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Proximate, Minerals, Phytochemical and Antioxidant Assessment of *Guiera Senegalensis* Leaves obtained from Yabo community for Standardization techniques.

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Abstract
Guiera senegalensis (Gs) is a plant popularly known as Sabara in Hausa. *The leaves extracts of Gs has been used for treatment of jaundice and other diseases such as malaria, diabetes mellitus, cough hypertension, arthritis, diarrhea and enteritis. Furthermore, the roots' powder of Gs was used for treatment of inflammation and wound associated with diabetic's mellitus and other injuries. Gs extract was also used in the folk medicine in other countries and found to be effective against leprosy, fever, and was helpful against increased blood pressure and high blood sugar level. The plant material were collected from Yabo town, the leaves were wash with distilled water and grinded into fine powder. The proximate, mineral content, phytochemical and antioxidant from leaves of Gs was assessed using standard procedures. The moisture content (87.0*$\pm$*0.05), ash (3.28*$\pm$*0.01), crude proteins (15.23*$\pm$*0.03), and crude fibre (52.0*$\pm$*0.05). the mineral content found are Na, Zn, K, Mg, Fe, Ca. the phytochemicals reveals the presence of alkaloids, flavonoids, tannins, anthraquinones, and phenolic. The leaves extracts show good antioxidant activities. The plant Gs could be used as a source for feedstock as well as medicine for both human and animals, and also for the treatment of diaebetics mellitus.*

Keywords: proximate, minerals, phytochemical, antioxidants, extracts

Introduction

Historically, plant materials derived from *Gs* are found to be valuable sources of variety of drugs for treatment of numerous ailments in sub-saharan Africa, including Nigeria. According to WHO, 80% of individuals from developed countries use traditional medicines extracted from plants (Garba *et al*., 2024). It is therefore, pertinent to make further more systematic investigation of medicinal values of indigenous plants with regards to their chemical constituents as well as standard practices (from collection to consumption) that are of medicinal value to man for effective use health wise. A balanced diet counterparts these extreme conditions with the proper proportion, composition, quantity, and presence of macronutrients, micronutrients, and bioactive compounds. However, little is known on the way these components exert any influence on our health. These

nutrients aiming to feed our bodies, our tissues, and our cells, first need to reach mitochondria, where they are decomposed into CO_2 and H_2O to obtain energy (García-García *et al*., 2023).

Several traditional medicinal plants, including *Guiera senegalensis (Gs*), a shrub that grows well in sub-Saharan Africa and Sudan (Nabaa *et al*., 2016), have been candidates for research because of their perceived medicinal properties. Evaluation of compounds such as, tannins, alkaloids, flavonoids saponins, terpenoids and phenols have been used as a method of screening of medicinal plants. *Gs* has been reportedly used in traditional medicine as a cure for infections and wounds (Nabaa *et al*., 2016). In the Nigeria, *Gs* is popular known as sabara in Hausa which the leaves extract and the roots powder are used for treatment of a variety and diseases and wounds, respectively. The leaves extracts of *Gs* has been used for treatment of jaundice and other diseases such as malaria, diabetes mellitus, cough hypertension, arthritis, diarrhea and enteritis. Furthermore, the roots' powder of *Gs* was used for treatment of inflammation and wound associated with diabetic's mellitus and other injuries. *Gs* extract was also used in the folk medicine in other countries and found to be effective against leprosy, fever, and was helpful against increased blood pressure and high blood sugar levels. The aim of this study was to investigate the proximate, minerals, phytochemicals and antioxidant of G. senegalensis leaves collected from Yabo for standardization techniques.

2. Materials and Methods

2.1 Sample collection and treatment

The leaves of *Gs* were collected from Yabo local government, Sokoto state, Nigeria. The plant leaves were was with dilled water and shade dried. After drying, the leaves were ground well into fine powder using pistle and mortar and the powder was transferred into airtight containers with proper labeling for future use.

2.2 Proximate Analysis

2.2.1 Moisture Content

The dry leaves powder was carefully examined to determine their moisture content. The powdered from *Gs* leaves two (2g) was transferred to pre-heated ceramic container (cruicible). Within the scorching oven set to one hundred and five degrees Celsius (105^{o}C) for 6h. Upon removal after six hour periods of time, it had achieved a consistent mass. Still warm, it was allowed to cool in the controlled environment of a desiccator. Only once it had returned to surroundings temperature was it reweighed. By comparing the initial and final values, the percentage of water could be calculated using the standardized formula below. The precise analysis revealed the amount of hydration still clinging to the remnants of the once vibrant seeds (Muhammad *et al*, 2020).

$$\% \, moiture = \frac{W1 - W2}{Wt \, of \, sample} X100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where
W_1= weight of crucible + sample before heating
W_2= weight of crucible + sample after heating

2.2.2 Determination of % Ash

A clean, empty crucible was put in a muffle furnace and fired to determine the amount of ash at 600^0C for 1 hour, Following cooling in a desiccator, the weight of the empty crucible was recorded (W_1). A sample of one gram (1g) was placed in crucible and weighed (W_2). With the aid of a blowpipe, the sample was ignited over a burner and the substance was blackened. The crucible was then heated to 550 degrees Celsius for three hours in a muffle furnace. All of the organic particles in the sample have finished oxidizing when grey-white ash appears. After cooling, the crucible was weighed again (W_3). Equation (2) below was used to get the percentage of ash (Muhammad *et al.*, 2020).

$$\% \, ash = \frac{difference \, in \, wt. of Ash \; \times 100}{Wt. of \; Sample} X100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 2$$

2.2.3 Crude Protein Determination

The Kjeldahl technique was used to assess the crude protein content of Gs leaves. Eight grams of the digestion mixture (K_2SO_4:$CuSO_4$, 8:1), two grams (2g) of dried *Gs*, and 15 cm^3 of concentrated H_2SO_4 were added to the flasks. To ensure that the contents were thoroughly mixed, the flask was swirled. The ingredients are put on the digesting setup gear to begin the process of digestion, which continues until the combination turns blue-green. After cooling, the digest-containing flask was moved to a 100 cm^3 volumetric flask and filled to 100 cm^3 with distilled water. A Markam-still distillation device was used for the distillation (Muhammad *et al*., 2019).
In the same way, 10 cm^3 of digest and 10 cm^3 of 0.5N NaOH were progressively added to the distillation tube. With the use of a conical flask containing 20 cm^3 of a 4% boric acid solution and five drops of a modified indicator (methyl red indicator) were added, the component (NH_3) that was formed after the 10-minute distillation process was collected as ammonium hydroxide. Following a 0.1N HCl solution titration of the distillate, the final result (pink hue) was observed. All of the preceding procedures were followed for blank titration and equation (3) below was used to get the percentage crude protein content:

$$\% \, crude \, protein = 6.25 \times N(\text{Correction factor}) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

$$\%N = \frac{S - B \times N \times 0.14 \times D \times 100}{Wt \, of \, sample} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

Where
S = sample titre value (cm^3)
B = blank titre value(cm^3)
N = concentration of Hydrochroric acid

D = Dilution factor of sample after digestion
V= volume of distilled water taken
0.014 = Milli equivalent weight of nitrogen

2.2.4 Determination of Crude Fiber

Two grams (2g) *Gs* leaves powder was put into the crucible weighed as (W_0). The crucible was then set on the Dosi-fiber unit while the valve was remained in the "OFF" position. Each column received three drops of foam suppressor after 150 cm^3 of hot sulfuric acid solution was injected. Next, the cooling circuit was opened and activated (power at 90%). The electricity was cut by 30% when it started to boil, and it was also left for half an hour. To guarantee that all of the acid was removed from the sample, the valve was opened to remove it and then rinsed three times with distilled water. Instead of using sulfuric acid for alkali digestion, KOH was utilized. After an hour of drying at 150^{o}C in an oven, the sample was cooled in a desiccator and weighed as (W_1). After three hours at 55^{o}C in a muffle furnace, the sample in the crucible was cooled in a desiccator and weighed as (W_2). Equation (5) below was used to estimate the percentage of crude fiber:

$$\%\ crude\ fiber = \frac{W_1 - W_2}{W_0} X100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 5$$

2.2.6 Assessment of Nitrogen Free Extract

In the proximate analysis, nitrogen free extract (NFE) was computed as the difference between the methods for analyzing all other components as follows:

$$NFE = (100 - \%\ moisture\ +\ \%protein + \%fat + \%crudefiber + \%\ ash) \ldots\ldots\ldots(7)$$

(Muhammad *et al*., 2023)

2.2.7 Determination of Mineral Contents

The minerals present in *Gs leaves* were assessed in accordance with Muhammad *et al*. (2023)

Digestion of *Gs leaves* Sample

In the wet digestion process, a glass tube containing precisely 1 gram of the *Gs*. *Leaves* powder was agitated. The mixture was left overnight at room temperature after twelve milliliters (12 ml) of HNO_3 was added. After adding 4.0 milliliters of perchloric acid ($HClO_4$), the mixture was placed in a fume block to aid in digestion. The temperature grew gradually, rising from 500°C to 250°C to 300°C. White vapors appeared, indicating that the digestion was finished in roughly 70 to 85 minutes. The contents of the tubes were moved to 100 ml volumetric flasks when the mixture had cooled, and the quantities of the contents were adjusted to 100 ml using distilled water. The wet digested solution was put into precisely labeled plastic bottles, where it was kept until it was needed for mineral analysis

2.2.7.1 Assessment of magnesium (mg) and Calcium (Ca) by AAS approaches

Basic Principle:

Using an atomic absorption spectrophotometer, the mineral content of the digested sample was determined, *Gs* leaves were utilized to test the absorption of the elements; different electrode lamps

were employed for each mineral. Before and during determination, the apparatus was tested for standard solutions of each mineral to ensure correct operation. Except for magnesium and phosphorus, all minerals had a dilution factor of 100. The original solution was further diluted using 0.5 ml, and extra distilled water was added to bring the volume up to 100 ml in order to determine the magnesium (Mg) as supported by equation below:

$$MW = \frac{absorbance\ (ppm)\ X\ dry\ Wt\ \ X\ D}{Wt.of\ sample\ x\ 1000} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 8$$

Note that: The dilution factor is 100 for calcium, iron, potassium, sodium manganese, and chromium, and 2500 for phosphorous and 10,000 for magnesium.

2.2.7.2 Flame Photometry Assessment of Potassium and Sodium

The sample was analyzed for sodium (Na) and potassium (K) using the flame photometry method. Na and K were determined using the same wet digested sample solution used in AAS. For both Na and K, standard solutions of 20, 40, 60, 80, and 100 milliequivalent/L were employed. The same process used in AAS is used to calculate the total mineral intake.

2.2.7.3 Spectrophotometry Analysis of phosphorus

Phosphorous in the *Gs* leaves were assessed using method describe by Muhammad *et al*. (2023).

2.4 Extraction (maceration)

Five hundred (500g) of dried plant material were extracted with the sample to solvents ratio (1:5, i.e 500g of sample with 2500 cm^3 of solvents) sequentially with (95% n-Hexane, 99.5% ethyl acetate, and 99.85% methanol). The solvent was evaporated at 45^{o}C with the aid of a rotary evaporator. After drying, the resultant crude extract was weighed to calculate the yield %, it underwent bioassay analysis (Zagga *et al*., 2024)

$$Percentage\ Yield(\ \%) = \frac{weight\ of\ extract}{weight\ of\ plant\ material} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots 9$$

(Zagga *et al*., 2024)

2.5 Preliminary Phytochemical Screening

The phytochemical constituents were assessed using standard methods for phytochemical screening with little modifications as reported by Muhammad *et al*,. (2022).

2.5.1 Determination of Alkaloids by Mayer's Approach

Four (4) drops from Mayer's solution were added to 2 cm^3 of *G. senegalensis* extracts. Alkaloids were present as an orange precipitate was obtained.

Wagner's Test: 2 cm^3 of crude extracts in a test tube were combined with a few drops of Wagner's solution, the presence of alkaloids was revealed by the production of a dark brown precipitate.

Dragendorff's Test: Four (4) drops of Dragendorff's solutions were applied to the *G. senegalensis* extracts (2 cm^3) and the formation of a reddish-brown precipitate confirmed the presence of alkaloids.

2.5.2 Keller Kiliani Test for Cardiac Glycosides

A 2 cm^3 of acetic acid was mixed with four (4) drops of 5% $FeCl_3$ solution, 50 mg of *G. senegalensis* extracts were dissolved then the solution was transferred into a test tube, followed by

2 cm^3 H_2SO_4. The formation of brown-ring at the interface indicated that cardiac glycoside was present.

2.5.3 Determination of Anthraquinones (Bontrager Test)

A 2 cm^3 of 10% NH_4OH was added into 2 cm^3 of extracts. A rose-pink color was obtained which indicated anthraquinones were present.

2.5.4 Ferric Chloride Test for Flavonoids

A test tube holding 5 cm^3 of crude extracts was filled with 2 cm^3 of 5% $FeCl_3$ solution. A green precipitate was formed. This indicated that flavonoids are present.

2.5.5 Salkowski Test for Steroids/Terpenes

After dissolving the 0.5 g of crude extracts in 5 cm^3 of chloroform, 2 cm^3 of concentrated sulfuric acid was added to the mixture. Red precipitation formed which reveals the presence of steroids.

Liebermann-Buchards' Test: A 2 cm^3 concentrated sulfuric acid and 5 cm^3 of acetic acid anhydride were added to small amounts of the *G. senegalensis* seed extracts, which have been diluted with 2 cm^3 chloroform. Steroid presence was manifested by the formation of green colouration.

2.5.6 Frothing Test for Saponins

A 5 cm^3 of distilled water was vigorously shaken with 2 cm^3 of *G. senegalensis* seed extracts and allowed to stand for 15 minutes. The formation of a foam persistently indicated saponin in the sample.

2.5.7 Ferric Chloride Test for Tannins

A 2 cm^3 of extract was combined with 5 cm^3 of distilled water. 2 drops of 5% $FeCl_3$ were added. After mixing, boil for 5 minutes. Tanning agents were detected by the formation of a greenish precipitate.

2.6 Antioxidant determination of Gs

Hydroxyl radical (OH•−) scavenging assay

The Hydroxyl radical (OH-) scavenging activities of the *Gs extracts* were estimated using procedure described by Oladimeji *et al.* (2019) with little modification. In the assessment, Two milliliter (2mL) of Gs extracts (heaxane, ethyl acetate and methanol) at different concentration 0.2 mg/ml to 1.0 mg/ml. 0.6 mL of 8 mmol/L ferrous sulfate ($FeSO_4$), 0.5 mL of 20 mmol/L hydrogen peroxide (H_2O_2), and 2 mL of 3 mmol/L salicylic acid were allowed to mixed and incubated at 37°C for the period of 30 minutes. After that, 0.9 mL of distilled water (H_2O) was added to each vial. The entire solution was then centrifuged at for fifteen minute (15min) at five thousands round per minutes (5000 r.p.m). finally , with the aid of spectrophotometer, the absorbance of each extract at different concentration was measured at 510 nm. The scavenging activities of Gs extracts was calculated using equation below:

$$\text{Percentage } OH^- \text{scavenveged } (OH^-) = \frac{A_c - A_e}{A_c} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 10$$

Where $A_c - is\ the\ absorbance\ of\ control\ ,\ A_e\ is\ the\ absorbance\ of\ extract$

Hydrogen peroxide scavenging assay

The Hydrogen peroxide (H2O2) scavenging properties of test extracts of *G. senegalensis leaves* were calculated by method decribed by Oladimeji *et al*. (2019) with little modifications. 3.4ML of etracts concentrations 0.2 mg/ml to 1.0mg/ml were mixed with 0.6mL hydrogen peroxide (40 millimole perlitre). The absorbance was recorded at 230nm after 10 minutes incubation period at room temperature

The percentage H2O2 scavenging activities of test extracts of *G senegalensis leaves* were calculated using the following expression:

$$\text{Percentage } H_2O_2 \text{ scavenveged } (\%H_2O_2) = \frac{A_c - A_e}{A_c} \times 100 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 11$$

Ferric Reducing power

The extract concentrations (0.2–1 mg/mL) was prepared in 1 mL of distilled water were mixed with 2.5 mL of 0.2 mol/L phosphate buffer (pH 6.6) and 2.5 mL of 1% potassium ferricyanide [K3Fe(CN)6]. The resulting mixtures were incubated at 50°C for 20 min, after which 2.5 mL of trichloroacetic acid (TCA) was added to each mixture and centrifuged at 1500 rpm for 15 min. Micropipette was used to collect 2.5 mL of supernatant and mixed with an equal amount of distilled water and 0.5 mL of 0.1% FeCl3. The
absorbance of the resulting solution was measured at 700 nm (Oladimeji *et al*., 2019).

Statistical analysis

All analyses were performed in triplicate and the results were reported as means ± standard deviations (SD), using minitab-17 statistical software.

Results

Table 1: Proximate content of *Guira senegalensis* leaves from Yabo LGA

Parameters	Moisture content	Ash content	Crude protein	Crude fiber
Concentration (%)	87.0±0.05	3.28±0.01	15.23±0.03	52.0±0.05

The nutritional significance of plant species is measured by their content of carbohydrates, proteins, fats, oils, vitamins, minerals, and water, which are responsible for growth in flora and fauna species. The fats, protein, and carbohydrates are vital nutrients for life expectancy. The results of the proximate obtained from *Guira senegalesnis* reveals the % moisture of 87.0±0.05 which was found to be higher 57.95 ± 0.31% for A*cer pictum Thunb* and 66.78 ± 0.47 for *Quercus ilex L.* as reported by Radha *et al*. (2021), and also the results was found to be lower than 95.90% for *Guira sengalensis* leaves as reported by Alshafei *et al*. (2016). The moisture content of harvested plants is generally very high, around 60–80%. If the moisture content is not significantly reduced, it enables maturation of harmful biological processes (Poós and Varju, 2017). The ash

content were found to be 3.28±0.01 %, which was found to be comparable with 2.15% for *Guira senegalensis* leaves reported by Alshafei *et al.* (2016). The results was found to be lower than 8.3 ± 0.2 and 8.67 for *Quercus ilex L.* and *Rothmania longiflora* as reported by Radha *et al*. (2021) and Muhammad *et al*. (2020) respectively. The ash content in a food material determines the consistency of the material, identifying it as carbon-free and showing the organic, inorganic, and impurity content found in the sample. The soluble and insoluble minerals in the sample are predicted by the total ash content (Ilodibia *et al*., 2016). The crude protein were found to be 15.23±0.03 % which was slightly high than 13.93 for *G. senegalensis* reported by Nabaa *et al*. (2016), the results also was found to be lower than 27.92 ± 0.29 for *Acer caecium Wall* and 21.0% for *Senegalia macrostachya* seed as reported by Radha *et al*. (2021) Zagga *et al*. (2024). The quantity and quality of proteins in the plants are important for the selection of plant species for nutritive significance (Prajna and Rama Bhat, 2015).

The crude fiber obtained was 52.0% which was found to be high than 30.03 ± 0.24 for *Berberis lycium royle* as reported by Radha *et al*. (2021).

Table 2: Minerals presence in *Guira senegalensis* leaves from yabo LGA

Minerals	Sodium (Na)	Zinc (Zn)	Potassium (K)	Cupper (Cu)	Iron (Fe)	Magnesium (Mg)	Calcium (Ca)
Conc.(mg/ml)	398.02	6.82	24.30	0.073	218.8	22.56	108.3

The analysis for several micro- and macro-elements in the plants indicated that these were present in all plant samples which are responsible for curing different types of diseases. A variety of factors have been attributed to the increasing public interest in herbal remedies, some of which include the high cost and side effects of most modern medications (Radha *et al*., 2021). The mineral contents from *Gueira senegalesnsi* reveals the following concentration sodium (Na) 398.02 mg/ml this results was found to be higher than 70.00 ± 0.32 for *S. macrostachya* seeds reported by Zagga *et al* (2024) and found to be lower than 450 *Acer pictum* Thunb and also were *comparabe* with 370 for *Betula utilis D.Don* reported by Radha *et al*. (2021). This connection between K and Na in foods helps to prevent hypertension (Radha *et al.,* 2021). The zinc concentration were 6.82 mg/ml which was found to be lower than 49.34 for *Berberis lycium* Royle reported by Radha *et al*., (2021).The potassium 24.30 mg/ml which was found to be higher than 20.3 for *Acer caecium Wall. Ex D.Don* and lower than 32.2 for *Heracleum lanatum* Michx as pointed out by Radha *et al*. (2021). The results for cupper was found to be 0.073 which were higher than 0.004 for *Gueira senegalensis* in sudan as pointed by Alshefei *et al*. (2016), the results also were found to be lower than 0.167 ± 0.15 for *Bambusa balcooa as* reported by Indira *et al*. (2024). The result for iron (Fe) 218.8 which was found to be higher than 3.2 ppm for *Gueira senegalensis* in Sudan and lower than 400.00 (4.00mg/kg) for *Bambusa balcooa as reported by* Alshefei *et al. (2016)* Indira *et al* (2024). For magnesium (Mg) 22.56 which were found to be lower than 24.00 ± 0.21 for *Senegalia macrostachya* as reported by Zagga *et al*. (2024) and high than 1.2 as reported by Alshefei *et al* (2016). For calcium 108.3 which were found to be higher than 71 ± 10.0 for *Bambusa balcooa as reported by* Indira *et al* (2024). The inconsistency of minerals results (mineral content)

may attributed to the various factors which includes difference geographical location, sample preparation and the method employed in mineral content determination (Panebianco *et al*, 2022).

Table 3 Determination of Extractive value

Solvents	Hexane	Ethyl acetate	Methanol
% Yields	1.6	3.6	17.4

The table 3 above show the extractive value of *Gueira senegalensis* leaves using different solvent system. Methanol have the high percentage followed by ethyl acetate (3.6) and finally hexane as shown the above table.

Table 4. Phytochemical results (qualitative) of *Guira Senegalensis* extract

Phytochemical	Alkaloid	Flavonoids	Anthraquinones	Cardiac glycoside	Tannins	Phenolic	Saponins
Hexane	+	-	-	+	-	-	-
Ethyl acetate	++	++	++	++	+++	++	-
Methanol ex	++	++	+++	++	++	++	++

The phytochemical assessment of Gs reveals the presence alkaloids, flavonoids, anthraquinones, cardiac glycosides, tannins, phenolic in ethyl acetate and methanol extracts. For hexane alkaloids and cardiac glycoside were detected in little amount, saponins were found to be present only in methanol extract as presented in Table 4 above. These secondary metabolites are of pharmacological importance, as suggested by literature plants that are rich in tannins exhibit some activity such as anti-diarrhea, antioxidant and anti-inflammatory activity (Khalid *et al*., 2019). Saponins, phenols and flavonoids are known to possess antimicrobial properties; as antifungal, antispasmodic, antibacterial, anti-allergenic as well as anti-inflammatory (Khalid *et al*., 2019). Likewise Alkaloids have been reported to aid in anti-diureticactivity of medicinal plants (Khalid *et al*., 2019).

Table 5 Antioxidant assay via H_2O_2 scavenging activity of the extracts at various concentrations

Extracts conc. (mg/ml)	Hexane	Ethyl acetate	Methanol	Std (vit.C)
0.2	21.42	45.12	30.23	30.02
0.4	47.83	54.21	56.80	42.23
0.6	55.26	80.15	66.34	63.30
0.8	63.42	86.20	80.54	83.03
1.0	68.54	92.14	85.26	92.50

HE= hexane, EA= etheyl acetate, ME= methanol Std (Vitc)= standard vitamin C

The table above showed the antioxidant activity of Gs using hydrogen peroxide at different concentration (0.2-1.0 mg/ml). at 0.2 mg/ml the high activity was recorded from ethyl acetate extract followed by methanol and hexane extracts respectively. The result was found to be slightly higher than that reported by Oladimeji etala. (2019). This variation could be due to geographical location and soil type.

Table 6: Antioxidant assay OH- radical scavenging activity of G. senegalensis leaves extracts

Extracts conc.(mg/ml)	HE	EA	ME	Std(Vit.c)
0.2	21.42	26..82	30.14	30.02
0.4	25.83	42.21	45.80	42.23
0.6	36.26	47.23	40.34	63.30
0.8	50.42	76.20	74.54	83.03
1.0	72.54	87.14	87.26	92.50

HE= hexane, EA= etheyl acetate, ME= methanol Std (Vitc)= standard vitamin C

From the above table, the hydroxyl radical scavenging activities of G .senegalensis extracts as presented in Table 6 shows that methanol have high activity (87.26), followed by ethyl acetate(87.14) and hexane (72.54) at 1mg/ml concentration. The activity recorded was comparable with standard (vitc 92.50). this indicates that all extracts scavenged the hydroxyl radical and the scavenging activities rises as the concentration of the extracts increases. The results was found to be slightly higher than the results reported by Oladimeji *et al.* (2019). This slight differences could be attributed to the soil type as well as geographical location.

Table 7 Antioxidant assay (Ferric reducing power) of *Guira senegalensis* extracts

Extracts conc. (mg/ml)	Hexane	Ethyl Acetate	Methanol
0.2	0.18	0.41	0.22
0.4	0.12	0.23	0.34
0.6	0.13	0.32	0.18
0.8	0.14	0.18	0.15
1.0	0.22	0.28	0.26

The change in colour of test solution from yellow to green depends on reducing power of the phytochemicals present in the solution. The reducing agent present in the test solution reduces Fe^{3+} compound to ferrous form. The absorbance of the solution is now measured at 700 nm to quantify Fe^{2+}. The reducing properties have been reported to exert antioxidant action by donating of a hydrogen atom to break the free radical chain (Gordon, 1990). Increasing absorbance at 700 nm

indicates an increase in reducing ability. The antioxidants present in extracts of *G s* caused the reduction of Fe^{3+} compounds to the ferrous form, and thus proved the reducing power. At 0.2mg/ml ethyl acetate > methanol> hexane as presented in table 7 above.

CONCLUSION

Moderate amount of moisture, ash, crude protein crude fibers as well as the minerals; sodium, zinc, potassium, cupper, iron, magnesium and calcium which are component of nutrients diet. The plant could be used in animal feedstock. The presence of alkaloid, flavonoid, tannins, anthraquinones, cardiac glycosides and phenolic compound this show that the plant could use for the treatment of various illness and diseases that affect both human and animals. The plant extracts shows good remarkable antioxidant activities which could be used as antidiabetic.

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