in the treatments of human-related ailments and as a source of an economic boost. The leaves are good sources of photochemical which have remarkable health benefits that cannot be overlooked. Although the utilization and availability of these benefits are usually limited by the anti-nutrients present in the plant, some measures have been proposed and implemented to reduce their impacts. However, there is a significant climatic threat faced by these

species due to their high vulnerability to the impending climatic changes. Death of this extremely beneficial tree has taken place in some part of the world and it has become crucial that effective means of management be enforced to ensure their safety.

Recommendations

The result obtained from the chemical analysis, the baobab powder of Monday Market Maiduguri have high content than that of WHO. Further research should be conducted in Baobab seeds and leaves of different location.

1. More attention should be given to sampling, sample pretreatment, accuracy, and precision in analyses in order to get more reliable information about biological variation.
2. Nutritional research should focus on digestibility and bioavailability for a better nutritional evaluation of baobab products.
3. Detailed studies should be carried out on the effects of processing and storage on nutrient composition.

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