Elements Analysis and Proximate Composition of *Guiera senegalensis* from West Kordofan, Sudan

Abstract:

The objectives of this work to determine the Elements Analysis and Proximate Composition from the leaves of *Guiera senegalensis*, the leaves collected from South Kordofan State, Sudan and leaves powder was prepared and analyzed using inductivity-coupled plasma \ Optical Emission Spectrometry to determine the concentration of elements and approximate Composition. The results revealed variation in the elements Concentration the highest is Fe (860), followed by K (840), Ca (810), and Mn (700) and further diminution to Li (0.19 ppm). The Proximate contents of moisture, protein, fat, carbohydrate, crude fiber and ash were (4.142%, 12.250%, 4.248%, 51.496%, 23.440% and 4.424%) respectively. five type of carbohydrate were also determined as Fructose , Glucose, Sucrose, Maltose and Lactose were gotten values 2.2687%, 2.49%, 2.5942%, 0.0% and 1.3624% respectively.

The results of Guiera senegalensis Proximate Composition and elements analysis must be exploited support the use of the plant in traditional medicine to treat infections diseases and could serve as basic ingredients in drug making for use in treatment of various ailments.

Key words: *G. senegalensis*, anti-inflammatory, phytochemical, *combretaceae*, Gabeish.

1. Introduction:

Guiera senegalensis is one of the most widely used medicinal plants in Africa. *G. senegalensis*, also known as Moshi medicine, belongs to the family of *Combretaceae*. Other common names include Sabara, Barb\arta (in the local Hausa language, Nigeria), and Gabeish (in Sudan). *G. senegalensis* is widely distributed in central and Western Africa. Traditionally, *G. senegalensis* was reported to be used alone or in combination for the treatment of dysentery, diarrhea, leprosy, depression, snake bite, epilepsy, and malaria. Pharmacological investigations revealed that the plant possesses antioxidant, anti-inflammatory, acaricidal, and antimicrobial activities against potential bacterial pathogens such as Shigella dysenteriae, Salmonella typhi, Staphylococcus aureus, and Pseudomonas aeruginosa [1, 2, 3, and 4]. General phytochemical investigations indicated that *Guiera Senegalensis* contains tannins, flavonoids, terpenoids, saponins and alkaloids. Potential phytochemicals have been identified in the leaves of *G.*

senegalensis, such as kaempferol, quercetin, ethyl gallate, miricitrin, gallic acid, myricetin, 5-methyl-dihydroflavasperon, isorhamnetin, guieranone A, β-sitosterol, rhamnetin and hyperoside [5]. Besides its antimicrobial ethnomedicine activity, interesting traditional uses were reported. G senegalensis decoction is used to increase milk production during postnatal periods [1] such ethnopharmacological uses require further investigations.

In this work, we aimed to investigate nutritional value of the leaves of *Guiera Senegalensis* collected from south kordfan state in Sudan by proximate analysis and determining the elements concentration.

2. Material and method

2.1 Plant material:

The leaves of *Guiera Senegalensis* were collected in 2020 from West Kordofan State, Sudan. A plant taxonomist from the Institute of Aromatic and Medicinal Plants in Khartoum, Sudan identified and authenticated the plant. The preserved leaves of plant were dried under laboratory conditions and homogenized into a fine powder.

2.2 Proximate Composition

Proximate of Moisture content, protein content, fat, carbohydrate, crude fiber, and ash content were determined according to the AOAC method (2000)[6].

2.3 Mineral composition

0.25 gram of G. senegalensis leaves powder was weighed and then 2 ml of concentrated HCl and 6 ml of concentrated HNO_3 were added. The mixture was placed in hot plate for 15 minutes and hence the sample is fully digested. After that, the digest was diluted with the addition of 50 ml of ultrapure water. Finally, the sample was analyzed using inductivity-coupled plasma \ Optical Emission Spectrometry (Shimadzu 2009) to determine the concentration of minerals in ppm.

Inductively coupled plasma is an elemental technique used for identifying and measuring the concentration of individual elements'.

3. Results and Discussion

Generally *Guiera Senegalensis* leaves are considered to be cheap sources of many nutritive contents and elemental compounds, in Table 1 shows the approximate analysis of the nutritive contents from *Guiera Senegalensis* leaves which containing moisture content (4.142%). Moisture content is among the most vital and mostly used measurement in the processing, preservation

and storage of food [7]. The value g indicates that leaves can not be stored for a long time without spoilage. The value of the ash (4.424%) which is higher than that reported by Nabaa (2.15%), the crude protein of these seeds (12.250 %) less than that reported by Nabaa **(**13.93%) for *Guiera Senegalensis* leaves. The considerable amount of crude fiber (23.440 %) in these leaves show that they will enhance easy movement of bolus in the large intestine, the crude fat value of the leaves (4.248%) that refer this plant leave is a good source of fat.

Table 1: Proximate nutritive composition of Guiera *Senegalensis* leaves

Sample	Moisture	Ash	Protein	Fat	Fiber	Carbohydrate
Composition (%)	4.142	4.424	12.250	4.248	23.440	51.496

In table (2) There for five type of carbohydrate was determined as Fructose, Glucose, Sucrose, Maltose and Lactose were gotten values 2,2687%, 2,49%, 2,5942%, 0,0%, and 1,3624% respectively. This study shows that the *Guiera Senegalensis* leaves are serve animal nutrition because it's relatively high carbohydrate, fat, ash, protein content and good source of energy.

Table 2: Proximate some types of carbohydrate from Guiera *Senegalensis* leaves

Sample	Fructose	Glucose	Sucrose	Maltose	Lactose
Composition (%)	2.2687	2.6649	2.5942	-	1.3624

The Guiera *Senegalensis* leaves contained significant amount of important minerals shown below in Table (3)

Table 3: Elemental analysis of *Guiera Senegalensis* leaves.

Element	Concentration (ppm)
Na	110
Fe	860
K	840
Ca	810
P	1.5
B	20

Cu	33
Mg	170
Mn	700
S	2.1
I	440
Zn	6,5
Cr	3,5
Al	1,5
Li	0.19
In	42

Medicinal plant contains the indispensable nutrients such as mineral, carbohydrates, proteins, vitamins, fibers, and fats required by the human body and is considered a source of energy. The elements are categorized in three class a macro elements (primary), micro elements (trace elements) elements and ultra-trace elements. Macro elements include Calcium, Phosphorus, Potassium, Sodium, Sulphur and Chloride, whereas the micro elements include Iron, lithium, Magnesium, Zinc, Copper, Iodine, Beryllium, Cobalt, Selenium, Chromium, Manganese, Fluoride, and Molybdenum but ultra-trace elements such as Radium. [8-10]. The macro elements are required in amounts greater than 100 mg/dl, and the micro-minerals are required in amounts less than 100 mg/dl [10]. Macro, Micro elements, are considered as a potential health risk [8, 11]. The results of nutritionally valuable mineral and trace elements are presented in table (3). The elements with the highest concentration is Fe (860ppm), followed by K (840 ppm), Ca (810 ppm), Mn (700ppm), I (440 ppm), Mg (170ppm), Na (110ppm). The Elemental analysis shows that the leaves are excellent sources of macro elements such as Calcium (Ca), Potassium (K), Sodium (Na), Phosphorus(P), Potassium(K), Sulphur(S) and Magnesium (Mg) and also are very rich with trace elements, Chromium, Manganese, iron, and subjected in Table (3) .the concentration of elements (Ca, Cu ,K, Na, Fe, Mg, B, Zn, , Al, Cr, Li) reported in this study is the highest among previous study [12] which recorded concentrations as (102, 0.0045, 14.7, 375,

3.2, 11.2, 0.013, 0.0173, 0.0126, 0.0045, 0.0124) respectively. Iron is well confirmed as an essential element and it is very important for the formation of haemoglobin, various human enzymes and normal functioning of the central nervous system and is present in the iron deficiency leads to anaemia and High doses of iron can cause hepatotoxicity that effect appeared in levels of red blood cells and muscle tissue. [13, 14, 15]

Sodium and Potassium are both essential elements that occur at high concentrations in the body (112g and 160g) respectively [16]. Potassium is involved in electrolytes balance and signal transduction by the famous Na\K ATP pump and has very important function for activation of enzymes in plant photosynthesis, protein synthesis and starch formation [17]. A deficiency of sodium lead to Loss of body weight [12]. The copper contain reported in this study (33 ppm) which more than that reported in [17]. The Copper an important essential trace element, is found in various human transcription factors and enzymes. Excessive copper intake can lead to liver damage and Wilson's disease [18] Deficiency of copper effective of human health including blood vessel damage, aneurysms, nosebleeds, hernias, and can also affect the movement of nutrients through cell walls [19]. The value obtained for Mn was (700ppm) it is an important element and is a constituent of metalloenzymes that oxidize fatty acids and cholesterol [20]. Excessive amounts of Manganese can cause, leg cramps, encephalitis and speech disorder, while deficiency in manganese can cause bleeding disorders [21]. Calcium is an essential elements with high level in the body (1.1 kg), it is necessary to formation and resorption of bones and teeth [16].

Chromium (Cr) is found to be (3.5ppm) in *Guiera Senegalensis* leaves (Table3) which is believed to be important in the production and utilization of insulin [12]. Also plays an important role in the metabolism of carbohydrate, cholesterol and protein synthesis [22]. In this study the level of Indium (In) was (42 ppm) it is used in clinical diagnostic imaging. Iodine appeared (440ppm) in this study it is essential for the thyroid gland in the form of thyroid hormones [16].

The concentration of Magnesium (170ppm) in plants it is very necessary for the synthesis of chlorophyll and photosynthesis. [12]. The Boron recorded content (20 ppm) may play a role in the development of healthy bones and joints, and as a dietary supplement [23, 24]. Zinc is an essential element together with a copper are considered important for metabolizing glucose and lowering cholesterol, a deficiency of zinc has been linked to a suppressed immune response [25]. This result suggest that the studied plant are a potential source of micronutrient elements such as

Fe, Cu, Zn, Mn and Se, which are considered as anti-oxidant elements. Other elements present in trace amounts include P, S, Al and Li at 1.5, 2.1, 1.5 and 0.19 ppm respectively. Our study reported a high elements concentration in *Guiera Senegalensis* plant than reported in previse studies. That variation depends on several factors, such as climate, analytical instrument, soil components, and harvest season.

4. Conclusion

The results obtained show that the Guiera *Senegalensis* leaves contains Proximate Composition, which might be beneficial for the nutritional industry as natural food additives and supplements. Also the leaves of Guiera *Senegalensis* it is an excellent source of essential mineral non-essential elements that can be formulated into nutritive herbal drugs. Our study supports the fact that some medicinal plants commonly consumed in Sudan are promising sources of complementary foods.

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