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Evaluation of Proximate, Minerals and Phytochemical Composition of *Ficus Ovata* Leave Obtained in, Mubi North Local Government Area Adamawa State, Nigeria

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Abstract
The present study was conducted to evaluate the proximate, minerals and phytochemical composition of Ficus ovata leaves in Mubi North Local Government Area of Adamawa State. The proximate and phytochemical composition of the leaves of F. ovata were investigated in accordance with standard procedures while quantitative analysis by High Performance Liquid Chromatography (HPLC). Mineral contents were determined by using Atomic Absorption Spectrophotometer (AAS) and flame photometer for Na and K respectively. The proximate analysis of the dried leaves of F. ovata showed high content of crude fiber (27.53±0.005 %), with appreciable levels of Carbohydrate (26.86±0.025 %), crude protein (21.36±0.010 %), Ash content (11.26±0.010 %) and Moisture content (9.25±0.000 %) low, but appreciable level of Crude fat (3.75±0.000 %). The phytochemical screening also showed the presence of the following tannin, alkaloids, glycosides, saponins, flavonoids and terpens. On the other hand, the quantitative analysis of the phytochemicals showed high concentration of tannins (18.34± 0.025 mg/100 g). Low, but appreciable levels of alkaloids (8.46±0.010 mg/100 g), glycosides (8.16±0.005 mg/100 g), saponins (4.56±0.015 mg/100 g), flavonoids (3.92±0.010 mg/100 g) and terpenoids (2.76±0.010 mg/100 g) respectively. The presence of these components showed that the plant can be useful as a drug candidate and sources for natural compounds as anti-infection agents. The leaves are also rich in mineral elements since it contained high concentration of Phosphorus, Potassium, Magnesium, Sodium, Calcium, Manganese, Zinc and Iron, (845.22±0.005 mg/100 g), (653.27±0.015 mg/100 g), 324.54±0.015 mg/100 g), (71.26±0.010 mg/100 g), (61.26±0.010 mg/100 g), (14.54±0.015 mg/100 g), (12.32±0.010 mg/100 g) and (2.43±0.00 mg/100 g) respectively. The rich content of the various constituents in this plant proves that F. ovata is a multipurpose plant and can serve as an alternative source of medicine and could contribute immensely towards meeting both human and livestock nutritional requirements.

Keywords: proximate, mineral, phytochemicals, HPLC, AAS and Ficus ovata

Introduction

Nigeria is rich in plants flora because of its soil and climatic conditions. This supports the growth of variety of plants species and one of the most populous plants species of the plant genera in Africa is the genus *Ficus which* belongs to the family Moraceae (Michel, 2004). It has over 750 different species which are distributed from Mauritania and Senegal to Cameroon, as far as Somalia, Nigeria, Eastern and Southern Africa (Michel, 2004). *Ficus* are all perennial trees or shrubs, mainly evergreen but shedding foliage at the end of the growing season. They are classified into three according to their growth form. They can grow as rock-splitters, stranglers or free standing terrestrial trees and the leaves are mostly entire, some rarely lobed with irregular margins (Michel, 2004). It has been reported that people use plants species because they possess some pharmacological activity against infectious diseases, abdominal pains and diarrhea (Kuete *et al*., 2011). Many reports however, came from the use of the genus in traditional medicines throughout the continent of Africa and a few for domestic purposes (Burrows and Burrows 2003; Ipulet, 2007). In the area of traditional medicine, they have been used for the treatment of skin inflammations in the study area. For example, the milky latex has antifungal properties which are used against some skin infections such as ringworms (Burrows and Burrows, 2003). The genus *Ficus ovata* is a plant of many species with many phytochemicals which can serve as precursors for

drug development because of its varied biological activities. Because of the potential of this plant and the rise in case of infectious diseases especially in developing countries like Nigeria and many other African countries there are need to explore the medicinal value of this plant, because of its high demand for its nutritional and medicinal values in this part of Adamawa State. It is used as soup condiments, livestock feeds by the communities in the study area and for medicinal purposes. Plants based medicines have been used in the alleviation of different types diseases. It is on record that plants contain both organic and inorganic substances which are used as precursor for the manufacture of minerals supplements, vitamins and certain hormone precursors in addition to energy and protein to human body (Magili *et al*., 2014). Macro and micro elements and other minerals play important role in the building up and restoration of human health (Haq and Ullah, 2011).

According to the concept of modern pharmacology, the chemistry of the direct correlation between elemental content of medicinal plants and their curative property is not yet understood. (Aziz et al.,2016). Thus the plants can be considered as potential sources of food and drug. These plants can be used in the pharmaceutical industry sector in order to synthesize new drugs. Therefore, quantitative determination of the concentration of different elements is significant for the determination of the effectiveness of medicinal plants in curing various diseases and also to understand the pharmacological action and its health implications (Khan *et al*., 2011). In this study, phytochemical, proximate, and mineral composition of the leaves of *F. ovata* were investigated to ascertain the levels of these components. The chemical composition of some of the members of genus *Ficus* has been widely studied. Most members have been investigated pharmacologically and phytochemicals, because of their chemical constituents which, are used for herbal medicine. It has been reported that plants from this genus are rich sources of characteristic classes of secondary metabolites such as crenelated flavonoids and bioflavonoids, lignin's, terpenoids, alkaloids, coumarins, chromones, phenylpropanoids and tannins (Chen *et al.*, 2010; Kuete *et al.*, 2008). Other classes reported include steroids, triterpenoids, fatty acids, saponins and anthocyanins (Chawla *et al*., 2012). The plants possess some useful phytochemicals which are of high medicinal values to humans and veterinary animals, some of which are alkaloids, tannins, flavonoids, saponins and phenolic compounds (Gilslence et al., 2000). The proximate analysis of plant parts, foods, feeding stuffs and other compounds reveals the presence of protein, carbohydrate, fat, crude fiber and moisture in them (Akpata and Miachi, 2001). In developing countries medicinal plants are often used to provide first-line and basic health services, both to people living in remote areas where it is the only available health service, and to people living in poor areas where it offers the only affordable remedy (WHO, 2014). Even in areas where modern medicine is available, the interest on medicinal plants and their utilization have been increasing rapidly in recent years.

Lots of different plants have been and are still being used to improve both health and nutrition, while a lot has been reported about nutritional and health benefits of other plants. There are fewer reports on the possible benefits of *F. ovata* in the study area. Fali people in northern Nigeria use the leaves of *F. ovata* as a source of soup ingredients, medicinal purposes; and also uses for livestock feeds. Keeping in mind the wide use of this plant in domestic and traditional medicine, there is need to analyze these components to ascertain their content.

Materials and Methods

Collection of plant materials

The fresh plant sample of *Ficus ovata* leaves was collected in May 2020 from Barama, Mubi North Local Government Area, Adamawa State, Nigeria. The plant was authenticated by Dr. Comfort S.Yusuf, Department of Botany, Adamawa State University, Mubi.The voucher specimen was deposited in the Department of pure and Applied Chemistry, Adamawa State University Mubi.

Pretreatment of the plant material

The leaves were separated from the stalks, washed and shade-dried in Chemistry Laboratory, Adamawa State University, Mubi. After drying, the sample was ground into a pulverize form using mortar and pestle and store in a tight container at room temperature until use.

Preparation and analysis of Samples

Ashing and Digestion of Plant Sample

Twenty grams (20 g) of the *F. ovata* was taken separately in a cleaned porcelain crucible which was heated to about 650°C and cooled and then weighed. The crucibles along with samples were placed in Bunsen burner (at low flow rate gas) until the smoke finished. Then the crucibles were placed in a muffle furnace whose temperature was controlled at 525°C for around 8-10 hours to get carbon free ash. The samples were then cooled properly in desiccators and weighed. This processes were repeated until a constant weight was attained. Two grams of the ash samples were digested using a mixture of nitric acid and hydrochloric acid (2:1 v/v) until a clear solution was obtained (Ehi-Eromosele *et al.*,2012). The digest was allowed to cool and then transferred into a 100 ml standard flask and made up to mark with distilled water and used for the analysis of the elements through Atomic Absorption Spectrophotometer ((Buck Scientific model. 210 VGP) using suitable Hallow Cathode Lamps and sodium and potassium determined by Flame Photometer (Model Jenway, PFP7) were used to determine Ca, Mg, Fe, P, Mn Zn, Na and K respectively.

Proximate Analysis

The proximate composition (moisture, crude fibre, crude fat, Ash content, protein and carbohydrate) of powdery samples of *F. ovata* were determined according to the procedure described by, the Association of Official Analytical Chemists (AOAC, 2000) method.

Qualitative Phytochemical Analysis

The phytochemical screening was carried out on the aqueous extracts to determine Alkaloids, Tannins, Saponins, Flavonoids, Terpenoids, flavonoids and glycosides according to the methods described by Sofowora,(1993) and Harborne, (1973).

Quantitative Phytochemical Analysis using HPLC

Quantitative phytochemical analysis *F. ovata* was carried out to determine Alkaloids, Tannins, Saponins, Flavonoids, Terpenoids, Glycosides on the hexane extracts in a 1.0 ml vial by High Performance Liquid Chromatography (HPLC) BLC10/11 (USA) according to method described by Nag (2006).

Results and Discussion

The result of proximate composition of *Ficus ovata* leaves is presented on Table

Table 1: Proximate composition of *Ficus Ovata* leaves

Parameters	Composition (%)
Crude fat	3.75±0.000
Crude protein	21.36±0.010
Crude fiber	27.53±0.005
Ash content	11.26±0.010
Moisture content	9.25±0.000
Carbohydrate	26.86±0.025

Values are means of three determinations ± S.D

Proximate Composition

The proximate analysis of *F. ovata* leaves is given on Table1.The result shows that it contains carbohydrate (26.86%), crude protein (21.36%), ash (11.26%), crude fibre (27’53%), Crude fat (3.75%) and moisture (9. 25%). Crude fibre has the highest value, while crude fat has the least. The high content of crude fibre (27.53 %) implies that they can serve as a source of dietary fibre and can be employed in the management of diabetes, obesity and gastrointestinal tract diseases (Ojo *et al.,* 2014). Adequate intake of dietary fibre can lower the serum cholesterol level and aids absorption of trace elements in the gut as well as reduced the risk of coronary heart disease, hypertension and breast cancer (Okiki *et al*., 2015). The ash content of 9.25% indicates that the leaves are rich in mineral elements. The value obtained is higher compared to 1.80% reported in sweet potato leaves (Asibey-Berko and Tayle,1999) and 5% in *tribulus terrestris* leaves (Nwaogu et al,2000), but lower than some leafy vegetables commonly consumed in Nigeria such as *Talinum trangulare* (20%) (Akindahunsi and Salawu, 2005). The amount of carbohydrate detected (26.86 %) showed that the leaves *F. ovata* could be consumed as a sources of carbohydrate food, in human, carbohydrates are utilized as major sources of biological energy through their oxidation

in the cells (Ajayi *et al.,* 2012). crude protein (21.36 %) which is the third highest parameter, would serve as enzymatic catalyst, mediate cell responses, control growth and cell differentiation. Ojo *et al., (2014),* also reported that the health implication of consuming high protein food include the involvement of its essential and non-essential amino acids as building blocks for protein synthesis, not only for the growth of infants and children but also for the constant replacement of turnover of the body. Amino acid are also precursors of hormones and many other biomolecules in humans. The lowest parameter noted was crude fat content (3.75%). Dietary fats function in the increase of palatability of food by absorbing and retaining flavors and excess in the consumption of fat is implicated in certain cardiovascular disorders such as cancer and aging (Okiki *et al*., 2015). The ash content (11.26±0.010) of the leaves *F. ovata* under study is closely related to that of *Ficus exasperate (*11.76%) as reported by Ajayi et al., (2012) the little differences (0.5%) might be as a result of climatic condition. Moisture content (9.25%) was also noted as the fifth highest parameter. Too much of moisture in any sample has been proved to cause caking and can also determine the shelf life and the viability of microorganisms' growth, the moisture content is also of close relation to that of *Ficus exasperate* (10.65%) as reported by Ajayi et al., (2012) the differences observed (1.39%) in the composition may be due to the differences in the environment of their growth.

Table 2 Mineral composition of *Ficus ovata* leaves (mg/kg)

Element	Composition
Sodium (Na)	71.26±0.010
Potassium (K)	653.27±0.015
Calcium (Ca)	61.26±0.010
Magnesium (Mg)	324.54±0.015
Phosphorus (P)	845.22±0.005
Zinc (Zn)	12.32±0.010
Iron (Fe)	2.43±0.010
Manganese (Mn)	14.54±0.015

Mineral Composition

The elemental composition of *F. ovata* was analyzed by the use of Atomic Absorption Spectrometer. A total of 8 elements (Table 2), Sodium (Na), Potassium (K), Calcium (Ca), Magnesium (Mg), Iron (Fe), Manganese (Mn), Zinc (Zn) and phospharus (P) were investigated to understand their pharmacological action (Rajua *et al.,* 2006). These elements play an important role in the development of secondary metabolites which are accountable for pharmacological actions of these elements in the plant. Sodium (Na) plays a key role in controlling blood pressure and regulates the function of muscles (Rajua *et al.,* 2006). Potassium (K) was another macro element found which helps to control body weight and improve water and electrolyte balance in the blood and tissues (Ekinci *et al.,* 2004). The concentration of K was found to be 653.27±0.015 (mg/Kg) which is the most abundant element amongst all. The concentration of sodium and potassium obtained were (71.26±0.010) and (653.27, mg/kg) respectively which exceeded the report by Ajayi *et al.,* (2012) (16.70, mg/kg) and (41.40, mg/kg). This shows that the leaf of *Ficus ovata* can be used to maintain osmotic balance of the body fluids, pH of the body, regulate muscle and nerve irritability and control of glucose absorption.

The role of Ca is to maintain strong bones and teeth. It lowers the risk of osteoporosis in elderly people (Khan *et al.,* 2011; Arthur and Luciano (2001). The concentration of Ca was found to be 61.26±0.010 (mg/Kg) which is lower than that of K. The presence of calcium (61.26, mg/kg) explains that the leaves is important in blood clotting, muscle contraction and in the metabolic processes of certain enzymes (Ojo *et al.,* 2014). Calcium in conjunction with phosphorus and magnesium are activator of many enzyme systems and maintains the electrical potential in the nerves (Freitas *et al.,* 2002).

Magnesium (Mg) was another important element found in the leaf of *F. ovata* (324.54±0.015 mg/Kg). It plays necessary and important roles in most reaction involving phosphate transfer. It helps in improving insulin sensitivity against complications related to diabetes. The concentration of Mg was found to be highest in F. ovata which justifies the

use of this in the management of diabetes. Iron (Fe) is another important element in the diet of pregnant women, nursing mothers, infants and the elderly to prevent anemia diseases moderate concentration of Fe was found to be 2.43±0.010 mg/Kg.

Manganese (Mn) is also another essential nutrient, which the body requires to function properly. Mn is available in acid soils due its higher solubility of Mn compounds under low P^H conditions. It is easily translocated to meristemic tissues of, young plant organs are thus rich in Mn. It is useful in chronic obstructive pulmonary disease and as a trace element in total parenteral nutrition preparations (Fraga ,2005). The average concentration of Mn was found to be 14.54±0.015 mg/Kg. Zinc (Zn) is needed for the proper growth and maintenance of the human body. The Zn content of *F. ovata* is an indication that it can play an important role in the management of diabetes mellitus which results from the deficiency in the secretion of insulin action or both. Zn is also important for the synthesis of Deoxyribonucleic acid (DNA) and Ribonucleic acid (RNA), insulin and functions of many enzymes. It is needed for immune function, wound healing, blood clotting, thyroid function and some other biological functions (Offor *et al*., 2014). The concentration of Zn was found to be 12.32±0.010 Mg/Kg which is moderate. This indicates that the plant can be a good sources of Zn. The elemental composition found in the present study might vary from those determined in other places. This might be due to the differences in the environment, climate, nature of soil and atmosphere, age of the plant and the time of sample collection. Zinc content of *F. ovata* was found to be lower (12.32, mg/kg) compared to (66.30 mg/kg) in *Ficus Exasperata* as reported by Ajayi *et al.*, (2012). Zinc plays an important role in gene expression and in regulation of cellular growth. Minerals are inorganic substances, present in all body tissues and fluids and their presence is necessary for the maintenance of certain physicochemical processes which are essential to life. Minerals are chemical constituents used by the body in many ways. Although they yield no energy, they have important roles to play in many activities in the body (Soetan *et al*., 2010)

The mineral composition revealed the presence of Phosphorus, Magnesium, Calcium, Sodium, Manganese, Zinc, Iron, and Potassium in appreciable quantities. This precludes that the leaves could be a good source of nutrition for body building and a booster to immune system. Ojo *et al.*, (2014) and Ajayi *et al.,* (2012) reported that Phosphorus content in *Ficus Asperifolia* and *Ficus Exasperata* was lower, but higher in *F. ovata* leaves. Phosphorus as Phosphate plays a major in structure and function of all living cells. Phosphorus has been reported to be good for bones and teeth formation. It contributes to energy production by participating in the breakdown of carbohydrate, protein and fats. Phosphorus is also needed to balance and metabolize vitamins and minerals such as vitamin D, Calcium, Iodine, Magnesium and Zinc (Fraga , 2005).

Iron plays important role in several enzyme systems.It is important in biosynthesis of chlorophyll. The concentration of iron is very low in comparism to other mineral elements in *F. ovata.*Most studies indicated that iron deficiency leads not only to behavioral changes but also to biochemical changes in the brain (Perez 2001). Iron plays an important role in many intracellular reactions of oxygen transport. It facilitates the oxidation of carbohydrate, proteins and fats (Ojo *et al.,* 2014).

Qualitative Analysis of Phytochemicals

Table 3 Qualitative Phytocemical screening of *F. ovata* leaves

Phytochemical	Extract content
Alkaloids	++
Tannin	+++
Saponin	+
Flavonoids	+
Terpens	+
Glycosides	++

+ = trace amount, ++ = moderate amount, +++ = appreciable amount,

The phytochemicals present were flavonoids, terpenoids, tannins, glycosides alkaloids and saponins. Phytochemical screening of *F. ovata* leaves as shown in Table 3 shows that the leaves contained an appreciable amount of tannins, moderate amount of glycoside and alkaloids, trace amount of flavonoids, saponins and terpenes. Owolabi et al., (2007) reported that these compounds have been shown to be active against potentially significant pathogens including those that are responsible for enteric infections. Apart from their potential antibacterial activity, compounds present in this study such as alkaloids are known as antimalarial agents, analgesics and can act as stimulants (Annan and Houghton; 2008). Glycoside moieties such as saponins, cardiac glycosides and flavonoids can inhibit tumor growth, act as an antiparasitic agent, and can be used as an antidepressant.

Medicinal plants have been serving as the main source for drugs over many centuries in many countries, in both developed and developing world. The medicinal property of herbs is due to the presence of different complex chemical substance as secondary metabolites, which are exclusively accumulated in different parts of the plants, (Haniyeh *et al*., 2010). The leave extracts contain wide range of secondary metabolites such as flavonoids, terpenoids, tannins, glycosides alkaloids and saponins. These natural metabolites are vital for antimicrobial crude drug and source for natural compounds as new anti-infection agents (Dwivedi *et al*., 2011)

Quantitative Phytochemical Analysis

Phytochemicals are non-nutritive plant chemicals that have protective or disease preventive properties. They are non-essential nutrients, meaning that they are not required by the human body for sustaining life. It is well known that plant produce these chemicals to protect themselves but recent research demonstrate that they can also protect human against diseases.

Table 4: Quantitative Phytochemical Composition of *F. ovata* leaves (mg/100g)

Phytochemical	Extract composition mg/100 g)
Alkaloids	8.46±0.010
Tannin	18.34±0.025
Saponin	4.56±0.015
Flavonoids	3.92±0.010
Terpenoids	2.76±0.010
Glycosides	8.16±0.005

From the studies the phytochemicals, tannins have the highest composition in *Ficus ovata* leaves (18.34±0.025 mg/100 g). Tannins are well known for their astringent property, they had been used as a base for several herbal treatments and also use to prevent cancer by preventing cellular damage. Alkaloids and Glycosides has the second and third highest composition. Several workers have reported the analgesic and antibacterial properties of alkaloids (Dwivedi *et al*., 2011). Glycosides are known to lower the blood pressure according to many reports (Ojo *et al.*, 2014). Saponins have the property of precipitating and coagulating red blood cells. Some of the characteristics of saponins include formation of foams in aqueous solutions, cholesterol binding properties and bitterness as reported by (Ojo *et al.*, 2014). Flavonoids content was (3.92±0.010 mg/100 g). This significant amount of flavoids is appreciable because flavoids behave as powerful protective agent against inflammatory disorders. They reduce odema formation and inhibit the synthesis of prostaglandin. Examination of the phytochemicals of *F. ovata* leaves, suggest that it is a rich source of phytochemicals. These

Phytochemicals possess biological functions which include anti-inflammatory, anti- oxidative and antiviral properties (flavonoids). Some of the phytochemicals act as pain relievers (alkaloids) while some confer protection against platelet aggregation (Okiki *et al*., 2015).

Conclusion

Based on the findings, the result of this research work showed that the leaves of *F. ovata* contained appreciable amounts of nutrients such as carbohydrate, protein, fibres and mineral element which are required as mineral supplements for

humans and livestock. This suggest that the plant leaves could be useful as feed supplement to improve health and growth performance in humans and livestock. The presence of the phytochemical constituents such as alkaloids, glycosides, and flavonoids of the plant leaves can explain the rationale for the use of this plant leaves in the treatment of infectious disease. Therefore, the outcome of this research work suggests that the leaves of *F. ovata* could probably be a veritable and cheaper substitute for mineral supplements.

References

Ajayi, O.B., Oluyeje, J.O., Olaleni, O.M., Ilesanmi, T.M (2012) Nutritional composition, phytochemical screening and Antimicrobial properties of the leaf of *Ficus exasperate (Vahl). Asian journal of biological and life sciences* 1(3): 242-244.

Annan K., Houghton P. J. (2008). Antibacterial, antioxidant and fibroblast growth stimulation of aqueous extracts of *Ficus asperifolia* Miq. and *Gossypium arboreum* L., wound-healing plants of Ghana. *Journal of Ethnopharmacology* 119: 141-144.

AOAC. (2000). *Official methods of analysis of AOAC. International 17th edition*; Gaithersburg, USA Association of Analytical Communities.Methods:925.10

Arthur J, Luciano D.S. (2001), Human physiology.The mechanisms of body function. Human physiology: The mechanisms of body function. 8th ed. Boston: McGraw-Hill;203-213

Aziz S, Saha K, Sultana N, Nur H.P, Ahsan M.A, Ahmed S, Hossain M.K(2016) Comparative studies of elemental composition in leaves and flowers of *Catharanthus roseus* growing in Bangladesh. Asian Pacific Journal of Tropical Biomedicine.; 6(1):50-54.

Burrows J., Burrows S. (2003). *Figs of southern and south-central Africa*. Umdaus Press. P.O Box 11059, Hatfield 0028, South Africa. Pp 379.

Channabasavaraj K. P., Badami S., Bhojraj S. (2008). Hepatoprotective and antioxidant activity of methanol extract of *Ficus glomerata*. *Journal of Natural Medicines* 62**:** 379 - 383.

Chawla A., Kaur R., Sharma A. K. (2012). *Ficus carica* Linn: A review on its pharmacognostic, phytochemical and pharmacological aspects. *International Journal of Pharmaceutical and Phytopharmacological Research* 1(4): 215 – 232.

Chen L. W., Cheng M. J., Pengc C. F., Chen I. S. (2010). Secondary metabolites and antimycobacterial activities from the roots of *Ficus nervosa*. *Journal of Chemistry and Biodiversity* 7: 1814 - 1821.

Dwivedi, S.C., Dudey, R., Richa tyagi, Meeta Masand & Uma Advani. (2011). Medicinal Bioactives as antimicrobial agents: an overview. *International Journal of Pharmaceutical Research and development*. 3(7) 24-30

Ehi-Eromosele, C.O., Adaramodu A.A., Anake W.U., Ajanaku C.O., Edobor-Osoh, A., (2012) Comparism of Three Methods of Digestion for Trace Metal Analysis in Surface Dust collected from an Ewaste Recycling Site. *A journal of Nature and Science*,10(10):42-47

. Ekinci N, Ekinci R, Polat R, Budak G (2004) Analysis of trace elements in medicinal plants with energy dispersive X-ray fluorescence. *Journal of Radioanalytical and Nuclear Chemistry*. ;260(1):127- 31.

Freitas, A.M., Schor, N and Boim, M. A. (2002). The effect of *Phyllanthus niruri* on urinary inhibitor of calcium oxalate Crystallization and other factors associated with renal stone formation .*BJU int*.; 89 (9): 829-834.

Fraga C.G.(2005), Relevance, essentiality and toxicity of trace elements in human health.*Molecular Aspects of Medicine.* 26 (4-5):235-344.

Haq F, Ullah R.(2011) Comparative determination of trace elements from *Allium sativum,*
Rheum australe and *Terminalia chebula* by Atomic Absorption Spectroscopy. *International Journal of Bioscience*.;1(5): 77-82.

Haniyeh, K., Seyyed, M., Seyyednejad, S. and Hussein M. (2010). Preliminary study on the antibacterial activity of some medicinal plants of Khuzestan (Iran). *Asian Pacific Journal of Tropical Medicine*. 3(3)180-184.

Ipulet P. (2007). Uses of the genus *Ficus* (Moraceae) in Buganda region, central Uganda. *African Journal of Ecology* 45: 44 - 47.

Khan K.Y, Khan M.A, Niamat R, Munir M, Mazari H.F, Seema N, Bashir T, Kanwal A, Ahmed S.N (2011). Element content analysis of plants of genus *Ficus* using atomic absorption spectrometer. *African Journal of Pharmacy and Pharmacology*.5(3):317-321.

Kuete V. Ngameni B., Simo C.C. F., Tankeu R. K., Tchaleu N. B., Meyer J.J.M., Lall N., Kuiate J.R. (2009). Antimicrobial activity of the crude extracts and compounds from *Ficus chlamydocarpa* and *Ficus cordata* (Moraceae). *Journal of Ethnopharmacology* 120**:** 17 - 24.

Kuete V., Kamga J., Sandjo L. P, Ngameni B., Poumale H. M. P., Ambassa P, Ngadjui B. T. (2011). Antimicrobial activities of the methanol extract, fractions and compounds from *Ficus polita* Vahl. (Moraceae). *BMC Complementary and Alternative Medicine* 11(6):1-6

Magili S.T., Onen A.I., Maina H.M., Barminas J.T. and Maitera O.N. (2014). Study of some trace and macro elements in selected antidiabetic medicinal plants used in Adamawa State, Nigeria by neutron activation analysis (NAA*). Peak Journal of Medicinal Plant Research*. 2 (2):13-22.

Michel, A (2004). Trees, Shrubs and Lianas of West African dry zones. Margraf Publishers GMBH, 135-151

Nag, A (2006) Analytical Techniques in Agriculture ,Biotechnology and Environmental Engineering .Prentice –Hall of India. Privte Limited, New Delhi. PP 147.

Neuwinger H. D. (2000). *African traditional medicine*: A dictionary of plant use and applications. Medpharm scientific publishers, Birkenwaldtstr. 44, 70191 Stuttgart, Germany. P 589.

Offor, I.F, , R.C, Njoku, C.N.(2014) Proximate ,Nutritional Analysis and Heavy Metal composition of dried Moringa oleifera leaves from Oshiri Onicha L.G.A. Ebonyi State. Nigeria. IOSR *Journal of.Enviro Science Toxicol Food Technology* 8(1):57-62.

Ojeaga Imohiose, Haruna H. Gurama, Tajudeen B. Lamidi. (2014). Phytochemical and Antimicrobial studies on *Moringa leaves extracts. IOSR Journal of Environmental Science* 8(1):39-45.

Ojo O.A., Ajiboye B.O., Ojo A.B., Onikanni S.A., Olarewaju O.I (2014) phytochemical proximate Analysis and mineral composition of aqueous crude extract of *ficus asperifolia miq*. *Journal of advancement in medical and life sciences* 1(1): 1-3.

Okiki, P. A., Osibote, I. A., Balogun, O., Oyinloye, B. E., Idris, O., Adelegan Olufunke., Asoso, S. O and Olagbemide, P. T. (2015). Evaluation of proximate, minerals, vitamins and phytochemical composition of *Moringa oleifera* Lam. Cultivated in Ado Ekiti, Nigeria. *Advances in Biological Research* 9 (6): 436-443.

Owolabi, O. J., Omogbai, E. & Obasuyi, O. (2007). Antifungal and antibacterial activities of the ethanolic and aqueous extracts of *Kigelia Africana* (Bignoniaceae) stem bark. *African Journal of Biotechnology*. 6(14): 1677-1680.

Rajua, G.J.N, Saritaa, P, Murtya, G.A.V.R, Kumara, M.R, Reddya B.S, Charlesa M.J, Lakshminarayanaa ,S ,Reddy T.S, Reddy, S.B, Vijayanb. V (2006).Estimation of Trace Elements in some antidiabetic Medicinal plants using PIXE Techniques. *Appl. Radiation Isotopes* (64):893-900

Suzanne, N. S. (2010). Food Analysis Laboratory Manual Fourth Edition :3-12

World Health Organization (2014) Monographs on selected Medicinal Plants, Vol (2) :1-4