

Phytochemical Composition and Antimicrobial Properties of *Guiera Senegalensis* Leaves Extract Obtained from Yabo Community in Sokoto State, Nigeria

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ABSTRACT

Antimicrobial resistance (AMR) is a global concern that causes numerous fatalities Worldwide. There is an urgent need to produce new drugs that will help address the issue of antimicrobial resistance. *G. senegalensis*, popularly known as “Sabara” in Hausa, is a shrub/ small tree that grows up to 5m. The plant was used as a source of medicine for the rural populace to cure illnesses. This research aims to investigate the antimicrobial properties of *G. senegalensis* against some selected bacterial and fungal isolates. The plant was collected from Yabo LGA, Sokoto State. The leaves were washed with distilled water, shade-dried, and ground into a fine powder. Five hundred grams of powdered *G. senegalensis* leaves were macerated with solvents in the ratio of 1:5, the solvents were evaporated at 45°C. The extract's phytochemical composition and antimicrobial properties were assessed using a standard procedure. The results of the phytochemical analysis revealed the presence of alkaloids, flavonoids, cardiac glycosides, anthraquinones, tannins, steroids, and saponins. The average zone of inhibition for the bacterial and fungal isolates was between 6.58±1.79 and 15.67±1.45mm. The minimum inhibitory concentration (MIC) is as follows: *S. dysenteriae* 0.1mg/ml, *S. aureus* and *E coli* 0.05 mg/ml, *S. typhi* 0.025mg/ml, while the minimum bactericidal concentration (MBC) was 0.1mg/ml. For the fungal, the MIC was found to be 0.025mg/ml and MFC 0.05mg/ml. The results indicated that *G. senegalensis* is effectively used in traditional medical systems and could be used as a source of medicine to treat numerous microbial diseases.

Keywords: *Guiera Senegalensis*, *Leave extracts*, Phytochemicals, antibacterial, antifungal.

1.0 INTRODUCTION

An important global hazard to public health and development is Antimicrobial Resistance (AMR). In 2019, bacterial AMR is thought to have led to 4.95 million fatalities Worldwide and directly caused about 1.27 million deaths (WHO, 2023). Antimicrobial medicines are the cornerstone of modern medicine. The different strategies employed in the treatment of common infections have been impacted so much by the emergence and spread of drug-resistant pathogens.

Medicinal plants or medicinal herbs are generally administered to treat many microbial infections. World Health Organization (WHO) reports that various plant fractions and their dynamic constituents are used as traditional medicines by 80% of the world population (Gizaw *et al.*, 2022). In Nigeria, 75% of the human population depends on traditional medicine, particularly in the rural areas and in some parts of the urban areas therapeutic usefulness of plants is decided by their chemical constituents, which are naturally present in various plant parts. Flavonoids, alkaloids, tannins,

saponins, phenols, and glycosides are the major secondary metabolites found in plants that have antioxidant, anti-inflammatory, anticancer, and antimicrobial properties (Roy *et al.*, 2022).

G. senegalensis usually occurs as a shrub or a small tree of 3 to 5 M in height depending on the habitat. Its grey-to-brown spindly bark consists of numerous knots that send out branches. The leaves are grey-green coloured and oval shaped which are 3 to 5 cm long and 1.5 to 3.0 cm broad and are arranged opposite or sub-opposite on the stem (Anka *et al.*, 2020; Shu'aibu *et al.*, 2024). The plant is distributed in the Savannah region of West and Central Africa including Senegal, Nigeria, Chad, Gambia, Mali, Guinea, Guinea-Bissau, Niger, Burkina Faso, Mauritania and Ghana (Anka *et al.*, 2020; Shu'aibu *et al.*, 2024).

The shrub is locally called Sabara in the Hausa language and is widely and extensively been used as a source of traditional herbal medicine. The plant is used for the treatment of different microbial ailments Worldwide. Locally, the plant leaves are popularly used as blood

tonic among nursing mothers. Likewise, it is found useful in the treatment of numerous inflammatory symptoms. Similarly, local livestock farmers, use it to treat varieties of disease conditions, including inflammation of skin (Alshafei *et al.*, 2016). The leaves are widely administered for pulmonary and respiratory complaints, for cough as a febrifuge, colic and diarrhoea, syphilis, dysentery, rheumatism, hypertension, eczema, beri-beri, leprosy, gastroenteritis, impotency, epilepsy, diuresis, expiration, bronchitis, tuberculosis, fever, cold and asthma (Alshafei *et al.*, 2016; Denou *et al.*, 2016). It is moreover, used as a poultice on tumours and against the Guinea work, kidney diseases, abdominal pain, joint problems, diabetes mellitus and increasing high blood sugar levels (Alshafei *et al.*, 2016). The root concoction is used to cure diarrhoea, dysentery and microbial infections (Shu'aibu *et al.*, 2024).

Phytochemical studies involving different parts of *G. senegalensis* have shown the presence of bioactive compounds such as alkaloids, tannins, terpenoids, saponin, flavonoids, coumarins, mucilage, amino acid, ascorbic acid, anthraquinones, elastin, cardiogenic and cyanoheteroside.

2.0 MATERIALS AND METHOD

2.1 Sample collection and identification and treatment

The sample of *G. senegalensis* was collected from Yabo local government area of Sokoto state, which was identified at the herbarium in the Department of Botany, Ahmadu Bello University Zaria where voucher number 1823, was assigned to it. The leaves were washed with a running tap and distilled water to remove dirt. Shade dried and ground into powder.

2.2 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 cm³ of solvents) sequentially with (95% n-Hexane, 99.5% ethyl acetate, and 99.85% methanol). The solvent was evaporated at 45°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(%)

$$= \frac{\text{weight of extract}}{\text{weight of plant material}} \times 100$$

(Zagga *et al.*, 2024)

2.3 Preliminary Phytochemical Screening

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

2.3.1 Determination of Alkaloids by Mayer's Approach

Four (4) drops from Mayer's solution were added to 2 cm³ of *G. senegalensis* extracts. Alkaloids were present as an orange precipitate was obtained.

Wagner's Test: 2 cm³ 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 cm³) and the formation of a reddish-brown precipitate confirmed the presence of alkaloids.

2.3.2 Keller Kiliani Test for Cardiac Glycosides

A 2 cm³ of acetic acid was mixed with four (4) drops of 5% FeCl₃ solution, 50 mg of *G. senegalensis* extracts were dissolved then the solution was transferred into a test tube, followed by 2 cm³ H₂SO₄. The formation of brown-ring at the interface indicated that cardiac glycoside was present.

2.3.3 Determination of Anthraquinones (Bontrager Test)

A 2 cm³ of 10% NH₄OH was added into 2 cm³ of extracts. A rose-pink color was obtained which indicated anthraquinones were present.

2.3.4 Ferric Chloride Test for Flavonoids

A test tube holding 5 cm³ of crude extracts was filled with 2 cm³ of 5% FeCl₃ solution. A green precipitate was formed. This indicated that flavonoids are present.

2.3.5 Salkowski Test for Steroids/Terpenes

After dissolving the 0.5 g of crude extracts in 5 cm³ of chloroform, 2 cm³ of concentrated sulfuric acid was added to the mixture. Red precipitation formed which reveals the presence of steroids.

Liebermann-Buchard's Test: A 2 cm³ concentrated sulfuric acid and 5 cm³ of acetic acid anhydride were added to small amounts of the *G. senegalensis* seed extracts, which have been diluted with 2 cm³ chloroform. Steroid presence was manifested by the formation of green colouration.

2.3.6 Frothing Test for Saponins

A 5 cm³ of distilled water was vigorously shaken with 2 cm³ of *G. senegalensis* seed extracts and allowed to stand for 15 minutes. The formation of a foam persistently indicated saponin in the sample.

2.3.7 Ferric Chloride Test for Tannins

A 2 cm³ of extract was combined with 5 cm³ of distilled water. 2 drops of 5% FeCl₃ were added. After mixing, boil for 5 minutes. Tanning agents were detected by the formation of a greenish precipitate.

2.4 Preparation of Bacterial Culture

The Media used was Mueller Hinton Agar. The media was prepared by weighing 39 g of the agar into 1000 ml of distilled water and shaking vigorously. The conical flask was plugged with cotton wool wrapped with aluminium foil paper then the medium in the flask was sterilized in an autoclave at 121° C for 15 minutes and allow cooling to about 40° C for 15 minutes before dispersing into a Petri dish (Muhammad *et al.*, 2022; Kakour *et al.*, 2023; Alex-Asaolu *et al.*, 2024).

2.5 Antibacterial activity of *Senegalia macrostachya* seed extract

The antibacterial activities of *G. senegalensis* seed extract were determined via an agar well diffusion method. A 0.2 mg/mL (stock concentration) was prepared by dissolving 1g of the extracts in 5 cm³ dimethyl sulfoxide (DMSO). Muller Hinton Agar was prepared according to the manufacturer's instructions and was sterilized for 15 minutes at 121° C, poured into sterile Petri dishes and allowed to cool and solidify, inoculated and incubated for 24 hours. The solidified sterile mediums were seeded with 0.1mL standard inocula of the test bacteria; the inoculums were spread over the surface of the medium with the aid of a sterile swab stick. Wells were bored into the solidified inoculated nutrient agar plate using a cork borer of 6 mm diameter. The wells were filled with 0.1 ml DMSO solution of the extract and allowed to diffuse for 1 h. Incubation of the inoculated medium was made at 37°C for 24. The Ciprofloxacin disc was used as a positive control for antibiotics. The zone of inhibition around the wells was recorded in millimetres (mm) and used for the antibacterial activity of *G. senegalensis* seed extracts (Muhammad *et al.*, 2022; Kakour *et al.*, 2023; Asaolu *et al.*, 2024).

2.6 Determination of minimum inhibitory concentrations of the effective *G. senegalensis* extracts

After 24 h of incubation, the MIC was characterized by a low concentration of antibacterial agents that prevent microbial growth. By using the method of disc diffusion, the most effective extracts of plants, having strong antimicrobial activities at 0.2 mg/mL, were modified to calculate their MIC by dissolving 1g of the extracts in 5 cm³ dimethyl sulfoxide (DMSO), filtering it with a Millipore filter and transferring the required amount to sterile discs, effective plant extracts with

different concentrations (0.2 mg/mL, 0.1 mg/mL, 0.5 mg/mL, 0.025 mg/mL,) were produced (the discs had 8 mm in diameter). Pathogenic strains of cultured bacteria were infused using Mueller–Hinton agar into sterile Petri dishes. Various amounts of extracts were obtained and loaded onto filter paper discs; Mueller–Hinton agar plates were later covered. The plates were then kept at 5°C in the fridge for 2 h and then incubated for 24 h at 35°C. With the help of Vernier caliper inhibition zones were determined and compared to the concentration of the effective extract of the plant (Imran *et al.*, 2021; Muhammad *et al.*, 2022; Kakour *et al.*, 2023).

2.7 Determination of Minimum Bactericidal Concentrations Gs Leaves Extracts

Two streaks of plates bearing MIC inhibitory zones with little concentration were collected and cultivated in tryptone soya agar (TSA) plates that displayed limited growth. Next, the plates were put for incubation at 35°C for 24 h. The growth of bacteria was observed in different plant extract concentrations. On freshly infected agar plates, MBC was defined as the extract of plant concentration that did not show any bacterial growth (Imran *et al.*, 2021; Muhammad *et al.*, 2023; Kakour *et al.*, 2023).

2.8 Antifungal Disks and Dissolvents

A standard disk of the antifungal drug, ketoconazole (15 µg), was used as a positive control. Extracts of *Guira senegalensis* were dissolved in 5% dimethyl sulfoxide (DMSO) (negative control). 5% Tween 80 (negative control) was used to dissolve *A. vera*.

2.9. Agar-Well Diffusion Method

The agar-well diffusion method was used to evaluate the antifungal activities of Gs extracts (Gizaw *et al* (2022). First, *A. niger* colonies that were stored on SDA agar slant were subculture on SDA plate and incubated at 35° C for three days. *A. niger* colonies that were taken from this fresh culture (3 days old) were mixed with 1 mL of sterile physiological saline solution, and a drop of Tween 20 was used to facilitate and produce an *A. niger* inoculum. After complete dissolution, the inoculum supernatant was

Compared with the 0.5 McFarland standard and adjusted by physiological solution. The supernatant was used for antifungal tests. *C. albicans* inoculum suspensions were prepared by taking a few colonies from fresh cultures grown on the SDA plate. The colonies were suspended in 5 mL of sterile physiological saline. The inoculum suspensions were shaken till complete dissolution, and the turbidity of the inoculum was compared with the 0.5

McFarland standards and adjusted with sterile physiological saline solution.

The antifungal activities of extracts of *G. senegalensis* were tested using SDA plates. Test organisms were inoculated uniformly with sterile swabs on the surface of the solidified SDA plate. After inoculation, four 6 mm diameter holes were made by using a sterile cork borer. The holes were filled with 0.1 mL of 0.2, 0.1, 0.05 and 0.0 25 mg/mL concentrations of the crude extracts, negative control (5% DMSO and 5% Tween 80) using a micropipette, and positive control (Ketoconazole 15 µg). The plates were then left at room temperature for 1 hr for diffusion and incubated. The zone of inhibition produced by *C. albicans* was measured in four directions and recorded after 48 hrs of incubation at 30°C (Gizaw *et al.* 2022). The zone of inhibition against *A. niger*, *A. fumigatus*, and *T. rubrum* was measured after 7 days of growth at room temperature. Each test was done in

triplicate. Values were given as the mean ± standard deviation (SD) of tests performed in triplicate.

2.10. Statistical Analysis.

Minitab-17 statistical software, one-way ANOVA was performed to test variation among the groups' mean concentrations of crude extracts. A Tukey post hoc test was used to compare the association between the zone of inhibition among concentration groups and the negative control. p value <0.05 was considered as statistically significant difference.

3.0 RESULTS

The use of *G. senegalensis* as an antioxidant drug demands thorough investigations into the phytochemicals to identify active components. The healing powers of medicinal plants have been attributed to the presence of various secondary metabolites such as alkaloids, flavonoids, glycosides, phenols, saponins, and steroids.

Table 1: Extraction of *G. senegalensis* leaves via maceration

Solvents	Hexane	Ethyl acetate	Methanol
% Yields of Extracts	1.6	3.6	17.4

Table 2: Phytochemical constituents of *G. senegalensis* leaves extracts

Constituents	Alkaloids	Flavonoids	Anthraquinones	Cardiac Glycoside	Tannins	Phenolics	Saponins	Steroids
Hexane	+	-	-	+	-	-	-	+
Ethyl acetate	++	++	++	++	+++	++	-	-
Methanol	++	++	+++	++	++	++	++	-

Key: Trace Amount = +, Moderate Amount = ++, Large Amount = +++

Table 3: Quantitative phytochemical analysis of *G. Senegalensis* extract

Phytochemicals	Alkaloids	Saponins	Flavonoids	Glycosides	Phenolics	Tannins
Results (mg/g)	8.3 ± 0.01	3.4 ± 0.02	1.2 ± 0.01	0.6 ± 0.00	48.0 ± 3.38	0.082 ± 0.01

Table 4.7: Antibacterial activity of the *Gs* leaves Extracts against different bacterial Isolates

Isolates	Extract	Concentration (mg/ml)/Zone of inhibition (mm)					
		0.2mg/ml	0.1mg/ml	0.05mg/ml	0.025mg/ml	+Control	- 5% DMSO
<i>S. dysenteriae</i>	HE	10	8	0	0	33	-
<i>S. dysenteriae</i>	EAE	11	9	0	0	33	-
<i>S. dysenteriae</i>	ME	17	13	11	0	33	-
<i>S. aureus</i>	HE	14	13	10	0	35	-
<i>S. aureus</i>	EAE	29	23	19	13	35	-
<i>S. aureus</i>	ME	21	17	10	0	35	-

IJS GS FUGUSAU VOL. 11(1)				WEBSITE: https://fugus-ijsgs.com.ng			
<i>S. typhi</i>	HE	17	12	10	10	40	-
<i>S. typhi</i>	EAE	24	22	15	11	40	-
<i>S. typhi</i>	ME	22	18	16	11	40	-
<i>E. coli</i>	HE	20	14	12	0	37	-
<i>E. coli</i>	EAE	20	17	13	11	37	-
<i>E. coli</i>	ME	16	15	12	15	37	-
<i>P-value</i>		0.006					

Key: ** = There is no statistically significant difference in the activity of the extracts against the isolates. Hence, the result has no significant difference at $p < 0.05$, Control = 0.05mg/ml of ciprofloxacin 0.05 mg/ml, HE = Hexene extract, EAE = Ethyl-acetate extract, ME = Methanol extract.

Table 4**.8: Antifungal activity of the *Gs* leaves Extracts against different bacterial Isolates**

Isolates	Extract	Concentration (mg/ml)/Zone of inhibition (mm)						- control (5% DMSO)
		0.2mg/ml	0.1mg/ml	0.05 mg/ml	0.025 mg/ml	+Ketoconazole (15 µg)		
<i>C. albican</i>	HE	6	6	6	6	20	-	
	EAE	12	9	7	6	20	-	
	ME	25	20	16	13	20	-	
<i>A. niger</i>	HE	6	6	6	6	30	-	
	EAE	15	12	9	8	30	-	
	ME	28	22	18	13	30	-	
<i>A. fumigatus</i>	HE	8	7	12	10	17	-	
	EAE	11	8	7	6	17	-	
	ME	23	18	13	10	17	-	
<i>T. rubrum</i>	HE	7	7	7	7	20	-	
	EAE	10	8	7	8	20	-	
	ME	16	14	12	10	20	-	
<i>P-value</i>		0.6**						

Key: ** = There is a statistically significant difference in the activity of the extracts against the isolates of fungal species. Hence, the result is not significant at $p > 0.05$, positive control = Ketoconazole (15 µg), negative control 5% DMSO HE = Hexane extract, EAE = Ethyl-acetate extract, ME = Methanol extract

4.0 DISCUSSION

Nowadays, the majority of the cases of urinary tract infections caused by multidrug resistance microbes constitute an important therapeutic challenge. They are widely spread and public health concerns at a global scale worldwide. Resistance mechanisms developed by MDR microbes are transferred from one strain to another bacteria through efflux, hyper-mutability and plasmid addiction. As a result, urinary tract infections caused by MRSA, extended-spectrum β -lactamases producing organisms (ESBL), vancomycin-resistant

enterococci (VRE), and carbapenem-resistant organisms (CRE/CRP) have higher morbidity and mortality. They are costlier to treat, result in longer hospital stays and place a greater burden on health systems than infections caused by susceptible organisms. These multidrug-resistant microbes have compromised all or the majority of currently accessible and affordable antibiotics widely used in developing countries. In such cases, searching for antibiotics from natural resources in general and medicinal plants in particular is a timely concern. Those plants have wide applications in the treatment of urinary tract infections

caused by multidrug-resistant bacteria and fungi. This can be demonstrated in that almost all tested medicinal plants had shown promising antimicrobial activity against the selected human pathogenic microbes. This finding substantiates previous studies that therapeutic agents derived from plants can be used as an important alternative for the treatment of infectious diseases (Gadisa and Tadesse, 2021).

The extraction yields of *G. senegalensis* leaves can vary significantly depending on the solvents and the method of extraction used, as indicated by many research findings. In this study, the Methanol solvent used indicated the highest % yield of 17.4 of *Gs* extract, while hexane reveals the lowest % yield of 1.6, as shown in Table 1 above. In this study, methanolic extract happened to yield a higher percentage (17.4) %, and so is adopted as the most suitable solvent for this research. This result was found to be comparable with 17.58 ± 5.43% for *G. senegalensis* as reported by Moreira *et al.* (2023).

The phytochemical screening of *G. senegalensis* leaves as extracted using three different solvents (Hexane, Ethyl acetate and Methanol) reveals the presence of secondary metabolites (alkaloids, flavonoids, anthraquinones, cardiac glycosides, tannins, phenolics, saponins and steroids) at varying amounts (Table 2 above). The result showed that methanol and ethyl acetate solvents yielded similar products except in anthraquinones and tannins, with moderate and large amounts and vice versa. Likewise, no saponins are present in ethyl acetate extract. Whereas hexane revealed the presence of only three phytochemicals (alkaloids, cardiac glycosides and steroids) in trace amounts. These secondary metabolites are of pharmacological importance, for instance, plants that are rich in tannins exhibit some activity such as anti-diarrhea, anti-inflammatory and antioxidant activity (Zagga *et al.*, 2024; Khalid *et al.*, 2022). Saponins, phenols and flavonoids are known to have antimicrobial activities; such as antifungal, antibacterial, anti-allergenic, antispasmodic and anti-inflammatory (Khalid *et al.*, 2022; Rodríguez-Negrete *et al.*, 2024). Likewise, Alkaloids have been reported to aid in the anti-diuretic activity of medicinal plants (Khalid *et al.*, 2022; Muhammad *et al.*, 2023; Zagga *et al.*, 2024). The leaves of *Gs* have similar phytochemicals as compared with *Sengalia macrostachya* seeds and *Rothmania longiflora* seeds as reported by Zagga *et al.* (2024) and Muhammad *et al.* (2022) respectively.

The quantitative phytochemical analysis of this study revealed that alkaloids (6.30 ± 0.01). This result was

found to be lower than 10.210.20 ± 0.10 for *Lantana camara* as reported by Khalid *et al.* (2022), saponins (3.40 ± 0.02), flavonoids (1.20 ± 0.01) was found to be higher than 0.719 ± 0.19 for *Lantana camara* as reported by Khalid *et al.* (2022), glycoside (0.6), and phenolic (38.03 ± 3.38) which were also found to be high 2.3 ± 0.09 for *Lantana camara* as reported by Khalid *et al.* (2022). This result indicated that the *G. senegalensis* leaves contain high phenolic compounds and a trace number of tannins (0.082±0.01). As shown in Table 4.5 above. This means that the leaves of *G. senegalensis* are very rich in phenolics, with tannins and cardiac glycosides in trace amounts.

However, according to different relevant research, these secondary metabolites are of paramount pharmacological importance. For instance, Plants that are rich in tannins exhibit some activity such as anti-diarrhea, anti-inflammatory and antioxidant activity (Khalid *et al.*, 2022). Similarly, saponins, phenols and flavonoids are known to have antimicrobial activities; such as antifungal, antibacterial, anti-allergenic, antispasmodic and anti-inflammatory (Khalid *et al.*, 2022). Likewise, alkaloids have been reported to aid in the anti-diuretic activity of medicinal plants (Khalid *et al.*, 2022).

The antibacterial activity of *Guira senegalensis* against *S. aureus*, *S. dysenteriae*, *S. typhi* and *E. coli* was estimated. The maximum zone of inhibition against the tested organism was found to be 29mm on *S. aureus* from ethyl acetate extracts at 0.2mg/ml. the average zone of inhibition recorded was found to be 6.58±1.79mm for *S. dysenteriae*, 14.08±2.48mm for *S. aureus*, 15.67±1.45mm *S. typhi* and 13.75±1.51 for *E. coli* respectively. The methanol extract shows a zone of inhibition of 17mm against *S. dysenteriae* which was found to be higher than 15.02 ± 0.11 mm for *S. macrostachya* seed as reported by Zagga *et al.* (2024). For the *S. aureus*, ethyl acetate extracts show the highest zone of inhibition of 29mm which was found to be a little bit comparable with 28.25 ± 0.2 for *S. macrostachya* seed extract as reported by Zagga *et al.* (2024). *Salmonella typhi* 24mm was found against ethyl acetate extract which was also found to be higher than 22.28 ± 0.19mm for *Senegalia macrosatchya* seed (Zagga *et al.*, 2024). For the *E. coli*, 20mm was recorded which was found to be lower than 21.22 ± 0.19^b for *S. macrostachya* seeds as reported by Zagga *et al.* (2024).

The antifungal activities of *G. senegalensis* show the average zone of inhibition of 11.00±1.85 for *C. albicans*, the value obtained was found to be higher than

6.0±0.00 for *A. vera* but lower than 15.5±0.5mm for *B. antidiysenterica* as reported by Gizaw *et al.* (2022) and likewise, 12.42±2.08mm for *A. niger* were comparable with 12.3±0.58mm for *A. vera* and higher than 6.0±0.00mm for *J. schimperiana* as reported by Gizaw *et al.* (2022). The result for *A. fumigatus*

5.0 CONCLUSION

Guira senegalensis leaf extract exhibited significant antibacterial and antifungal activity. Therefore, further structural elucidation of bioactive that inhibit the growth of microbes related to the studied plant may be used as precursors for the synthesis of new antibiotics shortly.

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REFERENCE

- Alshafei, N.K., Ahmed, S.M., Abdelfattah, N. A. (2016). Preliminary observations on the use of *Guira senegalensis* as a traditional medicinal plant in Western Kordufan, Sudan. *International Journal of Applied and pure science and Agriculture* 2 (5):42-48.
- Alex-Asaolu, A., Uba, A., Birmin-Yauri, U.A., Yusuf, A.J (2024). Isolation and Characterization of antimicrobial constituents from the stem of *Cissus populnea* Guill. & Perr. *Drugs and Drug candidates* 3:172-183.
- Anka, Z., Singh, V., Gimba, S., & Singh, G. (2020) Antitoxic, Antifungal and Phytochemical Analysis of Medicinal Compounds of *G. senegalensis* Leaves. *J. Drug Delivery and Therapeutics*.10(2):148-52. <https://doi.org/10.22270/jddt.v10i2.3932>
- Gadisa, E., Tadesse, E. (2021). Antimicrobial activity of medicinal plants used for urinary tract infections in pastoralist community in Ethiopia. *BMC Complement Med Ther* 21:74. <https://doi.org/10.1186/s12906-021-03249-7>
- Gizaw, A., Marami, L.M., Teshome, I., Sarba, E.J., Admasu, P., Babel, D.A., Dilba, G.M., Bune, W.M., Bayu, M.D., Tadesse, M and Abdisa, K (2022). Phytochemical Screening and In Vitro Antifungal Activity of Selected Medicinal Plants against *Candida albicans* and *Aspergillus niger* in West Shewa Zone, Ethiopia. *Hindawi Advances in Pharmacological and Pharmaceutical Sciences*. 20(22): 1-8 <https://doi.org/10.1155/2022/3299146>
- Kakouri, E.; Daferera, D.; Trigas, P.; Charalambous, D.; Pantelidou, M.; Tarantilis, P.A.; Kanakis, C.D. (2023). Comparative Study of the Antibacterial Activity, Total Phenolic and Total Flavonoid Content

(11.08±1.44mm) was found to be comparable with 10.4±0.5, *Anogeissus leiocarpus* higher extracts and found to be lower than 16.5±0.1mm for *Terminalia avicennioides* as reported by Aliyu-Amoo and Isa (2023).

of Nine Hypericum Species Grown in Greece. *Appl. Sci.* 13 (3305): 1-12.

- Khalid, S., Shahzad, A., Basharat, N., Abubakar, M., Anwar, P. (2022). Phytochemical Screening and Analysis of Selected Medicinal Plants in Gujrat. *J Phytochemistry and Biochemistry* 2(1): 108.
- Moreira, R., Ferreres, F., Gil-Izquierdo, Á., Gomes, N.G.M., Araújo, L., Pinto, E., Andrade, P.B., Videira, R.A. (2023). Antifungal Activity of *Guiera senegalensis*: From the Chemical Composition to the Mitochondrial Toxic Effects and Tyrosinase Inhibition. *Antibiotics (Basel)*. 12(5):869. doi: 10.3390/antibiotics12050869. PMID: 37237772; PMCID: PMC10215606.
- Muhammad, M.U., Gayari, M.S., Idris, B., Garba, U. and Bello, I (2022) Evaluation of Phytochemical Composition and Antibacterial Activity of *Indigofera hirsuta* Linn Arid Zone *Journal of basic and Applied Research*. 1(5):192-203 doi.org/10.55639/607.1322.
- Rodríguez-Negrete, E.V., Morales-González, A., Madrigal-Santillán, E.O., Sánchez-Reyes, K., Álvarez-González, I., Madrigal-Bujaidar, E., Valadez-Vega, C., Chamorro-Cevallos, G., Garcia-Melo, L.F and Morales-González, J. A. (2024). Phytochemicals and Their Usefulness in the Maintenance of Health, *Plant* 13(4): 523.
- Roy, A., Khan, A., Ahmad, I., Alghamdi, S., Rajab, B.S., Ahmad O Babalghith, A.O., Alshahrani, M.Y., Islam, S., Islam, M.R. (2022). Flavonoids a Bioactive Compound from Medicinal Plants and Its Therapeutic Applications. *Hindawi BioMed Research International* 1-9 <https://doi.org/10.1155/2022/5445291>.
- Shu'aibu, Y.I., Badariya, B. B., Mu'azu, L., & Ali, M (2024). Antibacterial Activity of *G. senegalensis* Root extracts against some Clinical Isolates. *International Journal of Health and Pharmaceutical Research*. 9(1):82-89. DOI: 10.56201/ijhpr.v9.no1.2024.pg82.89.
- WHO (2023). World Health Organization: Antimicrobial Resistance. <https://www.who.int/news-room/fact-sheets/detail/antimicrobial-resistance>.
- Zagga, A.S., Tambuwal, B.Z., Garba, U., Bello, M.A, Achida, B.M and Bande, A.B (2024). Phytochemical Composition and Antibacterial Properties of *Senegalia macrostachya* Seed Extracts. *Arid Zone Journal of Basic and Applied Research*.3(6): 1-11 doi.org/10.55639/607.02010014Askale



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