Journal of Environmental Impact and Management Policy
ISSN: 2799-113X
Vol : 02 , No. 06 , Oct-Nov 2022
http://journal.hmjournals.com/index.php/JEIMP
DOI: https://doi.org/10.55529/jeimp.26.1.11

Senna Alata Leaf and Stem: Phytochemical Screening, Nutritional Content, and Antimicrobial Activities

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Received: 05 July 2022 **Accepted:** 15 September 2022 **Published:** 19 October 2022

Abstract: ***In the current examination, the nutritional composition, phytochemical content and antibacterial activities of an extract from Senna alata leaf and stem were all evaluated. The Candle bush (Senna alata) leaf and stem were then cleaned, allowed to air dry at room temperature, and then ground. In ethanol aqueous solutions, extracts of the leaves and stems were produced. To ascertain the nutritional composition, antibacterial content, and phytochemical property, standard techniques were employed. Moisture content, crude protein, crude fat, ash content, crude fat and carbohydrate for Senna alata were measured at 16.43± 0.02, 18.89± 0.05, 9.36± 0.03, 6.17± 0.02, 16.73± 0.01, 32.42 ± 0.05 respectively for leaves extract and 4.43± 0.04, 14.22± 0.02, 5.46± 0.01, 4.17± 0.03, 14.56± 0.05, 57.16± 0.02 respectively for stem extract. Alkaloid, flavonoid, phenol, saponin, tannin, and phlobatannin were quantitatively and qualitatively identified in Senna alata's aqueous and ethanolic extracts utilizing leaf and stem extract, respectively. Amoxicillin was used as the control and the zones of inhibition by ethanolic extracts (leaf and stem) against streptococcus were determined at 3.5 mm, 3.5 mm, and zone of 6.5 mm, respectively. The zones of inhibition for ethanolic against E. coli were, respectively, 4.0 mm, 4.5 mm, and amoxicillin medication as control at zone of 4.5 mm. At zones of 5.0 mm, 5.0 mm, for both stem and leaves, and 6.0 mm for the amoxicillin medication as control, ethanolic extracts inhibited Staphylococcus aureus. As the outcome suggests, Senna alata's stem and leaves both demonstrate that they contain antimicrobial compounds and have a high therapeutic potential for use as sources of safer or more effective antimicrobial agent replacements for synthetically produced antimicrobial agents, which are conventionally hailed as being effective in treating infections.***

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Keywords: Senna Alata, Phytochemical, Nutritional, Antimi Crobial Property, Leaf and Stem.

1. INTRODUCTION

Scientists from all around the world have become interested in the successful use of plant materials to treat and prevent infectious diseases over the years (Falodun *et al*., 2006). On the basis of data provided by the local inhabitants, several studies on medicinal plants are being carried out with the goal of identifying phytochemical ingredients for use in the prevention and treatment of infectious disease and other diseases with non-microbial etiologies. Despite the fact that safety and efficacy data are only available for a small subset of plant materials, the general consensus among society and the medical community is that plant-based goods are safer, healthier, and more dependable than synthetic ones (Benli *et al*., 2008). Plants are natural nourishment for people and generally work as stimulants and supplements to the body's regenerative powers (Ajayi et al, 2008). Senna alata (candle brush) Linn is an erect tropical perennial herb that is native to South America and is a member of the fabaceae family. It is a decorative shrub or tree that can grow up to 12 meters high and is widely distributed in the tropics. It has naturalized in many tropical African countries, including Nigeria, and is also known as "Rai dore" in Hausa, "Asunwo oyinbo" in Yoruba.
Igoli *et al*. (2005) state that medicinal plants like Senna alata produce antimicrobial compounds with significant therapeutic potential as sources of safer or more effective substitutes for synthetically produced antimicrobial agents and have historically been hailed as effective in treating infections like hemorrhoids, constipation, inguinal hernias, intestinal parasites, syphilis, food poisoning, burns, wounds, ringworm, as well as eczema According to Ibrahim and Osman's (1995) investigation, Senna alata extract had low activity against non-dermatophytes fungi but strong activity against a variety of dermatophytes fungi (Chatterjeesup *et al*., 2010).
The numerous portions of Senna alata were examined for phytochemicals, and alkaloids, tannis, saponins, phenol, flavanoids, anthraquinones, and cardiac glycosides were found (Owoyale *et al*, 2005 and Makinde *et al*, 2007). Interestingly, Senna alata's leaves have a lot of nutrients available to them, which makes them a fundamental and crucial feature in plant selection for nutritional value, systematic classification, and plant improvement initiatives (Nisar *et al*., 2009). Understanding the nutritional relevance of these plant species can help us grasp their value because certain therapeutic plant species are also used as food (Pandey *et al*., 2006). Drugs found in plants are known as active principles, and these defend the plants from pests and animal predation as well as microbiological (bacteria, fungal, and virus) infections (Elmahmood and Amey 2007). Since many drugs, including some antibiotics, are no longer active against some targeted pathogenic organisms, numerous studies have been conducted to provide scientific support for the effectiveness of plants in herbal medicine. As a result, reports have been made that the effective lifespan of these therapeutic agents is constrained. However, the emergence of resistance to the majority of the antimicrobial agents currently in use, together with the high cost of treatment as a result of the resistance, has made it necessary to look for new, secure, effective, and affordable methods for the management of infectious diseases.

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2. MATERIALS AND METHODS

2.1Materials

Among the supplies, tools, and chemicals utilized are Nutrient Agar (NA), Mannitol Salt Agar, MacConkey agar, Petri dishes, Conical flasks, Beakers, and Petri plates. lab tubes, Cotton wool, a spirit lamp, a sterile swab stick, distilled water, an inoculating loop Masking tape, aluminum foil, sterile EDTA vials, rubber gloves, sterile plastic containers, and nose plugs syringe and needle, Micropipette, measuring cylinder, autoclave, incubator, microscope, and microscope slides weighing scales, Immersion oil, ethanol, cleaning products, etc.

2.1.1 Sterilization of Materials

Before and after each use, all items were sterilized. The glassware was thoroughly cleaned with detergent before being rinsed with water and drained. After being drained, they were wrapped in aluminum foil and sterilized for an hour in a hot air oven (70°C). Cotton wool soaked in 70% alcohol was used to thoroughly sanitize the work bench and the surrounding area. Before usage, the inoculating loop was heated in Bunsen Flame to a red-hot temperature. In an autoclave set at 121 degrees Celsius for 15 minutes, the culture media and distilled water were sterilized. Near the Bunsen flame, microbial analysis was conducted.

2.2. Sample Collection

Senna alata leaves and stems were gathered at Oke-Eruru Street in Ijebu Jesa, Osun State, Nigeria. The leaves were then transferred to the Microbiology Laboratory of the Department of Science Laboratory Technology at Kanmi Alo Interlink Polytechnic. However, the stem and leaves were both air dried for two and four weeks, respectively. They were then ground using a standard blender and stored in a clean container for phytochemical, nutritional content, and antimicrobial studies on specific microbes.

2.3 Extraction of the Plant Extract (Leaves and Stems)

The plants were prepared for ethanol and aqueous extraction by soaking 20g of the dry powdered plant leaf and stem in 100ml of pure ethanol and aqueous for 48 hours at room temperature. The extract was then filtered via cotton wool and filter paper. The extract was then reduced to one-tenth of its original volume using a rotary evaporator with the water bath set at 40°C, and then dried using a freeze dryer. The residue was then dried and kept at 40 C. For experimental examination, portions of the crude plant extract residue were weighed and dissolved in distilled water.

2.4 Preparation of Culture Media

The culture media were produced as instructed by the manufacturer. The culture mediums used to isolate, stock, and characterize the isolated bacteria biochemically included mannitol salt agar, nutrient agar, and eosin methylene blue.

2.4.1 PREPARATION OF NUTRIENTS AGAR (NA)

In order to create a uniform mixture, 14g of the nutrient agar was weighed, dissolved in 250ml of distilled water, and heated. Aluminum foil was placed over the conical flask's

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mouth after it had been corked with non-absorbent cotton wool. It was sterilised for 15 minutes at 121 °C in an autoclave.

2.4.2 PREPARATION OF MANITOL SALT AGAR (MSA)

In order to create a homogenous mixture, 27.8g of the agar was dispensed into 250ml of distilled water. Aluminum foil was placed over the conical flask's mouth after it had been corked with non-absorbent cotton wool. It was sterilized for 15 minutes at 121°C in an autoclave.

2.5 SAMPLE INOCULATION

In already poured Nutrient Agar, an isolate streak was created and incubated for 24 hours at 37°C. The obtained colony was subcultured for biochemical and morphological characterisation in a freshly made agar. Senna alata leaves and stem extractions in ethanol and water were injected with chosen microorganisms for antibacterial activity into the bored hole on the plate.

2.6 PHYTOCHEMICAL ANALYSIS

Qualitative Phytochemical Analysis of Samples

The leaf and stem samples were analyzed for the presence of Phytochemicals as follows.

2.6.1 Test for Saponins

Using the method of Harbone (1994), to 0.5g of extract, 5ml of distilled water was added in a test tube and the solution shaken vigorously and observed for a stable persistent forth. The frothing was mixed with 3 drops of olive oil and shaken vigorously after which it was observed for the formation of an emulsion.

2.6.2 Test for Tannins

Using the method of Trease and Evans (2005), 0.5g of the extract was boiled in 10ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and the solution observed for brownish green or a blue-black coloration.

2.6.3 Test for Flavonoids

Using the method of Mayuri (2012), Dilute ammonia (5ml) was added to portion of an aqueous filtrate of the extract. Then, concentrated sulphuric acid (1ml) was added. A yellow colouration indicated the presence of flavonoids.

2.6.4 Test for Alkaloids

The method of Sofowora (2006) was adopted, The extract was dissolved in dilute HCL and filtered. Filtrates were treated with Mayer's Reagent (potassium mercuric iodine). Formation of a yellow coloured precipitate indicates the presence of alkaloids.

2.6.5 Test for Phlobatannins

Deposition of a red precipitation when an aqueous extract of each samples was boiled with 1%

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Aqueous hydrochloric acid was taken as an evidence for the presence of phlobatannins (Sofowora
2006).

2.6.6 Test for Phenols
Using the method of Tiwari *et al*. (2011), each of the powdered samples (10 mg) was treated with 2 drops of ferric chloride solution. Formation of bluish black colour indicates the presence of phenol.

2.7. Quantitative Phytochemical Analysis of Sample
2.7.1 Determination of Alkaloid contents:
5 g of each of the powdered materials were weighed into a 250 mL beaker according to the Harbone (1993) method. 200 mL of 10% acetic ethanol was then added, capped, and allowed to stand for 4 min. This was filtered, and the extract was then concentrated to a quarter of its original volume in a water bath. Until the precipitation was finished, concentrated ammonium hydroxide was applied drop by drop to the extract. After allowing the entire solution to settle, the precipitate was collected, cleaned with diluted ammonium hydroxide, and then filtered. The residue is the alkaloid, which was dried and weighed
% Alkaloid= W3-W2/W1 x 100
Where,
W1=Weight of sample.
W2= Weight of dish.
W3=Weight of dish + filtrate after drying.

2.7.2 Determination of Flavonoid contents
Using the aluminum colorimetric test method, the amount of flavonoids in the extract of each sample was quantified (Harbone) (1993). The sample solution was mixed with a 2% AlCl3 ethanol solution in a volume of 0.5 mL. Using a UV spectrophotometer, the absorbance at 420 nm was determined after 1 hour at room temperature. The final concentration of the extract samples was 0.1 mg/mL. Total flavonoids were calculated as mg/g of quercetin standard curve using the following calibration:
Y = 0.0255x, R2 = 0.9812, where x was the absorbance and Y as the quercetin equivalent.

2.7.3 Determination of Saponin contents
For the examination of saponins, the spectrophotometric technique of Brunner (1994) was applied. Each of the finely ground powdered samples was weighed (1 g) into a 250 mL beaker along with 100 mL of isobutyl alcohol. To ensure equal mixing, the liquid was shaken on a UDY shaker for 5 hours. 200 mL of a 40% saturated solution of magnesium carbonate was then added after the mixture had been filtered into a 100 mL beaker. A second filtering step was used to get a clear, colorless solution from the mixture made with saturated MgCo3. Pipetting a volume of 1 mL of the colorless solution into a 50 mL volumetric flask, followed by 2 mL of 5% FeCl3 solution and making up the remaining 1 mL with distilled water. The blood red color of this was allowed to develop for 30 minutes. From saponin stock solution, a volume of 0–10 ppm standard saponin solutions were created. Similar to what was done for the 1 mL sample above, the standard solutions were treated with 2 mL of 5% FeCl3 solution.

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After color development, a Jenway V6300 Spectrophotometer was used to measure the sample's absorbance as well as that of reference saponin solutions at a wavelength of 380 nm.
Saponin content = Absorbance of sample x gradient factor x dilution factor
Weight of sample x 10,000

2.7.4. Determination of Tannin contents

In accordance with the Swain (1979) procedure, 0.20 g of the samples were measured into a 50 mL beaker, 20 mL of 50% methanol was added, and the beaker was then wrapped in parafilm and submerged in a water bath set to 77–78 OC for one hour. It was vigorously shook to achieve even mixing. After filtering the extract, 20 mL of water was added to a 100 mL volumetric flask. Then, 10 mL of 17% Na2CO3 and 2.5 mL of Folin-Denis reagent were added and thoroughly mixed. Water was added as directed, well combined, and let to stand for 20 minutes. The color will turn bluish-green at the extremes of the range; samples from 0 to 10 ppm received the same treatment as the 1 Ml sample above. The absorbance of the tannic acid standard solutions as well as samples was read after colour development on a spectrophotometer at a wave length of 760 nm. Results were expressed as milligrams of Tannic Acid Equivalents (mg TAE/g) using the calibrated curve from the equation:
Y = 0.0593x - 0.0485; R2 = 0.9826, where x was the absorbance and Y tannic acid equivalent.

2.7.5. Determination of Phenolic contents

2 g of each of the powdered samples were extracted for 2 minutes with 20 mL of acetone containing 0.5% formic acid using the Devmurari (2010) procedure, and then they were filtered. 2 mL of the extract was combined with 0.5 mL of Folin-Ciocalteu reagent for 15 seconds, and the mixture was left to stand at 400°C for 30 minutes. The absorbance was calculated at 765 nm and represented as milligrams of gallic acid equivalents per gram (mg GAE/g).

3. RESULTS AND DISCUSSION

3.1 RESULTS

Table 1: Phytochemical Screening Results of Senna Alata Ethanolic Extracts

Bioactive	**Ethanolic Extract- *S. alata* Leave**	**Ethanolic Extract- *S.alata* Stem**
Alkaloids	+	+
Tannin	+	+
Saponin	+	+
Phenol	+	-
Phlobatannin	+	+
Flavonoid	-	+

Key: += Present, - = Absent

Table 2: Phytochemical Screening Results of Senna Alata Aqueous Extracts

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Qualitative Parameters	Leaf	Stem
Alkaloids	+++	+
Tannins	++	-
Saponins	+++	+
Phenols	+	++
Flavanoids	+	+++

Note: +++ = abundantly present; ++= moderately present; += slightly present

Table 3: Quantitative Phytochemical Property of Leaf and Stem of Senna Alata

Quantitative Parameters	**Leaf (mg/mg100)**	**Stem (mg/mg100)**
Alkaloid	4.31± 0.04	0.15± 0.01
Tannin	1.81± 0.01	0.34± 0.01
Saponin	4.90± 0.05	1.84± 0.02
Phenols	0.85± 0.01	0.95± 0.06
Flavanoids	1.41± 0.03	7.21± 0.05

Table 4: Nutritional Composition of Leaves and Stems Of Senna Alata

SAMPLE	**Moisture**	**Crude Protein**	**Crude fat**	**Ash**	**Crude fiber**	**Carbohydrate**
LEAVES	16.43± 0.02	18.89± 0.05	9.36± 0.03	6.17± 0.02	16.73± 0.01	32.42± 0.05
STEMS	4.43± 0.04	14.22± 0.02	5.46± 0.01	4.17± 0.03	14.56± 0.05	57.16± 0.02

Table 5: Zone Of Inhibition Measurement (Mm)

Microorganisms	**Ethanolic Extract-*S. alata* Leaf**	**Ethanolic Extract-*S. S.alata* Stem**	**Amoxicillin (250mg/ml)**
Escherichia coli	4.0	4.5	4.5
Streptococcus pyogene	3.5	3.5	6.5
Staphylococcus aureus	5.0	5.0	6.0

4. DISCUSSION

The study's findings indicate that the leaves and roots of Senna alata can be effectively extracted with both aqueous and ethanol solvents for use as food, medicine, and as a pesticide. The leaves and roots were subjected to qualitative and quantitative phytochemical screening, and the results revealed that the extract from the Senna alata plant contained a significant blend of phytochemical and nutritional values. The results of the qualitative phytochemical analysis of the leaves and stem sample reveal that the alkaloids and saponins are the major phytochemical components in the leaves, while flavonoids are the primary component in the stems.

The quantitative composition also demonstrates that the sample of leaves has a higher percentage composition of alkaloids, tannins, and saponins, whereas the sample of stem has a higher percentage composition of flavonoids and phenols. Senna alata's leaves and stems

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contain alkaloids, which attest to their usage in the treatment of numerous ailments. Alkaloids, according to Edeoga and Enata (2011), are potent painkillers with antipyretic, stimulant, and tropical anesthetic properties in ophthalmology.

In a similar vein, Sofowora noted that the flavonoids present in the plant's components may be to blame for its use as anti-bacterial, anti-inflammatory, anti-oxidant, anti-allergy, antiviral, antimutagenic, and vasodilatory characteristics (1993). The presence of saponins in the plant's leaves and stem could be proof that they have the ability to bind cholesterol and have hemolytic activity in aqueous solutions (Sodipo et al., 2000). In both animal and human studies, saponins have been shown to have an effect on the immune system and to have the ability to decrease cholesterol. In addition, phenols have been said to be effective against aging, cancer, and cardiovascular disease (Yadav and Agarwala, 2011). Similar to this, tannins may be successful in treating bleeding and restricting naked swellings.

Pearson and Cuthbertson's proximate examination of the Senna alata leaf and stem, however, revealed that they were relatively protein-rich, accounting for more than 12% of their calorific values (1996). As a result, the plant part's notable protein content points to potential applications as a suitable source of supplemental protein for humans and livestock. The leaves and stems of the plant both had a substantial amount of moisture, carbohydrate, crude fibers, ash levels, and fat, with the stems containing a larger percentage of carbohydrates than the leaves. Thus, this proves that the stems can be classified as having high carbohydrate content.

For the brain, heart, neurological, digestive, and immune systems to function at their best, there must be an adequate supply of carbohydrates. The removal of potential carcinogens from the body by crude fiber is said to cleanse the digestive tract and stop the body from absorbing too much cholesterol. Additionally, crude fiber gives food more weight and decreases the consumption of too much starchy food, which is a feature of the diets of the underprivileged and locals. Therefore, this protects against harmful metabolic diseases including high blood pressure and diabetes in men (Sabale et al., 2008). The percentage composition of ash and fat agrees with Mulaudzi et alresearch .'s results (2012).

Agar well diffusion was used to test the antibacterial effects of S. alata leaf and stem extracts on Mueller Hinton Agar. Escherichia coli, Streptococcus pyogenes, and Staphylococcus aureus standard strains were inoculated into 10ml of sterile nutritional broth. The infected plates were then manufactured to have diameter wells (in mm). A positive control was amoxicillin. For 24 hours, the plates were incubated at 370C. The diameter of the zone of inhibition was used to measure the antibacterial activity, and the results were recorded. From the aforementioned findings, it is evident that S. alata leaf and stem ethanolic extracts are antibacterially effective against all pathogens chosen, albeit to varied degrees.

For Escherichia coli, Streptococcus pyogenes, and Staphylococcus aureus, respectively, ethanol leaf extract of Senna alata demonstrated inhibitory zones of 4.0 mm, 3.5 mm, and 5.0 mm. However, the inhibitory zones for Escherichia coli, Streptococcus pyogenes, and Staphylococcus aureus for the ethanolic stem extract of Senna alata were 4.5 mm, 3.5 mm, and 5.0 mm, respectively. The findings of this investigation are consistent with those of earlier studies (Leven et al., 2009), Ibrahim et al., 2007, and Harborne et., al (2004). Oloke and Kolawole (1998) noted that the solubility of any medicinal plant's bioactive components can change depending on the extraction solvents utilized. Senna alata leaf and stem antibacterial extracts were generally found to have somewhat favorable results against the

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pathogenic bacteria that were put to the test. It follows from this that plant parts may be effective antibacterial agents, in line with Takazawa et al reports. .'s (1982).

5. CONCLUSION

The phytochemical, nutritional, and antimicrobial screening of Senna alata leaves and stems extracts reveals the various importance and benefits of the plant, particularly as it could serve for various remedies against malnutrition, disease, and infection controls. The plant part also exhibits antimicrobial potential as it exhibits a varying degree of effectiveness against selected species of bacteria, such as Escherichia coli, Streptococcus pyogene, and Staph. Therefore, the main advantages of adopting plant-based medicines are that they are generally safer than synthetic pharmaceuticals and offer profound therapeutic and more cost-effective treatment options due to their pharmacological significance.

6. REFERENCES

1. Ajayi I.A, Jonathan SG, Adewuyi A, Oderinde RA (2008). Antimicrobial screening of the essential oil of some herbal plants from Western Nigeria. World Appl. SC. J.3(1);79-81.
2. Benli M, Bingol U, Geven F, Guney K, Yigit N (2008). An investigation on to antimicrobial activity of some endemic plant species from Turkey. Afr.J. Biotechnol. 7(1);001-005.
3. Brunner, J.H. (1994). Direct spectrophotometer determination of saponins. Anal. Chem. 3 (15): 1314-1326.
4. Chatterjeesup S, Dutta S. A survey on VAM association in three different species of Cassia and determination of antimicrobial property of these phytoextracts. Journal of Medicinal Plants Research. 2010;4(4);286-92.
5. Devmurari, V. (2010). Phytochemical screening and evaluation of antioxidant activities of Symplocoracemosa Roxb. Journal of Advanced Science Research. 1:28-34.
6. Edeoga, P.K and Enata, D.O. (2011). Alkaloids, tannins and saponins contents of the medicinal plants. Med. Anm. Plant Sci: 23: 344-349.
7. Elmahmood, A.M, Amey J.M (2007). In vitro antibacterial activity of Parkia biglobosa (jacq)root-bark extract against some microorganisms associated with urinary infections. Afr. J. Biotechnol. 6(11); 1272-1275.
8. Falodun A, Okenroba L.O, Uzoamaka N (2006). Phytochemical screening and anti-inflammatory evaluation of methanolic and aqueous extracts of Euphorbia heterophylla Linn. (Euphorbiaceae). Afr.J. Biotechnol. 5(6);529-531.
9. Harbone J.B. (1994). Phytochemical methods 2nd edition London. Chapman and Hall, Ltd. ELBS page 12-56.
10. Harbone, J.B. (1993). Direct spectrophotometer determination of alkaloid. Anal. Chem. 6(2): 1153-1167.
11. Harborne J.B (2004). Phytochemical Methods. Chapman and Hall, London. pp. 166-226. Ibrahim, D and Osman, H. (1995). Antimicrobial activity of Cassia alata from Malaysia. J. Ethnopharmacol.45(3);151-156.

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12. Ibrahim M.B, Owonubi M.O, Onaolapo J.A (2007). Antimicrobial effects of extracts of leaf, stem, and root-bark of Anogiessus leicarpus on Staphylococcus aureus NCTC 8190, Escherichia coli NCTC 10418 and Proteus vulgaris NCTC 4636. J. Pharmaceutical Res. Dev. 2: 20-26.
13. Igoli J.O, Ogaji O.G, Igoli NP, Tor-Anylin T.A (2005). Traditional Medicinal practices among the Igede people of Nigeria (part 11). Afr. J. Tradit. Comp. Alt. Med. 2(2);134-152.
14. JohnWiley& sons, New York, Pp. 97-145.
15. Leven M, Vanden Berghe D.A, Mertens F, Vlictinck, A, Lammens E (2009). Screening of higher plants for biological activities/antimicrobial activity. Plant. Med. 36: 311-321.
16. Makinde A.A, Igoli J.O, TA'Amal, Shaibu S.J, Garba A. (2007). Antimicrobial activity of Cassia alata. Afr. J. Biotechnol. 6(13);1509-1510.
17. Mayuri, P.N. (2012). Screening of Ailanthus excelsRoxb. For secondary metabolites J. Curr Pharmaceutical Res., 10(1):19-21.
18. Mulaudzi, R.B., Nahala, A.R., Kulkarni, M.G., Van Staden, J. (2012). Pharmacological properties and protein binding capacity of phenolic extracts of some Venda medicinal plants used against cough and fever. Journal of. Ethnopharmacology. 143(1):185-93.
19. Nisar, M, Tariq, S.A, and Ullah, I. (2009). Nutritional levels of Indigoferagerdiana Wall and Crataegussongrica. Pakistan Journal of Botany. 41(3): 1359-1361.
20. Oloke, J.O and D.O Kolawole (1998). The antibacterial and antifungal activities of certain of certain components of Aframomum melegueteа fruits. Fitoterapia, 59(3);384-388.
21. Owoyale J.A, Olatunji G.A, Oguntoye S.O (2005). Antifungal and antibacterial activities of an alcoholic extract of Senna alata leaves. J. Appl. SC. Environ. Managem. 9(3);105-107.
22. Pandey, M., Abidi, A.B., Singh, S. and Singh, R.P. (2006). Nutritional Evaluation of Leafy Vegetable of Paratha. Journal of Human Ecology. 19: 155-156.
23. Pearson, W.T. and Cuthbertson, E.G. (1996). Noxious weeds of Melbourne, Australia Intake press. Page 53-59.
24. Sabale, V., Patel, V., Paranjape, A., Arya, C., Sakarkar, S.N., Sabale, P.M. (2008). Moringa oleifera (Drumstick) An overview. Phcog Rev. 2(4): 7-13.
25. Sodipo, O.A., Akiniyi, J.A. and Ogunbamameru, J.V. (2000). Studies on certain characteristics of extracts of bark of Pansinystallamacruceras (K schemp) pierre Exbeille. Global J. Pure Appl.Sci. 6(1): 83-87.
26. Sofowora, A.O. (1993). Medicinal plants and traditional medicine in Africa. Spectrum Books Ltd, Ibadan, Nigeria. Pp.191-289.
27. Sofowora, A.O. (2006). Medicinal plants and traditional medicine in African, Chichester
28. Swain, T. (1979). Tannin and Lignins. In Roseental, G.A. and D.H (Eds.) Herbivore: Their interaction with plant metabolites. Academic press. New York. Page 1173.
29. Takazawa, H, F. Tajima and C. Miyashita, 1982. An Antifungal compound from shitake (Lentinus edodes). Yakugaku Zasshi, 102;489-491.
30. Tiwari, P., kumar, B., Kaur, M., Kaur, G. and Kaur, H. (2011). Phytochemical Screening and Extraction. A review. Int. Pharm. Sci. 1(1): 98-106.

Journal of Environmental Impact and Management Policy
ISSN: 2799-113X
Vol : 02 , No. 06 , Oct-Nov 2022
http://journal.hmjournals.com/index.php/JEIMP
DOI: https://doi.org/10.55529/jeimp.26.1.11

31. Trease, J, and Evans, W.C. (2005). Phamacognosy. 15th Ed. Saunders, London. Pp.53-72
32. Yadav, R.N.S. and Agarwala, M. (2011). Phytochemical Analysis of Some Medicinal Plants. J. Phyt, 3(12): 10-14.