PHYTOCHEMICAL SCRRENING, PROXIMATE COMPOSITION AND MINERAL CONTENT ANALYSIS OF MIXED SOLVENTS EXTRACTS OF *FICUS CAPENSIS* LEAVES

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UNIVERSITY OF BENIN

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CERTIFICATION

This is to certify that this project work was carried out by ILENIKHIENA MIRACLE IROBOSA with the Matriculation of PSC1908745 of the Department of chemistry, University of Benin, Benin city, Nigeria.

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DEDICATION

This project is dedicated to God almighty, who ha always found a way to sustain and protect me.

To my parent, Mr and Mrs Malachi Ilenikhiena, I will make you proud. God bless you.

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I am deeply thankful to God almighty who has kept me going despite my shortcoming, down and trying time during my undergraduate years.

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To my Favourite girls, TRACY, CASSY and IYANU, God bless and keep you. Cheers to achieving all our dreams.

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ABSTRACT

The phytochemical, proximate, and mineral composition of the mixed solvents extract of the leaves of *Ficus capensis* collected from university of Benin, Edo state was investigated. The parameters investigated were determined using standard biochemical methods. Phytochemical studies carried out on mixed ethanol and methanol extract of *Ficus capensis* leaves showed high levels of flavonoids, terpenoids, tannins and alkaloids while glycosides, saponins, steroids were in trace amount, with no anthraquinone present. The proximate analysis of the leaves revealed that *Ficus capensis* leaves has a high carbohydrate content of (36.45%), moisture content of (20.22%), crude fiber (20.41) significant amount of crude protein (15.70%), lipids (4.24%) and very low amount ash content of (2.98%). This composition shows that the sample could be a good source of carbohydrate, moisture, and fiber. The mineral content showed the presence of zinc, calcium, magnesium, phosphorus, potassium and iron content. This indicates the tendency of *Ficus capensis* to be able to control osmotic balance, essential for bone formation, lower blood pressure and also act a source of antioxidant vitamins and minerals. Additionally, the pH, electrical conductivity of the soil, and Thin Layer Chromatography (TLC) analysis of the leaf extracts were conducted. In which the TLC was used to identify the component present in the extracts. The presence of these phytochemicals and minerals in this leafy vegetable supports the use of the leaves of *Ficus capensis* for food and ethnomedicinal purposes in many parts of Nigeria and across the globe.

CHAPTER ONE

INTRODUCTION AND LITERATURE REVIEW

Approximately one billion people, primarily in developing countries, rely on wild plants for their nutrition, according to reports from the Food and Agricultural Organization (Bharucha and Pretty, 2010). They are said to be vital components of the human diet since they provide the body with nutrients like vitamins, minerals, and certain hormones. precursors in addition to energy and protein (Akubugwo *et al*., 2007). According to Khan *et al*. (2016), the fact that wild edible plants are excellent sources of proteins, minerals, vitamins, dietary fiber, carbohydrates, essential fatty acids, antioxidants, phenolic compounds, and secondary metabolites has led to a rise in interest in these plants among people worldwide in recent years. For centuries, Medicinal plants are sources of raw materials for pharmaceutical drug formulation [World health organization (WHO), 2014].

Medicinal plants contain numerous biologically active compounds such as phytochemicals which have physiological actions on the human body and important active components used for treating various ailments. (Okigbo R.N, *et al*., 2008). *Ficus capensis* can also serve as vegetables being one of the most affordable and readily accessible sources of proteins, vitamins and minerals. Thus they pose great help in providing medicinal benefits (Thompson and Kelly, 1990). Herbs and vegetables also have plenty of phytonutrients which are extremely valuable for our body and good health. A majority of the world's population in developing countries rely on herbal medicines from medicinal plants to meet their health challenges (Uzoekwe N.M. *et al*.,2015). A great number of Nigeria higher plants are traditionally noted for their medicinal and pesticidal properties (Ayensu 1978, Okwute 1992, 1998), but regrettably only very few have so far been studied for their active constituents (Takeda and Fatope, 1988, Okwute, 1989).

Phytochemicals are chemical compounds that occur naturally in plants (phyto means “plant” in Greek). Some are responsible for colour and others for organoleptic properties, such as the deep

purple of blueberries and the smell of garlic (James, 2000). Examples of which may include flavonoids, tannins, saponins, terpenes, etc. Phytochemical composition of plants varies in their leaves, stems, roots, bark and seed (Mgbemena N M. *et al*., 2020). Phytochemical Screening is very crucial in the determination of the important and active bio ingredients in the plants. There are many phytochemicals and each works differently. Some of the possible actions are via antioxidants, hormonal action, and stimulation of enzymes, interference with DNA replication, antibacterial effect and physical action (Papp, *et al*., 2007).

1.1 BACKGROUND OF STUDY

In recent years, there has been a growing interest in alternative therapies and the therapeutic use of natural products. This has led to a continuous search for active biochemical compound from plants which could also be used for nutritional and medicinal purposes (Oktay, *et al*., 2003; Wangensteen, *et al*., 2004). Also, it is well known that plants contain essential oils and various extracts that may be used as alternative remedies for many infectious diseases. Due to reduced costs and fewer side effects, the use of medicinal plants are preferred to chemical drugs (Kumar *et al*., 2012); and regarding the complications and harmful effects of chemical drugs, the use of natural and herbal medicines have been seriously taken into consideration. In recent years, the use of herbal medicines has significantly increased (Firenzuoli *et al*., 2007). The antimicrobial compounds found in plants are interesting because of antibiotic resistance which is becoming a worldwide public health concern especially in terms of food, borne, illness and nosocomial infections (Mora, *et al*., 2005; Navon-Venezia, *et al*., 2005). Naturally occurring antimicrobials are being sought as replacements for synthetic preservatives such as parabens (ethyl, methyl, butyl and propyl parabens), butylated hydroxytoluene (BHT) and butylated hydroxanisole (BHA) that are under scrutiny as suspected cancer-causing agents (Wangensteen, *et al*., 2004; Bergfeld,

et al., 2005). Plants produce a multitude of organic compounds that have anti - inflammation and antimicrobial activities.

The Investigation of the phytochemical screening, mineral analysis, and biological activity in *Ficus capensis* is an intriguing venture that combines botany, chemistry, and pharmacology. *Ficus capensis* also known as the Bush fig, is a significant plant within the *Ficus* genus renowned for its various healing properties in traditional medicine worldwide. Analyzing its phytochemical composition offers valuable insights into potential medicinal uses. Researchers aim to pinpoint the chemical components responsible for the therapeutic effects of compounds like alkaloids, flavonoids, terpenoids, and phenolic compounds, paving the way for developing innovative drugs or supplements.

Moreover, delving into the mineral content of *Ficus capensis* provides a comprehensive understanding of its elemental makeup, shedding light on its nutritional value and potential health advantages. Minerals play crucial roles in human bodily processes, and studying the mineral composition of *Ficus capensis* could clarify its nutritional benefits and potential use as a dietary supplement or functional food. Additionally, exploring *Ficus capensis* biological activities, such as its antioxidant, antibacterial, anti-inflammatory, and anticancer properties, shows promise in uncovering its healing potential and expanding natural treatment options in medicinal botany. This interdisciplinary approach to studying *Ficus capensis* emphasizes its significance as an important scientific subject with implications for both traditional and modern medicine.

1.1.1 STATEMENT OF PROBLEM

The research on "phytochemical screening, proximate analysis and mineral analysis of *Ficus capensis* aims to comprehensively explore the chemical composition and potential health benefits of this plant species. Despite its traditional medicinal use and widespread distribution, little is

known about the specific phytochemicals, proximate composition and mineral present in *Ficus capensis.* This lack of knowledge hinders its full potential in modern healthcare and nutrition. With the rising interest in natural therapies and alternative healthcare options, it is crucial to bridge this gap. Understanding the phytochemicals, proximate composition and minerals present in *Ficus capensis* could unlock its therapeutic and nutritional potential, leading to evidence-based medicines and supplements. The study is designed to address this gap by meticulously analyzing the phytochemical, mineral, and proximate aspects of *Ficus capensis* paving the way for future research and potential applications in healthcare and nutrition.

1.1.2 JUSTIFICATION/RELEVENCE OF STUDY.

Traditionally*, Ficus carpensis* has been used for the treatment of dysentery and wound dressing (Igoli *et al*., 2005). It is also used to treat circumcision wounds, leprosy and epilepsy, rickets, infertility, gonorrhea, edema and respiratory disorders (Olowokudejo *et al*., 2008) and abortion (Owolabi *et al*., 2009). Apart from its traditional uses, scientific investigations have reported its; blood-boosting effect (Otitoju *et al*., 2014; Njoku-oji *et al*., 2016), anti-sickling (Umeokoli *et al*.,2013; Mpiana *et al*., 2008) antibacterial (Oyeleke *et al*.,2008), anti-abortifacient (Owolabi *et al*., 2009), immune-stimulatory (Daikwo *et al*., 2012), antidiarrhoea (Owolabi, 2013), antioxidant (Ramde-Tiendrebeogo *et al*., 2012) and pro-fertility in treating azoospermia (Gelfand *et al*.,1985; Akomolafe *et al*., 2016). Previous work relating to *Ficus carpensis* showed antispasmodic and antiplasmodial activities from aqueous and leaves (Sanon *et al*., 2003; Ayinde *et al*.,). Hence there is need to evaluate extensively the phytochemical, minerals present and antibacterial components of *Ficus capensis* leaves.

1.1.3 SCOPE OF STUDY

The scope of this work majors on the phytochemical screening, proximate composition, mineralogy, pH determination, electric conductivity analysis of the soil sample where *Ficus carpensis* was planted.

1.1.4 AIM

The aim of the research work is to discover the phytochemicals present in the *Ficus capensis* leaves extract using different solvent mixture, proximate analysis of the leaves extract, mineral content, pH and electrical conductivity of the soil of *Ficus capensis*, with respect to its usefulness in the health sector.

1.1.5 SPECIFIC OBJECTI VES

In order to achieve the above aims, the following objectives are done;

- Identify the key phytochemicals present in *Ficus capensis*, including alkaloids, flavonoids, tannins etc.
- Determine *Ficus capensis* proximate composition which include moisture, crude protein, crude fiber, lipids, carbohydrates and ash content.
- Examine the mineral profile of *ficus capensis* with emphasis on key minerals such as calcium, iron, sodium e.t.c
- Determine pH and electric conductivity of the *Ficus carpensis* soil.
- Determine the component present in the extract by using TLC

1.2 LITERATURE REVIEW

1.2.1 TAXONOMY/CLASSIFICATION OF Ficus CARPENSIS

KINGDOM Plantae

PHYLUM Spermatophyta

CLASS Magnoliopsida

SUBCLASS Dilleniidea

ORDER Urticales

FAMILY Moraceae

GENUS Ficus

SPECIES Ficus carpensis

Common Names; Cape fig, broom cluster or bush fig (Cronquist *et al***.** 1835**)**

1.2.2 MORPHOLOGY OF *FICUS CAPENSIS.*

Ficus capensis commonly called "bush fig tree", it can also named F. riparia, F. ituriensis , F. guineensis, and F. thonningiana while its common names are cape fig and broom cluster fig (Berg, 1991). It is classified under the genus *Ficus* (over 700 species), which falls under the family Moraceae, with over 1400-1500 species. The plant is a fast-growing, deciduous or evergreen tree and usually grows from 5-12 meters in height, but may attain a height of approximately 40 meters (Hankey, 2003). The fruits are carried on short, round of about 3cm which may emerge from surface roots, the trunk or especially from lower main branches (Hankey, 2003). The fruits are edible and utilized in fresh or dried form by native people of many regions of the world. It is rough; gray, pink or red. Its latex is white. This species belong to the genus *Ficus*, constituting the largest genus in the botanical family Moraceae, with over 1500 species. (amde-tiendrebeog *et al*., 2012). They are distributed in tropical and subtropical regions of the world and their morphological characteristics vary considerably (Arbonnier, 2000).

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. Leaves of *Ficus* capensis are used as vegetable both in soup and yam pottage in various parts of Nigeria (South East) (Otitoju *et al*., 2014).

Fig 1. Matured *Ficus capensis* leaves

1.2.3 ETHNOMEDICINAL USES OF THE PLANT

Ficus capensis leaves, stems, bark, fruits have been discovered to helpful in curing various diseases. Some parts are used to treat pregnancy-related ailments most especially cases of threatened abortion (Owolabi *et al*., 2009). The bark decoction is used in Senegal in baths for the new-born, children with rickets and feverish children. The bark pulped up with *Xylopia f*ruit is given in enemas for oederna (Burkill 1997; Fadimu *et al*.,2014). The latex is used for treating wounds, toothache, eye problems, general body pain, lung and throat problems, gonorrhoea and as an anti-emetic. Root preparations of *Ficus capensis* are used for the treatment of cough, sore throat, diarrhoea, stomach pain in babies, chest pain, infertility, uterine pain, gonorrhoea, oedema, and as an emmenagogue and emetic. The decoctions or infusions are used against pain,

rheumatism, diarrhoea, stomach problems, oedema in children, infertility and as a galactagogue; bark macerations are drunk for treatment of fever and cough, and the powdered bark is applied on skin rashes and mouth sore ((Ruffo *et al*., 2002). The leaves are chewed as a remedy for peptic ulcer, leaf maceration is drunk against chest problems, leaf infusions are drunk to treat tonsillitis and stomach pain. Sap squeezed from leaves is applied on wounds; leaf decoctions are used as a disinfectant wash and in the treatment of ophthalmia, the sap of young shoots is taken against gonorrhoea, preparations are used to treat infertility, tuberculosis, abscesses, sores, and as a lactogenic, purgative and aphrodisiac. The plant has been used extensively for the management of leprosy, epilepsy, rickets, infertility, gonorrhoea, oedema, respiratory disorders and as emollient (Olowokudejo *et al*., 2008). In Nigeria, *F. capensis* has been used by the Igede people Benue state as a treatment for dysentery and in wound dressing (Igoli *et al*., 2005). Gill *et al*., 1991 reported the use of the plant leaves in treating dysentery, oedema, epilepsy and rickets in infants among some tribes in Edo-Delta areas. *Ficus capensis* is believed by the Igala people of Kogi State to possess immune- boosting property, hence, forming part of most of their traditional remedies for several ailments (Daikwo OA *et al*., 2012)

1.2.4 PHARMOLOGICAL ACTIVITIES OF *FICUS CARPENSIS*

Ficus capensis has been scientifically proven to be biologically useful as drug/medicine because of its antimicrobial, antibacterial, antifungal, antioxidant and anti-sickling activities.

I. MICROBIAL INHIBITORY ACTIVITIES

Several studies have proven the microbial inhibitory activity of *F. capensis*. Microbial inhibitory activities of the stem, root and leaf of *F. capensis* against test disease-causing microorganisms were reported (Adebayo-Tayo BC *et al*., 2012). The bark extracts had the highest inhibitions on *Pseudomonas aeruginosa, Candida albicans* and *Staphylococcus aureus*. While *Streptococcus*

faecalis and *Proteus mirabilis* were resistant to many antibiotics (87.5%), they were effectively inhibited by all concentration of ethanolic extract of *F. capensis* extract. (Oyeleke *et al*. 2008)reported the inhibitory effect of the leaves and stem bark of *F. capensis* against *Esherichia coli* and *Shigella* species but no activity against *Salmonella typhi.* Solomon-Wisdom GO *et al*., 2011 reported the crude extract inhibited *S. aureus*, *Escherichia coli, Bacillus subtilis* and *Candida pseudotropicalis* at 2 mg/ml but *P. aeruginosa* and *Salmonella typhimorium* were not inhibited at the same concentration. Ogundare A.O *et al*., 2013 also reported antimicrobial activities of the methanol extract of *Ficus capensis* leaf against some clinical pathogenic bacteria namely: *Escherichia coli, Klebsiella pneumoniae, Proteus mirabilis, Staphylococcus aureus, Serratia marcescens, Pseudomonas aeruginosa, Micrococcus roseus* and *Bacillus cereus*. The leaf extract had inhibitory effect on all the test organisms except *Pseudomonas aeruginosa.*

II. ANTI-ULCER ACTIVITY

The anti-ulcer effects of the aqueous extract of the leaves of *Ficus capensis* were evaluated in rats using diclofenac sodium-induced ulcer model. The extract showed significant ($P<0.05$) dose-dependent anti-ulcer activity. The percentage ulcer inhibition of the extract at 100, 150 and 200 mg/kg were 25, 41.7 and 43.3% respectively, while that of ranitidine (150 mg/kg) was 66.7% (Eluka P et al., 2015).

III. ANTI-SICKLING ACTIVITY

Ficus capensis was reported to have shown significant ant sickling activity because of the anthocyanins and terpenoids present in the plant. It was said to have reversal anti-sickling activity (Mpiana PT *et al*., 2008). The anti-sickling test showed inhibition of sickling at 32.81% and 36.9% respectively on sickled red blood cell samples from patients using concentration of

50g/L and 100g/L. Significantly, high and anti-sickling properties of the plant have been reported(Umeokoli BO *et al*., 2015)

IV. ANTIDIARRHEAL ACTIVITY

The leaf aqueous extract of the plant produced a significant dose-dependent increase in percentage inhibition of the movement of charcoal meal in the small intestine of the mice $P < 0.05$. The extract showed a percentage inhibition of 23.52% 31.41% and 48.95% at a dose of 100 mg/kg, 200 mg/kg and 400 mg/kg. This is comparable to atropine at a dose of 0.1 mg/kg which showed a percentage inhibition of 44.02%. The aqueous extract also exhibited a dose-dependent increase in the average onset of stooling in the animal using castor oil model. The onset of stooling in atropine treated animals was 19 + 0 min. The leaf extract exhibited a significant dose dependent decrease in the number and weight of stool produced by the mice (Ayinde BA *et al*., 2013).

V. TOXICITY OF *F. capensis*

The acute toxicity test of the aqueous leaf extract showed no death or obvious signs of toxicity up to 5000 mg/kg body weight. Oral administration of aqueous extract of *F. capensis* up to 5 g/kg caused no death in mice. Also, no signs of obvious behavioral and physical adverse effects were observed (Eluka P. *et al*., 2015).

VII. LEUKOCYTES MOBILIZATION

Daikwo O.A, *et al*.,2012 observed the plant extract increased leukocyte mobilization in all the treated groups in a study. Evaluation of data obtained from their study indicated a significant ($p<0.05$) dose-dependent increase in leukocyte mobilization, with doses 150 and 250 mg/kg respectively, the most mobilized being neutrophils at a dose of 250 mg/kg.

VIII. IMMUNE-BOOSTING ACTIVITY

The immune system is subject to modification by substances to either enhance or suppress its ability to resist invasion by pathogens. Justification of the folkloric use of the plant as an immune boosting agent has been reported (Daikwo OA, *et al*., 2012).

1.3 MINERALOGY/MINERAL ANALYSIS

Mineral analysis involves examining materials to determine the mineral composition and mineral structure. The analysis can be used to identify mineral species and understand their characteristics and properties. Atomic absorption spectrophotometer (AAS) and Flame photometer can be used to determine the minerals present. *Ficus capensis* leaves were found to have high quantities of calcium, magnesium and phosphorus. Iron, zinc, copper and manganese were present but not in very high concentration. (Uzoekwe NM *et al*., 2015).

1.3.1 Different minerals and their health benefits

1.3.1.1 Calcium (Ca)

The most prevalent mineral in the body, calcium can be found as a nutritional supplement, added to other foods, and even in some medications (like antacids). Much of the construction of bones and teeth is composed of calcium, which also maintains tissue robust, flexible, and rigid, allowing for appropriate physical movement (Institute of Medicine, 2011). Blood artery contraction and dilatation, muscular activity, blood clotting, nerve transmission, and hormone production are all mediated by the little ionized pool of calcium present in the circulatory system, extracellular fluid, and different tissues (Institute of Medicine,2011).The bones contain nearly all of the calcium in the body (98%) and are both a source and a reservoir for calcium, helping the body to maintain calcium homeostasis (Institute of Medicine, 2011).The inorganic calcium and

phosphate matrix known as calcium hydroxyapatite, which is found in the bones and teeth, contains more than 99% of the calcium in the body (Institute of Medicine, 2011).

References: The greatest dietary sources of calcium are dairy products like cheese and yoghurt as well as milk. Additional calcium-rich foods include: fish (like tuna and salmon), leafy greens (like kale and turnip greens), tofu (which is calcium-set), and small, boneless fish (like canned salmon and sardines).

Advantages for Health: The following are a few advantages of calcium for health:

According to the Institute of Medicine (2011), calcium is essential for healthy bones in older persons and may help lower the risk of cancer, particularly in the colon and rectum. Because calcium binds fatty acids, it can lessen the absorption of lipids and perhaps minimize the risk of cardiovascular disease (CVD) (Institute of Medicine, 2011).

Insufficient Calcium: Insufficient calcium can weaken bones and cause osteoporosis, a condition marked by brittle bones and a higher chance of falling (Institute of Medicine, 2011). While vitamin D insufficiency is most frequently the cause of these problems, calcium shortage can also result in rickets in children and other bone disorders in adults. The rickety development cartilage in children might cause irreparable abnormalities to the skeletal structure because it does not mineralize normally (Institute of Medicine, 2011). Osteomalacia, or abnormal bone mineralization and softening, is another consequence of long-term calcium insufficiency that can affect both adults and children (Institute of Medicine,2011)

1.3.1.2 Potassium (K)

One significant mineral that is thought to be necessary for human survival is potassium. It is among the most crucial minerals required for the heart, kidneys, and other major body organs to operate properly. One of the seven important macro minerals, along with calcium, sodium,

phosphorus, Sulphur, and chloride, is this one. The human body needs at least 100 milligrams of potassium each day to support vital physiological processes. Excessive potassium consumption can assist lower blood pressure, stroke, muscle loss, kidney stone production, and bone mineral density preservation. In the human body, potassium's main job is to maintain fluid balance and manage electrical activity in the heart and other muscles. In essence, potassium is an electrolyte that balances the body's acid-base levels while opposing the effects of sodium.

Sources: The most significant sources of potassium are citrus fruits, cereals, and vegetables. Additionally, whole milk, almonds, fresh fruit juices, poultry, and salmon can all provide significant levels of potassium. Potassium is also found in potatoes, chicken, legumes, and nuts. Nonetheless, bananas, avocados, and coconut water are the most important dietary sources of potassium.

Benefits to Health: Potassium is essential for the normal operation of the brain, the body's regulation of sugar levels, the contraction of muscles, the prevention of low blood pressure and cardiovascular diseases, and the promotion of an alkaline environment.

potassium salts are essential for the body to build muscle and protein, reduce cramping in the muscles, increase muscle strength, keep cells free of excess waste, enhance bone health, prevent osteoporosis, build lean muscle mass, maintain muscle health over an extended period of time, enhance cell function, and help people manage stress.

Potassium Allergies & Side Effects: People who consume excessive amounts of potassium may experience major health problems. Hypokalemia is a potassium shortage in the blood that causes irregular heartbeats, an increase in blood levels and weak muscles. Hypokalemia, or having too much potassium in the blood, can cause hazardous or irregular cardiac beats.

1.3.1.3 Zinc (Zn)]

For all living organisms, zinc is a trace element that is necessary. It was only lately that the importance of zinc for human nutrition and public health was realized. Many specialists have acknowledged that inadequate zinc intake is a serious public health concern, particularly in poorer nations. The frequency of zinc deficiency and its clinical effects on growth retardation, diarrhea, pneumonia, altered cognitive function, and anomalies in foetal development. Because zinc is so important to human health, even a slight deficit can have disastrous consequences. Supplementing with zinc is an effective therapeutic strategy for treating a wide range of diseases. Zinc is a trace mineral that is necessary for the metabolism of 300 different enzymes in the body. It is also thought to be important for cell division and the creation of DNA and protein.

Protein, carbohydrate, fat, and alcohol metabolism are all impacted by these enzymes. According to Debjit Bhowmik *et al*. (2010), zinc is also essential for immune system function, prostaglandin synthesis, bone mineralization, thyroid function, blood coagulation, cognitive processes, foetal growth, wound healing, taste acuity, connective tissue growth and maintenance, and immune system function.

References: Zinc is abundant in seafood, steak, and other red meats. Legumes and nuts make for comparatively healthy plant sources.

Zinc has been shown to have positive effects on the immune system, digestion, diabetes management, stress reduction, energy metabolism, healing of wounds, and acne. Moreover, zinc's health benefits include those related to pregnancy, hair care, eczema, weight reduction, night blindness, cold, eye care, appetite loss, and many more conditions. As a crucial mineral, zinc regulates the creation of cells in the human immune system and is essential for the synthesis of proteins (Debjit Bhowmik *et al*., 2010).

1.3.1.4 Copper (Cu)

One of the d-block elements or transition metals is copper. Life requires copper, which is the body's third most prevalent trace element after iron and zinc. However, an adult's body can become poisonous when it absorbs more than 80,000 µg to 100,000 µg of copper from the environment. A surplus of copper damages antioxidant enzyme performance, oxidatively modifies DNA and proteins, oxidises lipids, activates redox-sensitive genes, inhibits the body's consumption of zinc, and interferes with iron homeostasis to cause anaemia

1.3.1.5 Sodium (Na)

Sodium plays tremendous role in acid-base balance and osmotic regulation of the body fluids and as such the chief cation of blood plasma and other extracellular body fluids. Its deficiency in the body is characterized by stunted growth, dehydration, low osmotic pressure, reduction in egg production etc.

Sources: According to The Centers for Disease Control and Prevention, the top 10 sources of sodium in our diets include: breads/rolls, pizza, sandwiches, cold cuts/cured meats, soups, burritos, tacos, savory snacks (chips, popcorn, pretzels, crackers), chicken, cheese, eggs and omelets.

Health Benefits: Sodium plays a key role in quite a few of your body's functions. It is crucial for fluid balance, active transport mechanism and proper regulation of the acid-base balance of the body. It participates in the transmission of nerve impulses as well as regulates the passage of fluids and nutrients into and out of cells. Sodium in the bones signifies a reserve for the body in the instance that requires modification of the pH level in the blood. Sodium, in conjunction with potassium, is accountable for balancing nerve stimulation and muscle contraction. An imbalance of fluid and electrolytes in the body can result from the deficiency of sodium. Signs or symptoms

connected with the deficiency of sodium include anorexia, nausea, and vomiting. The abnormal serum sodium levels, in extreme cases, can also affect action of the muscles, especially of the heart; this can result to coma or lethal consequences. Hypertension and other complications can result from excessive sodium intake, which is caused by an increase in water retention and blood pressure levels. These impediments involve the organs, arteries, and the heart, which in turn upset the health of the organism as a whole. Similarly, some of the symptoms caused by extreme doses of sodium include fever, vomiting, nausea, convulsions as well as impairment of the respiratory centers (Humanitas Research Hospital, 1996).

1.3.1.6 Manganese

Manganese is an element essential to the proper functioning of both humans and animals, as it is required for the functioning of many cellular enzymes (e.g. manganese superoxide dismutase, pyruvate carboxylase) and can serve to activate many others (e.g. kinases, decarboxylases, transferases, hydrolases) (IPCS, 2002).

Sources: Manganese occurs naturally in many food sources, such as leafy vegetables, nuts, grains and animal products (IOM, 2002).

Health benefits: Manganese is an essential element for many living organisms, including humans. For example, some enzymes require manganese (e.g. manganese superoxide dismutase), and some are activated by the element (e.g. kinases, decarboxylases). Adverse health effects can be caused by inadequate intake or overexposure. Manganese deficiency in humans appears to be rare, because manganese is present in many common foods. Animals experimentally maintained on manganese-deficient diets exhibit impaired growth, skeletal abnormalities, reproductive deficits, ataxia of the newborn and defects in lipid and carbohydrate metabolism (USEPA, 1984). The neurological effects of inhaled manganese have been well documented in humans chronically

exposed to elevated levels in the workplace (Canavan *et al*., 1934). The syndrome known as "manganism" is caused by exposure to very high levels of manganese dusts or fumes and is characterized by a "Parkinson-like syndrome", including weakness, anorexia, muscle pain, apathy, slow speech, monotonous tone of voice, emotionless "masklike" facial expression and slow, clumsy movement of the limbs. In general, these effects are irreversible.

1.4 SPECTROMETRY

Spectrometry is the spectroscopic technique used to assess the concentration or amount of a given chemical (atomic, molecular, or ionic) species. In this case, the instrument that performs such measurements is a spectrometer, spectrophotometer, or spectrograph.

1.4.1 TYPES OF SPECTROMETRY

1.4.1.1 Atomic Absorption Spectrometry (AAS)

Atomic absorption spectrometry (AAS) is a spectroanalytical procedure for the quantitative determination of chemical element by free atoms in the gaseous state. Atomic absorption spectrometry is based on absorption of light by free metallic ions. In analytical chemistry, the technique is used for determining the concentration of a particular element (the analyte) in a sample to be analyzed. AAS can be used to determine over 70 different elements in solution, or directly in solid samples via electrothermal vaporization.

Fig 2: Atomic absorption spectrophotometer (Spectrophotometry and chromatography lab NCEE, Benin city.

It uses the principle that atoms (and ions) can absorb light at a specific, unique wavelength. When this specific wavelength of light is provided, the energy (light) is absorbed by the atom. Electrons in the atom move from the ground state to an excited state. The amount of light absorbed is measured and the concentration of the element in the sample can be calculated.

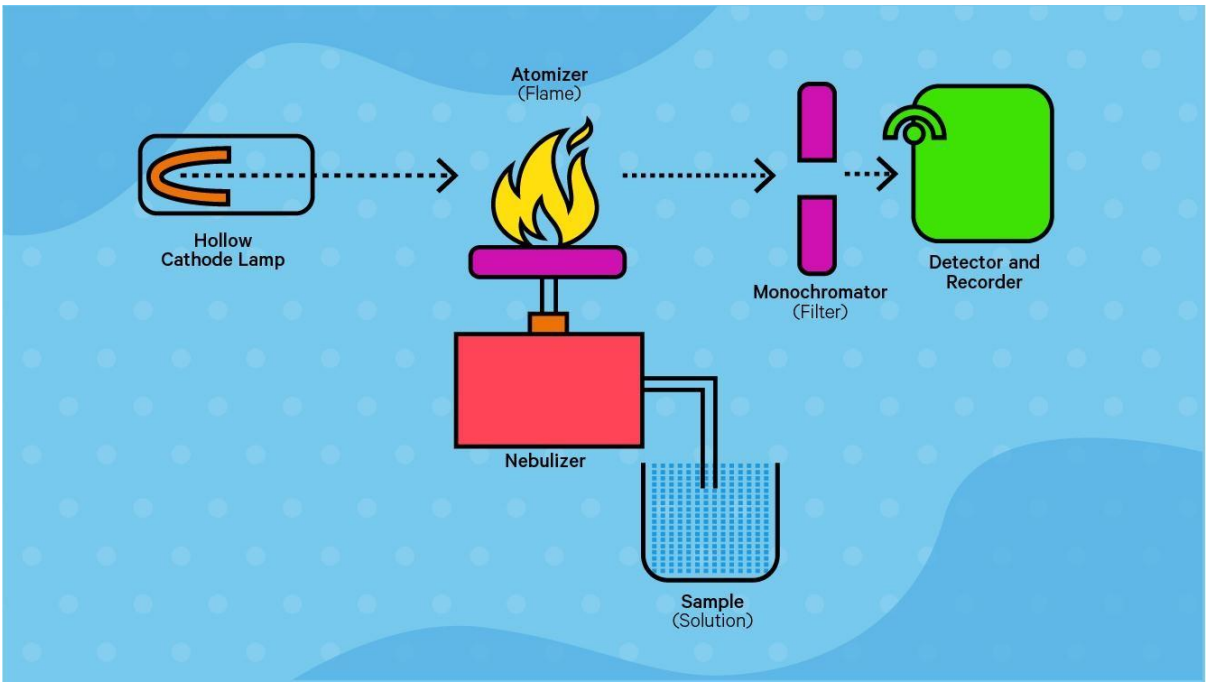

Fig 3: Working principles of AAS

1.4.1.2 Flame Emission Spectrometry (FES)

Flame emission spectrometry is a technique used to analyze metal ions in solution. It is majorly used for analyzing Group I and Group II elements. When substances are heated, they often emit energy in the form of light. This is due to electrons falling back to their original energy level after becoming excited which causes them to jump up one or more energy levels.

Flame emission spectrometry works by exposing the sample to a very hot flame and then measuring the intensity and wavelength of the light emitted.

- **Desolvation:** The metal particles in the flame are dehydrated by the flame and hence the solvent is evaporated
- **Vaporization:** The metal particles in the sample are dehydrated. This also led to the evaporation of the solvent.
- **Atomization:** Reduction of metal ions in the solvent to metal atoms by the flame heat.

- **Excitation:** The electrostatic force of attraction between the electrons and nucleus of the atom helps them to absorb a particular amount of energy. The atoms then jump to the exited energy state.
- **Emission process:** Since the higher energy state is unstable the atoms jump back to the stable low energy state with the emission of energy in the form of radiation of characteristic wavelength, which is measured by the photo detector.

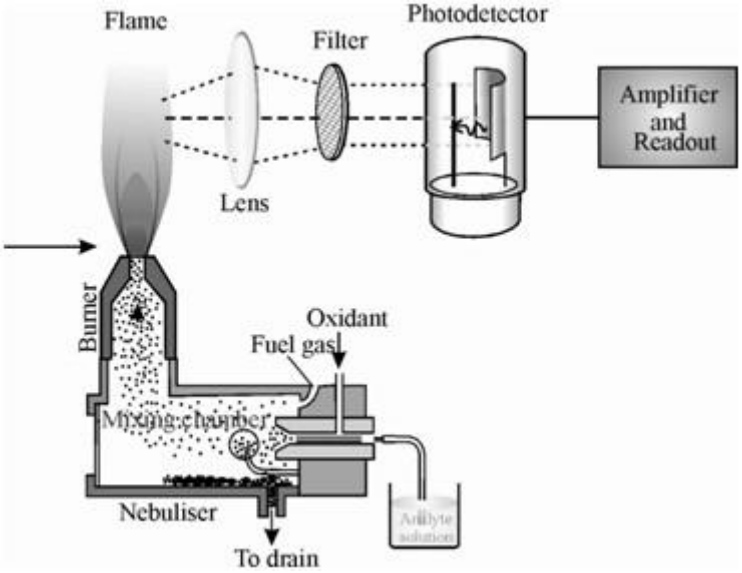

Fig 4: Schematic representation of flame emission spectrometer

1.5 PHYTOCHEMICAL SCREENING

Phytochemicals are chemical compounds that occur naturally in plants (phyto means "plant" in Greek). Some are responsible for colour and other for organoleptic properties, such as the deep purple of blueberries and the smell of garlic (James, 2000). Examples of which may include flavonoids, tannins, saponins, terpenes, etc. Phytochemical composition of plants varies in their leaves, stems, roots, bark, seed and twig. (Mgbemena N.M. *et al*.,2020). Phytochemical Screening is very crucial in the determination of the important and active bio ingredients in the plants. There are many phytochemicals and each works differently. Some of the possible actions

are via antioxidants, hormonal action, and stimulation of enzymes, interference with DNA replication, antibacterial effect and physical action (Papp, *et al*., 2007).

1.6 pH DETERMINATION

pH, a measure of acidity or basicity of aqueous or other liquid solutions. Chemicals have their distinct nature they can be neutral or acidic or basic. These ions have a particular chemical it is releasing in its aqueous solution. For example, chemicals that release H+ ions are acidic, whereas those which release OH- ions are basic.

Soil pH helps determine the potency of toxic element of soil. It also helps in understanding the physical conditions, nutrient availability, permeability etc. (Vedantu website 2021)

1.7 ELECTRIC CONDUCTIVITY

Soil electrical conductivity (E.C) measures the ability of soil water to carry electric current. Electric conductivity is an electrolytic process that takes place principally through water filled pores. Cations (Ca^{2+}, Mg^{2+}, K^{+}, Na^{+}, and NH_4^{+}) and anions ($SO^{2-}_{4,}$ Cl^{-}, NO^{-}_{3}, and HCO_3^{-}) from salts dissolved in soil water carry electric charges and conduct the electrical current (USDA 2011).

1.8 PROXIMATE ANALYSIS

Proximate analysis is defined by H. Bennett in the Concise Chemical and Technical Dictionary as the “determination of a group of closely related components together, e.g. total protein, fat.” It conventionally includes determinations of the amount of water, protein, fat (ether extract), ash and fiber, with nitrogen-free extract (sometimes termed Nifext) being estimated by subtracting the sum of these five percentages from 100. In order to emphasize the group nature of the

percentage of protein, fat and fiber, many chemists use the word “crude” before these three terms (Hart *et al*., 1971).

1.8.1 TYPES OF PROXIMATE ANALYSIS

- Moisture content
- Ash content
- Crude fiber content
- Crude protein content
- Carbohydrate
- Lipid content

Proximate analysis is used for estimation of the food and food substances including moisture and crude protein, total fat, crude fiber and total carbohydrate content. (J Adv Pharma technol Res 2020).

1.8.2 THIN LAYER CHROMATOGRAPHY

This method is used for analyzing mixtures by separating compounds in the mixture. It helps to determine the number of components present in a mixture, identify them, and the purity of the compound. It consists of three steps spotting, development, and visualization.

The Retention factor valve (Rf) is used to quantify the movement of the materials along the plate. Rf is equal to the distance traveled by the substance divided by the distance traveled by the solvent.

CHAPTER TWO

2.0 MATERIALS AND METHODS

Materials

Solvents and Reagents

Apparatus

Equipment

Others

2.1 SOLVENTS AND REAGENT

Concentrated HCl

Concentrated HNO_3

Methanol

Ethanol

Deionized water

Distilled water

Concentrated H_2SO_4

Dilute H_2SO_4

Benedict's solution

Distilled water

Dragendoff's reagent

Gelatin solution

2,2-diphenyl-1-picrylhyddrazyl (dpph) radical

N-hexane

Ethyl acetate

NaOH solution

NaCl solution

Chloroform

Concentrated HNO3

2.2 MATERIALS

Glassware

Beaker

Conical flask

Evaporating Dish

Funnels

Measuring cylinder

Stirrer

Spatula

Test tube

Sample collection bottle

Volumetric flask

Round bottom flask

All glassware used were products of pyrex

2.3 EQUIPMENTS

Analytical balance

Mechanic grinder

Rotary evaporator

Soxhlet extractor

Atomic absorption spectrophotometer (BULK SCIENTIFIC VGP210)

Electric conductivity meter

Furnace

Flame emission spectrometer (SHERWOOD 7200)

2.4 OTHER MATERIALS

Filter paper

Masking tape

TLC plate

2.5 METHOD

2.5.1 Sample collection and preparation of *Ficus capensis* leaves.

The fresh leaves of *Ficus capensis* were collected from its tree at University of Benin, Ugbowo,

Benin city. The plant sample was authenticated at the Plant biology and biotechnology, PBB, University of Benin, Benin city, with herbarium voucher number (UBH-F331)**.** The samples were washed with distilled water to remove any foreign materials, air dried at room temperature for two weeks. The dried leaves were ground using a milling machine, it was then packaged for further studies.

2.6 Extraction

About 100g of already pulverized *Ficus capensis* leaves was placed in a Soxhlet extractor using a mixture of methanol and ethanol. Two different extract solution were made due to the difference in the proportion of the two solvent (50% each) and (25% methanol and 75% ethanol) respectively. After which the extract is concentrated using a rotary evaporator, a dark brown thickened paste was obtained.

2.7 PHYTOCHEMICAL SCREENING

The phytochemical screening of this following phytochemicals was done using standard procedure (Trease and Evans, 1989 and Harbone 1993).

*Test for Flavonoids***:** 1ml of extract in a test tube was mixed with 5ml of dilute ammonia and 1ml of concentrated sulfuric acid was added to the mixture. A yellow color indicated the presence of flavonoids.

Test for Tannins: 1ml of extract in a test tube was heated for 5minutes to boil. Thereafter, 2 drops of 15% ferric chloride was added. A blue black colouration indicated the presence of tannins.

Test for Cardiac Glycosides: 1ml of extract in a test tube was mixed with 2ml of glacial acetic acid, after which1 drop of 15% ferric chloride and 1ml of concentrated sulfuric acid were added

to the mixture. A brown colouration formed at the interface confirmed the presence of cardiac glycosides.

*Test for Saponins***:** 1ml of extract in a test tube was mixed with 5ml of distilled water. The mixture was shaken vigorously and observed for frothing which indicated the presence of saponins.

*Test for Steroids***:** 1ml of the extract in a test tube was mixed with 2ml of acetic acid and 2ml of concentrated sulfuric acid. A color change from violet to blue-green indicated the presence of steroids.

Test for Terpenoids: this test was done using Salkwoski test. 1ml of extract in a test tube was mixed with 2ml of chloroform and 3ml of concentrated sulfuric acid. A reddish brown colouration at the interface confirmed the presence of terpenoids.

*Test for Anthraquinones***:** 1ml of extract in a test tube was mixed with 5ml of benzene and 2.5ml of dilute ammonia. The mixture was then shaken vigorously. A pink-red colour at the lower phase indicated the presence of anthraquinones.

*Test for Alkaloids***:** Hager's Test: 1ml of filtrate in a test tube was mixed with 3 drops of Hager's reagent (picris's). Formation of a yellow precipitate indicated the presence of alkaloids.

*Test for Reducing Sugar***:** *Fehling's Test*: 1ml of 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 confirmed the presence of reducing sugars.

2.8 MINERAL ANALYSIS

The mineral content in the soil was gotten by digestion using aqua regia. Aqua regia is a mixture of HCL and HNO_3 in a 3:1 proportion. 75ml HCL was added to 25ml of HNO_3, it was left for 10mins after a brown color was noticed due to the presence of NO_2.

2.0g of air-dried soil was weighed and transferred into a digested flask. 40ml of Agua regia was added to the measured soil sample in the digestion flask and digestion was carried out. As temperature increased, agitation was noticed. Evaporation occurred and the volume dropped from 40ml to 10ml. aided the removal of NO_2. The resulting solution become colorless, it was then filtered, washed with distilled deionized water and finally transferred to 100ml volumetric flash topping it to the mark with deionized distilled water. (Abegunde SM *e*., 2018)

The dilute solution was analyzed using atomic absorption spectrophotometer (BULK SCIENTIFIC VGP210) and flame emission spectrometer (SHERWOOD 7200)

2.9 pH ANALYSIS

The pH of the soil was analyzed using the universal paper pH indicator. 20g of the air-dried soil was measured and added to 100ml of distilled water in a 250ml beaker. That is the soil to distilled water was in a 1:5 ratio. The solution was stirred for two minutes, and left to settle for 4-5minutes. The pH indicator is dipped into the solution and a colour change synonymous to a pH of 6, which indicates that the soil is slightly acidic. (University of western Australia 2009)

2.10 ELECTRIC CONDUCTIVITY

The soil electric conductivity was analyzed using an electrical conductivity meter. 10g of the soil was weighed using a sensitive beam balance and then added to 50ml of distilled water. It was allowed to sit for 20mins for form a uniform suspension.

The electrode cap from the E.C meter was removed and switched on. The electrode was dipped into 1-2cm into the solution and stirred. The displayed result was taken at room temperature of 25^{o}C (university of western Australia 2009).

2.11 PROXIMATE ANALYSIS

For the proximate determination, *Ficus capensis* leaves were analyzed in percentages for moisture, ash, crude protein, lipid, crude fiber and carbohydrate using AOAC method (AOAC 1995).

2.12 THIN LAYER CHROMATOGRAPHY MEASUREMENTS

A pencil line of about 1cm was drawn carefully from the end of the plate on the powdered side of the silica gel plate. A very small spot was made on the plate to avoid spillage. The plate was then dipped into a very small amount of ethyl acetate (2ml). It was then left to develop for a while. The solvent must be below the line. After the solvent has almost gotten to the top of the plate, the plate is removed and dried.

It is then visualized using a UV lamp and the distance and Retention factor valve measured.

CHAPTER THREE

3.0 RESULTS AND DISCUSSION

3.1 The results gotten from the phytochemical analysis of *Ficus capensis* is shown below:

Phytochemicals Present	*Ficus capensis* leaves Ethanol:methanol **(50:50)**	*Ficus capensis leaves* Ethanol:methanol **(75:25)**
Alkaloids	+	+
Flavonoid	+	+
Saponins	+	+
Tannins	+	+
Terpenoids	++	+++
Phenolic compound	+	+
Steroids	+	+
Reducing sugar	++	+
Cardiac glycoside	++	+++
Anthraquione	--	--

+=*present*

++= *highly present.*

Table 1; Results of the phytochemical screening of *Ficus capensis*

Table 1 shows that flavonoid, saponins, tannins, terpenoids, phenolic compounds, steroids, reducing sugar, and cardiac glycoside are present in both 50:50 and 75:25 ratio of ethanol to methanol but there is absence of alkaloids and anthraquinone. It is noted that in the 75:25 ratio terpenoid and cardiac glycosides were more visible to the 50:50 ratio. Alkaloids are present in the 75:25 but absent in 50:50. Anthraquinone was absent in both extracts.

It is noteworthy that whilst alkaloids were observed in high and moderate concentrations in the ethanolic extracts of the leaves. Similarly, Adebayo *et al*. (2017) did not observe the presence of anthraquinones in neither bark nor leaves whereas in this study, anthraquinones were detected in moderate concentrations in the leaves. The presence of important phytochemicals, such as: alkaloids, flavonoids and phenols, in the leaves of the *Ficus capensis* plant is pertinent as these groups of secondary metabolites are medically beneficial and impact useful potentials to the body. Flavonoids and other phenolic compounds are potent water-soluble antioxidants and free radical scavengers that prevent oxidative cell damage and have strong anti-cancer properties (Del-Rio *et al.,* 1997; Cowan, 1999; Okwu, 2004). Alkaloids, on the other hand, have marked physiological effects on animals (Edeoga and Eriata, 2001). They also act as anti-poisons, antioxidants and stimulants (Cordell *et al.,* 2001). Tannins have been reported to be responsible for a decrease in feed intake and feed efficiency, net metabolizable energy, protein digestibility and growth rates in experimental animals (Shills *et al.,* 2006). The presence of terpenoids in the leaves of *Ficus capensis* supports its use in the treatment and management of cancer, ulcers and malaria. Plants produce volatile terpenes either to attract specific insects for pollination or otherwise to expel certain preys which consume these plants as food (Degenhardt *et al*, 2003). In addition, terpenoids possess medicinal properties such as anticarcinogenic, antimalarial, antiulcer, antimicrobial or diuretic activity (Dudareva *et al*, 2004). So therefore, leaves of *Ficus capensis*

could be used in ethnomedicine in the management of various ailments due to the presence of these terpenes. Plant steroids are phytoconstituents that have found therapeutic applications as arrow poisons or cardiac drugs (Firn, 2010). Trace amounts of steroid content in the leaves could be useful in promoting nitrogen retention in osteoporosis and in animals with wasting illness (Maurya *et al.,* 2008; Madziga *et al.,* 2010).

3.2 The results gotten from the mineral analysis of the *Ficus capensis* leaves are shown below*;*

Minerals present	Leaves	Soil
Calcium (Ca)	4.46	3.69
Magnesium (Mg)	2.49	2.04
Potassium (K)	20.5	17.8
zinc (Zn)	1.9	3.2
Sodium (Na)	15.7	20.1
Manganese (Mn)	1.6	4.0
Copper (Cu)	0.04	0.05
Chromium (Cr)	0.05	0.06
Nickel (Ni)	0.01	0.02
Iron (Fe)	10.2	33.6
Lead (Pb)	ND	ND
Cadmium (Cd)	ND	ND

ND= not detected.

Table 2; Mineral contents of *Ficus capensis* leaves and soil.

Table 2 reveals *Ficus capensis* leaves have high quantities of potassium, sodium and Iron. Calcium, magnesium, zinc, manganese are present but in small quantities. Chromium, copper, nickel are present in trace amount.

K>Na>Fe>Ca>Ma>Zn>Mn>Cr>Cu>Ni

The mineral gotten from the soil gotten from the soil shows the same re3lation although there are variation in the amount present.

Fe>Na>K>Mn>Ca>Zn>Mg>Cr>Cu>Ni

Ficus capensis very rich in Potassium, Potassium 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). High amount of potassium in the body was reported to increase iron utilization (Adeyeye 2002) and beneficial to people taking diuretics to control hypertension and suffer from excessive excretion of potassium, through body fluid (Arinathan et al, 2003). 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 immune system, regulation of blood sugar level and production of energy. Copper is also required in one body for enzyme production and biological transfer of electron within the body. Zinc plays a vital role in gene expression, regulation of cellular growth and acts as a co enzyme for carbohydrates, protein and nucleic acids metabolism

3.3 The result gotten from the pH of the soil sample.

It was discovered that the soil was loamy and had a pH of 6, making it slightly acidic.

3.4 The result gotten from the electrical conductivity test on the soil sample shows that, after calculating for the electrical conductivity using electrical conductivity meter. The meter read

480us/cm under a temperature of 25^0C which indicates a significant presence of dissolved salts in soil, potentially impacting plant growth. Excessive salt levels can hinder plant uptake, leading to stunted growth or death. A moderate EC value may indicate essential plant nutrients, but a high EC value may indicate an imbalance or excess salts. High EC values may also suggest finer-textured soils with higher clay content.

3.5 The results gotten from the proximate analysis of *Ficus carpensis* leaves

TEST	RESULTS GOTTEN (%)
Moisture content	**20.22**
Ash content	**2.92**
Crude fiber content	**20.41**
Crude protein content	**15.70**
Fats/lipid content	**4.24**
Carbohydrate	**36.45**

Table 3 shows *Ficus capensis* yielded 20.22% moisture content, 2.92% ash content, 15.70% crude protein content, 4.24% lipid content and 36.45% carbohydrate content.

Carbohydrate>crude fiber>moisture content> crude protein>lipid content> ash content. *Ficus capensis* had high carbohydrate content which was higher compared to the values reported for the other content implying that *Ficus capensis* leaves could serve as a good source of carbohydrates. Carbohydrates are easily digested and provide the necessary calories in the diets of humans.

Followed by crude fiber which was available in high amounts. Fibers lower body cholesterol and therefore reduce the risks of cardiovascular diseases and diabetes. Plant with high amounts of fiber is advised 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 leaves* cannot be stored for a longer time because of its high moisture content. 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 (Fagbohun et al..,2012) ash content in leafy vegetables is a reflection of 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.

3.6 The results gotten from thin layer chromatography are shown below;

For the 50:50 extract, two compounds were spotted

Compounds	Rf valve
Alkaloids	0.74
	0.8

Distance moved by the solvent= 6.5cm

For the 50:50 extract, two spot were spotted on the TLC plates. After measurement, the first spot read 4.8cm and second read 5.2cm.

For the 50:50, the first component

Rf= 4.8/6.5

Rf= 0.74

The second component

Rf= 5.2/6.5

Rf= 0.8

For the 75:25 extract, only one compound was spotted

Compound	Rf valve
Alkaloid	0.74

For the 75:25 extract, just one spot was noticed on the TLC plate. After measurement it read 4.8cm

Rf= 4.8/6.5

Rf= 0. 74

CONCLUSION

The results show the high qualitative amount of bio active/ phytochemicals present that would aid the fast curing of diseases. Due to the mixture of solvent, more bio active compounds were discovered, increasing its medicinal and pharmacological effect. The high proximate composition and mineral content present in *Ficus capensis* leaves promotes the high nutritional valve found in the plant.

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