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Proximate, Phytochemical Screening and Mineral Analyses of *Ficur Sur* Forssk Leaves and Stem Bark

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ABSTRACT

Natural products such as plants remains the most readily available remedy to many of human problems. The free oxygen we breathe in comes from plants and many more nutritional and health benefits which are yet to be discovered. This is why the proximate analysis, phytochemical screening and mineral content of *Ficur sur forssk* leaves and stem bark were investigated. The proximate analysis, phytochemical screening and mineral content analysis were carried using standard methods. The proximate analysis of the leaves of revealed; 36.45%, 20.41% and 20.22% for carbohydrate, crude fibre and moisture content while that of the stem bark was 60.12%, 20.35% and 8.37% for carbohydrate, crude fibre and moisture content respectively. The presence of active phytochemical constituents such as alkaloids, glycosides, flavonoids, saponins, terpenoids, phenolics and eugenols were detected in both leaves and stem bark. Among the minerals present in both leaves and stem bark was potassium which gave the highest concentration of 19.3ppm and 17.7ppm respectively. Others were Na (15.90ppm, 12.60ppm), Ca (1.86ppm, 5.62ppm), Mg (2.91ppm, 1.63ppm), Fe (2.60ppm, 5.30 ppm) and Cr (0.08ppm, 0.05). This study suggests that the plant samples have useful phytochemicals and minerals which can have useful pharmacological effects and also serve as nutritional supplements.

Keywords: *Ficur sur*, Medicinal plant, Mineral analysis, Phytochemical, Proximate

INTRODUCTION

One of the greatest sources of food and drugs made available to mankind is plants. So many plants have been identified to be of great value to humanity by serving as foods, drugs and other purposes at the same time. However, the medicinal importance of some plants has not been fully utilized. *Ficur sur* Forssk (synonym: *Ficus capensis* Thumb.) is commonly known as "broom cluster fig" or "bush fig". In Nigeria, various tribes call it different names such as Ogbaikolo among the Igalas, Opoto in Yoruba, Akoro in Nsukka area of Enugu State, Obada in Edo State, Rimabichehi by the fulanis and Uwargara in Hausa (Mgbemena *et al*., 2022). It belongs to the genus of plant family Moraceae, and it has about 850 species. Most of the species of Ficus are used as a source of nutrition for humans. The roots, aerial roots, stem, bark, leaves, latex, fruit, and pulp of the Ficus plants are medicinally important due to the presence of a variety of bioactive phytochemical compounds, such as polyphenols, phenolic acids, triterpenoids, flavonoids, flavonols, anthocyanins, carotenoids, glycosides, polysaccharides, reducing compounds, and vitamins K, E, and C (Haq *et al*., 2019).

About 200 different varieties of Ficus are present as woody trees, shrubs and vines in the forests of tropical and subtropical regions (Awad *et al*., 2011). About 500 species of Ficus are found in the region of Asia and Australia (Al-Aboudi *et al*., 2011). Some species of Ficus are also grown as indoor as well as outdoor ornamental plants. Ficus species are rich in nutritional components and used as a source of food in Egypt, India, south China, Turkey and Malaysia. The plants of Ficus species are well known in the field of traditional medicine. Ficus species have been found to be a rich source of phenolic acid and flavonoids which make them able to protect against disorders of oxidative stress (Sirisha *et al*., 2010)

A finding which was consistent with the traditional usage of *Ficur sur* as a diuretic agent reveals that the crude leaf extracts enhanced urine excretion and urinary electrolyte concentrations in a dose-dependent manner (Ayele *et al*., 2020). The results of another study indicated that an ethanol extract of *Ficur sur* has a substantial anticonvulsant effect, validating the traditional use of the plant in the treatment of epilepsies. The processes may entail interaction with glycinergic, serotonergic, and glutaminergic system components (Ishola *et al*., 2013). The findings of another author demonstrated that the health of the pigs was better when fed with *F. sur* fruits as creatinine and cholesterol concentrations were lower (Diba *et al*., 2015).

The aim of this study is to investigate the proximate analysis, phytochemical screening of different solvents extracts and mineral analysis of *Ficur sur* leaves and stem bark collected from Benin city, Nigeria.

MATERIALS AND METHODS

The leaves and stem bark of *Ficur sur* were collected in Benin city and identified on September 28, 2023. It was identified and authenticated in the Department of Plant Biology and Biotechnology, University of Benin, Benin City, Edo State, Nigeria with herbarium voucher number (UBH-F331). About 360 grams each of the powdered leaves and stem bark were extracted with the five different solvents (methanol-water, methanol, water, ethylacetate and N-hexane) successively in a Soxhlet apparatus for eight hours. The crude extracts were respectively concentrated in a rotary evaporator (model, RE, 200).

The Phytochemical screening was done to detect the presence of the active chemical constituents such as alkaloids, glycosides, steroids, flavonoids, saponins, terpenoids, phenolics, tannins, eugenols and reducing sugar. The elements sodium (Na) and potassium (K), were assayed using Flame Photometer (SHERWOOD 7200) while magnesium (Mg), calcium (Ca), Iron (Fe) and copper (Cu), zinc (Zn), manganese (Mn), lead (Pb), nickel (Ni), cadmium (Cd) and chronium (Cr) were assayed using Atomic Absorption Spectrophotometer (BULK SCIENTIFIC VGP210) (Kolawole *et al.,* 2018 and Mgbemena *et al.,* 2020). The proximate analysis was carried out following the methods describes in (AOAC 1990).

Sample Preparation

The leaves and stem bark of the plant were dried at room temperature for two weeks. It was pulverized with an electric blender and used for a series of tests and analysis.

Phytochemical tests (Sofowara, 1982).

Test for flavonoids: A few drops of lead acetate solution were added to 2ml of plant extract. Observation was made for the formation of a yellow precipitate.

Test for Saponins: About 5 ml of the filtrate was diluted with 20ml of water and shaken vigorously. A stable froth upon standing indicated the presence of saponins.

Test for Alkaloids: Dragendorff's test: A few mg of extracts sample was taken and dissolved in 5ml water. Then 2M hydrochloric acid was added until an acid reaction developed. In this mixture, 1ml of Dragendorff's reagent (potassium bismuth iodine solutions) was added. The formation of orange red precipitate indicated the presence of alkaloid.

Test for Tannins: Ferric chloride test. About 1g of powdered crude plant sample was boiled with 50ml of water, filtered and the filtrate was used for the following test:

Ferric chloride test: To 3ml of the filtrate, two drops of ferric chloride were added. The presence of green precipitate indicated the presence of tannins. However, tannins were absent in all extracts of leaves and stem back.

Test for phenolic compounds: about 3 drops of ferric chloride solution was added to 2 ml of the plant extract. The observation was made for the formation of a bluish-black coloured solution.

Test for Glycosides: About 1ml of the extract was mixed with 2ml of glacial acetic acid in a test tube, then 1 drop of 15%f ferric chloride and 1ml of concentrated sulfuric acid were added to the mixture. The observation was made for the formation of a brown coloration at the interface.

Test for Reducing Sugar: about 1ml of the plant extract was added to a boiling mixture of 1ml each of Fehling's solutions A and B in a test tube. A colour change from blue to green was observed.

Test for Steroids: 1 ml of the extract in a test tube was mixed with 2 ml of acetic acid and 2 ml of concentrated sulphuric acid. The observation was made for a colour change from violet to blue-green.

Proximate Analysis

The analyses for the proximate contents of the dried powder of *Ficur sur* leaves and stem bark were carried out using methods described by the Association of Official Analytical Chemists (AOAC, 1999). The samples were analysed for moisture content, carbohydrates, crude fibre, crude proteins, total ash content and crude fats (lipids).

RESULTS AND DISCUSSION

The phytochemical analyses of the various extracts of *Ficur sur* leaves and stem bark revealed the presence of alkaloids, flavonoids, phenols, steroids, glycosides, terpenoids, and reducing sugars. The results of the phytochemical screening, proximate and mineral analysis are shown in Tables 1 and 2.

In this study, glycosides were present in all extracts of the leaves and stem bark which contradicts the report of (Jocelyn *et al*., 2018) who reported on the ethanolic extracts of *Ficur sur* leaves and stem bark. It also corresponds with the report of (Haq *et al*., 2019). Glycosides play numerous important roles in living organisms. Many plants store important chemicals in the form of inactive glycosides. Whenever these chemicals are needed, the glycosides are brought in contact with water and an enzyme. The sugar part is broken off, making the chemical available for use. Many

of such plant glycosides are used as medications. In animals (including humans), poisons are often bound to sugar molecules in order to remove them from the body (IUPAC, 2009). Saponins were present in all extracts of stem bark except ethylacetate and N- hexane while it was present in all extracts of leaves except ethylacetate. The reports of (Solomon-Wisdom *et al*., 2011) shows that saponin were present in methanol extracts of *Ficur sur*. In a nutshell, saponins are bioactive compounds found in plants. Saponins have anti-inflammatory and anticancer qualities since they show cytotoxic effects and growth inhibition against a range of cells (Iniaghe *et al*., 2009).

Phenolics were absent in all extracts of stem bark except ethylacetate and N-hexane while it was present in all extracts of leaves except water. Phenolics were also present in the methanolic extracts of *Ficur sur* leaves and stem bark as reported by (Vincenzo *et al*., 2022). Terpenoids was present in all extracts of stem bark and leaves except water and ethylacetate. This corresponds to the reports of (Amarvani *et al*., 2020). Eugenols was absent in all extracts of stem bark except methanol and water while it was present in all extracts of leaves except water and water/methanol extracts. Eugenol is a versatile naturally occurring molecule as phenolic monoterpenoid and frequently found in essential oils in a wide range of plant species. Eugenol bears huge industrial applications particularly in pharmaceutics, dentistry, flavoring of foods, agriculture, and cosmetics (Muhammad *et al*., 2021).

Steroids was absent in all extracts of stem bark while it was equally was absent in all extracts of leaves except methanol and N-hexane. This is in accordance with (Jocelyn *et al*., 2018) and contradicts (Bunawan *et al*., 2014). Alkaloids were present in all extracts of stem bark and leaves. Most plants extract contains alkaloids and this corresponds with (Jocelyn *et al*., 2018). Flavonoids was absent in all extracts of stem bark and leaves except ethylacetate. Flavonoids are powerful antioxidants and free radical scavengers. They also help to boost the immune system (Panche *et al*., 2016). Tannins were absent in all extracts of stem bark and leaves. This corresponds tom (Haq *et al*., 2019, Jocelyn *et al*., 2018 and Vincenzo *et al*., 2022). Reducing sugars was present in all extracts of stem bark except ethylacetate and N-hexane while it was present in all extracts of leaves.

Table 1: The results of the phytochemical screening of *Ficur sur* leave extracts

Constituents	Test	Methanol-water (1:1)	Methanol	Water	Ethylacetate	N-hexane
Glycoside	General test	+	+	+	+	+
Saponins	Frothing	+	+	+	-	+
Phenolics	Ethanol/ferric Chloride	-	+	-	+	+
Terpenoids	Salkowski	+	+	-	-	+
Eugenols	KOH/HCl	-	+	-	-	+
Steroids	Acetic acid/H_2SO_4	-	+	-	-	+
Alkaloids	Picric acid or Dragendoff's	+	+	+	+	+
Flavonoids	Ammonium solution	-	-	-	+	-
Tannins	Ferric Chloride	-	-	-	-	-
Reducing Sugars	Fehling A and B	+	+	+	+	+

Table 2: The results of the phytochemical screening of *Ficur* sur stem bark extracts

Constituents	Test	Methanol-water (1:1)	Methanol	Water	Ethylacetate	N-hexane
Glycoside	General test	+	+	+	+	+
Saponins	Frothing	+	+	+	-	-
Phenolics	Ethanol/ferric Chloride	-	-	-	+	+
Terpenoids	Salkowski	+	+	-	-	+
Eugenols	KOH/HCl	-	+	-	-	+
Steroids	Acetic acid/H_2SO_4	-	-	-	-	-
Alkaloids	Picric acid or Dragendoff's	+	+	+	+	+
Flavonoids	Ammonium solution	-	-	-	+	-
Tannins	Ferric Chloride	-	-	-	-	-
Reducing Sugars	Fehling A and B	+	+	+	-	-

Keys: + present - absent

The results of the proximate and mineral analyses are presented in Tables 3 and 4. The proximate analysis of the leaves of revealed; 36.45%, 20.41% and 20.22% for carbohydrate, crude fibre and moisture content while that of the stem bark was 60.12%, 20.35% and 8.37% for carbohydrate, crude fibre and moisture content respectively. *Ficur sur* leaves and stem back is very rich in carbohydrate which was higher compared to the values reported for the other contents. This corresponds to the report of (Mgbemena *et al.*, 2020). This implies that *Ficur sur* leaves could serve as a good source of carbohydrates. Carbohydrates are easily digested and provide the necessary calories in the diets of humans.

A high level of crude fiber content can lower the body cholesterol and therefore reduce the risks of cardiovascular diseases and diabetes. Plant with high amounts of fiber has been recommended for the treatment of obesity, diabetes, cancer, and gastrointestinal disorders to prevent coronary heart disease, hypertension, constipation, and diabetes (Iniaghe *et al*., 2009, Rishi *et al*., 2012). The amount of moisture in plant material determines its absorption and assimilation rate within an organism. Thus, the plant moisture content determines storability and plant quality since high moisture content is associated with lower storage stability. Moisture contributes to slowing the growth and development of microorganisms and inhibiting hydrolysis of some components present in plant material, so that the material can be stockpiled for a long time with no risk of microbial attack (Egga *et al*., 2014). Hence the leaves of *Ficus sur leaves* cannot be stored fresh for a longer time because of its high moisture content, however it can be stored after it has been air-dried. However, the stem bark contains low moisture content which could be stored for a longer time compared to the leaves.

The health benefits of proteins include the involvement of their essential and non-essential amino acids as building blocks for protein synthesis. Proteins are important in the body for the production of hormones, enzymes, and blood plasma (Mgbemena *et al.*, 2020). The habit of drinking the aqueous extracts of the leaf for blood building should be encouraged as a result of the high protein contents in the leaves as indicated in the result. According to Fagbohun *et al*.,2012 ash content in leafy vegetables reflects the percentage of mineral elements present in the vegetables. High ash content in a leafy vegetable is an indication of high mineral content and hence high nutritional quality. However, this may not always be the case according to (Ukam 2008) who noted that it could be the reverse if it contained toxic metals which also contribute to the percentage ash content.

The mineral analysis results reveal that the *Ficur sur* leaves and stem bark contains Zn (0.5ppm, 1.40 ppm), Cu (0.01ppm, 0.04 ppm), Cr (0.08ppm, 0.05ppm), Mn (1.18ppm, 0.20ppm), Fe (2.60ppm, 5.30 ppm), Mg (2.91ppm, 1.63 ppm), Ca (1.86ppm, 5.62 ppm), K (19.3ppm, 17.70 ppm) and Na (15.90ppm, 12.60ppm). Cd and Pb where not detected within the detection limit for Cd and Pb of the AAS machine used. The mineral analysis results reveal that *Ficur sur* leaves and stem back is very rich in Potassium, which helps to maintain osmotic pressure and regulate acid-base equilibria. It plays an important role in nerve and muscle excitability and it is also involved in carbohydrate metabolism (McDonald *et al*., 2011). A high amount of potassium in the body was reported to increase iron utilization (Adebayo *et al.*, 2017). It is also beneficial to people taking diuretics to control hypertension and suffer from excessive excretion of potassium, through body fluid (Mgbemena *et al.*, 2020).

Calcium and magnesium play a significant role in photosynthesis, carbohydrate metabolism, nucleic acids, and binding agents of cell walls (Russel, 1973). Calcium assists in teeth and bone development (Brody 1994). However, its presence

in high concentration may be a risk factor for hypertensive patients since it results in calcification of the arteriole walls. Magnesium is an essential mineral for enzyme activity. Like calcium and chloride, magnesium also plays role in regulating the acid-alkaline balance in the body. High magnesium levels in drinking water have been linked to resistance to heart disease (Fallon 2001). Manganese is required for building the immune system, regulation of blood sugar levels, and production of energy. Copper is also required in the human body for enzyme production and the biological transfer of electrons within the body. Zinc plays a vital role in gene expression, and regulation of cellular growth and acts as a co-enzyme for carbohydrates, protein and nucleic acids metabolism. The mineral analysis of *F. sur* leaves and stem as reported by (Jocelyn *et al*., 2018) also corroborates the findings of this work.

Table 3: The results of the proximate analysis of *Ficur sur* leaves and stem bark

Test	(%) in leaves	(%) in stem bark
Moisture content	20.22	8.37
Ash content	2.98	6.21
Crude fibre	20.41	20.35
Crude protein	15.70	3.78
Fats/lipids	4.24	1.17
Carbohydrates	36.45	60.12

Table 4: The results of the mineral analysis of *Ficur sur* leaves and stem bark

Element	Concentration in ppm (leaves)	Concentration in ppm (stem bark)
Pb	ND	ND
Zn	0.50	1.40
Cd	ND	ND
Ni	0.01	0.01
Cu	0.01	0.04
Cr	0.08	0.05
Mn	1.18	0.20
Fe	2.60	5.30
Mg	2.91	1.63
Ca	1.86	5.62
K	19.30	17.70
Na	15.7	12.60

Key: ND means not detected within the detection limit for Cd and Pb of the AAS machine used

CONCLUSION

The results of proximate analysis, phytochemical screening and mineral analysis of *Ficur sur* forssk leaves and stem bark reveals that the plant contains essential minerals and phytochemicals which could be harness for medicinal and nutritional purposes. The existence of these components in the plant should therefore justify its use in alternative/traditional medicine, specifically in the treatment of heart disease, sexually transmitted illnesses, hypertension, anemia, and diarrhea.

REFERENCES

Adebayo-Tayo BC, Odeniyi AO. (2012) Phytochemical screening and microbial inhibitory activities of *Ficus capensis*. *Afri J Biomed*. Res.15:35- 40.

Al-Aboudi A, Afifi FU. (2011). Plants used for the treatment of diabetes in Jordan: A review of scientific evidence. *Pharmaceutical Biology*. 49(3):221-239.

Amarvani P Kanjikar, Ramesh L Londonkar (2020). Isolation, Purification and Characterization of Terpene from Ficus Krishnae. https://pharmacophorejournal.com/4MZL76L

Ao C., Li, A., Elzaawely, A. A., Xuan, T. D. and Tawata, S. (2008). Evaluation of antioxidant and antibacterial activities of Ficus microcarpa L. fil. extract. Food Control.19(10):940-948.

AOAC (1990): Official Methods of Analysis of the Association of Officials Analytical Chemists, 14th Ed. Association of Official Analytical Chemist, Washington D.C., pp: 223-225, 992-995.

Awad Nagwa E, Ahmed A Seida, Manal A Hamed, Marwa M Elbatanony (2011). Hypolipidaemic and antioxidant activities of Ficus microcarpa (L.) in hypercholesterolemic rats. *Natural Product Research*. 25(12):1202-1207.

Ayele, M.; Makonnen, E.; Ayele, A.G.; Tolcha, Y. (2020). Evaluation of the Diuretic Activity of the Aqueous and 80% Methanol Extracts of *Ficur sur* Forssk (Moraceae) Leaves in Saline-loaded Rats. *J. Exp. Pharmacol*. 12, 619. [CrossRef] [PubMed].

Blench, R. and Dendo, M. (2007). Hausa names for plants and trees 2nd Edn, Cambridge. 67pp.

Brody T. (1994). Nutritional biochemistry. San Diego, CA: Academic Press; 761-794.

Bunawan H., Amin, N. M. and Bunawan, S. N. (2014). Ficus deltoidea Jack: A review on its phytochemical and pharmacological importance. *Evidence-based Complementary and Alternative Medicine*.:1-9.

Cagno, V.; Civra, A.; Kumar, R.; Pradhan, S.; Donalisio, M.; Sinha, B.N.; Ghosh, M.; Lembo, D. (2015). *Ficus religiosa* L. bark extracts inhibit human rhinovirus and respiratory syncytial virus infection in vitro. *J. Ethnopharmacol*. 176, 252–257. [CrossRef] [PubMed].

Camero, M.; Marinaro, M.; Lovero, A.; Elia, G.; Losurdo, M.; Buonavoglia, C.; Tempesta, M. (2014). *In vitro* antiviral activity of Ficus carica latex against caprine herpesvirus-1. *Nat. Prod. Res*., 28, 2031–2035. [CrossRef] [PubMed].

Deepa, P., Sowndhararajan, K., Kim, S. and Park, S. J. (2018). A role of Ficus species in the management of diabetes mellitus: A review. Journal of Ethnopharmacology. 215:210-232.

Diba, D.; Mekasha, Y.; Urge, M.; Tolera, A. (2015). Feed intake, digestibility, growth performance, and blood profile of pigs fed mixtures of dried and ground fig (*Ficur sur*) fruits and graded levels of maize. *Trop. Anim. Health Prod*., 47, 339–346. [CrossRef] [PubMed].

Egga E. S., O. Adeyanju and O. E. Agyeno (2014). Preliminary Phytochemical, Antimicrobial and proximate of tender leaves of *Psidium guajava* L in Jos, Plateau State, *Nigeria Asian review of Environmental and Earth Sciences*,1(2) 35-38.

Fagbohun E.D, O.U. Lawal and M.E. Ore (2012): The proximate, mineral and phytochemical analysis of the leaves of *Ocimum grattissimum* L., *Melanthera scandens* A. and *Leea guineensis* L. and their medicinal value *International Journal of Applied Biology and Pharmaceutical Technology, 3:15-22.*

Fallon S, Enig MG. Nourishing traditions: The cookbook that challenges policitally correct nutrition and the diet dictocrats. 40-45.

Ghosh, M.; Civra, A.; Rittà, M.; Cagno, V.; Mavuduru, S.G.; Awasthi, P.; Lembo, D.; Donalisio, M. (2016). *Ficus religiosa* L. bark extracts inhibit infection by herpes simplex virus type 2 in vitro. Arch. Virol., 161, 3509–3514. [CrossRef] [PubMed].

Gregory M., Vithalrao, K. P., Gregory, F. and Kalaichelvanjoyc, V. K. (2009). Anti-ulcer (ulcer-preventive) activity of Ficus arnottiana Miq. (Moraceae) leaf methanolic extract. *American Journal of Pharmacology and Toxicology*. 4(3):89-93.

Haq Nawaz, Rashem Waheed and Mubashir Nawaz, (2019). Phytochemical Composition, Antioxidant Potential, and Medicinal Significance of Ficus. DOI: 10.5772/intechopen.86562.

Huang, N.-C.; Hung, W.-T.; Tsai, W.-L.; Lai, F.-Y.; Lin, Y.-S.; Huang, M.-S.; Chen, J.-J.; Lin, W.-Y.; Weng, J.-R.; Chang, T.-H. (2017). *Ficus septica* plant extracts for treating Dengue virus in vitro. PeerJ, 5, e3448. [CrossRef] [PubMed].

Iniaghe O.M, S.O. Malomo & J.O. Adebayo, (2009). Proximate Composition and Phytochemical Constituents of leaves of some Acalypha species, *Pakistan Journal of Nutrition*, 8, 256-25.

Ishola, I.O.; Olayemi, S.O.; Yemitan, O.K.; Ekpemandudiri, N.K. Mechanisms of anticonvulsant and sedative actions of the ethanolic stem-bark extract of *Ficur sur* Forssk (Moraceae) in rodents. Pak. J. Biol. Sci. 2013, 16, 1287–1294. [CrossRef] [PubMed].

IUPAC Gold Book - Glycosides. 2009. doi:10.1351/goldbook.G02661. ISBN 978-0-9678550-9-7

Jocelyn A., Odusami, Anita K. Asekunowo, Josephat U. Izunobi, Edimo A. Ekarica, Olayinka T. Asekun and Oluwole B. Familoni (2018) phytoconstituents, Proximate and Mineral Investigations of the Ethanol Extracts of the Bark and Leaves of *Ficur sur* Forssk. *Nigerian Journal of Botany* 17(1):9-14

Khairunisa, S.Q., Indriati, D.W., Tumewu, L., Widyawaruyanti, A. and Nasronudin, N. (2021) Screening of anti-HIV activities in ethanol extract and fractions from Ficus fistulosa leaves. *J. Basic Clin. Physiol. Pharmacol*., 32, 737–742. [CrossRef].

Lazreg Aref, H., Gaaliche, B., Fekih, A., Mars, M., Aouni, M., Pierre Chaumon, J. and Said, K. (2011). In vitro cytotoxic and antiviral activities of *Ficus carica* latex extracts. *Nat. Prod. Res*., 25, 310–319. [CrossRef] [PubMed].

McDonald A, R.A. Edwards, F.D. Greenhulgh, C.A. Morgan, L.A. Sinclair and R.G. Wilkinson (2011). *Animal Nutrition* 7th Edn. Pearson, Harlow, England. 692pp.

Mgbemena N.M, and N.F. Amako (2020). Comparative Analysis of the Phytochemicals, Proximate and Mineral Compositions of Scent Leaf (*Ocimiumgratissimum*) and Bitter Leaf (*Vernonia amygdalina*) Leaves. *International Journal of Biochemistry Research and Review* 29 (7)1-9.

Mohan, G.K., Pallavi, E., Ravi Kumar, B. Ramesh, M. Venkatesh, S. (2007). Hepatoprotective activity of Ficus carica Linn leaf extract against carbon tetrachloride-induced hepatotoxicity in rats. *DARU Journal of Pharmaceutical Sciences*. 15(3):162-166.

Muhammad Farrukh Nisar, Mahnoor Khadim, Muhammad Rafiq, Jinyin Chen, Yali Yang, Chunpeng Craig Wan (2021). "Pharmacological Properties and Health Benefits of Eugenol: A Comprehensive Review", Oxidative Medicine and Cellular Longevity, vol. 2021, Article ID 2497354, 14 pages, https://doi.org/10.1155/2021/2497354.

Panche A. N., A. D. Diwan, and S. R. Chandra (2016). Flavonoids: an overview. *J Nutr Sci*. 5:47. doi: 10.1017/jns.2016.41.

Rishi K. S, P. Deepak, P.Anirudh, & S. Abha (2012). Proximate analysis, nutritive value, total phenolic content and antioxidant activity of *Litchi Chinesissonn*. *Natural products an Indian journal*, 8, 361-369.

Russel EW. (1973). Soil conditions and plant growth. Supergene Zone, M. Nedra, 19 (in Russian).

Shukla, R., Shweta Gupta, J. K. Gambhir, K. M. Prabhu, and P. S. Murthy. (2004). Antioxidant effect of aqueous extract of the bark of Ficus benghalensis in hypercholesterolaemic rabbits. *Journal of Ethnopharmacology*.92(1):47-51.

Sirisha, N., Sreenivasulu, M. and Chetty, C. (2010). Antioxidant properties of Ficus species—A review. *International Journal of PharmTech Research*. 2(4):2174-2182.

Sofowora, E.A. (1982) Medicinal Plants and Traditional Medicine in Africa. John Wiley and Sons Ltd., Hoboken, 64-79.

Solomon-Wisdom, G. O., Shittu, G. A. and Agboola, Y. A. (2011). Antimicrobial and phytochemical screening activities of *Ficur sur* (Forssk). NY Sci. J. 4(1): 15–18.

Trivedi C, Shinde S, Sharma R. (1969). Preliminary phytochemical and pharmacological studies on Ficus racemosa (Gular). *The Indian Journal of Medical Research*. 57(6):1070-1074.

Ukam N.U, (2008): The potentials of some lesser-known vegetables. *Nigerian Journal of Nutritional Sciences*, 29(2), 299-305.

Vincenzo D. F., Elwira Sieniawska, Łukasz Świątek, Kouadio Ibrahime Sinan, Gokhan Zengin, Anastazja Boguszewska, Małgorzata Polz-Dacewicz, Nabeelah Bibi Sadeer, Ouattara Katinan Etienne, Mohamad Fawzi Mahomoodally (2022). Phytochemical Insights into *Ficur sur* Extracts and Their Biological Activity. PMCID: PMC894914 doi: 10.3390/molecules27061863.

Yarmolinsky, L.; Zaccai, M.; Ben-Shabat, S.; Mills, D.; Huleihel, M. (2009). Antiviral activity of ethanol extracts of Ficus binjamina and Lilium candidum in vitro. *New Biotechnol*., 26, 307–313. [CrossRef] [PubMed].

You T, Nicklas B. J. (2006). Chronic inflammation: Role of adipose tissue and modulation by weight loss. *Current Diabetes Reviews*. 2(1):29-37.