International Journal of Medical and Health Research
www.medicalsciencejournal.com
ISSN: 2454-9142
Received: 31-01-2026, Accepted: 03-03-2026, Published: 18-03-2026
Volume 12, Issue 1, 2026, Page No. 97-102

Phytochemical analysis and antimicrobial analysis of *Zizipus oenoplia, Uraria rufescence Susbania grandiflora* and *Sansevieria roxbergiana* which collected from Hogenakkal Forest location

Manikandan Venkatachalam, Dr. D Arvind Prasanth*
Department of Microbiology, Periyar University, Salem, Tamil Nadu, India
Corresponding Author: Dr. D Arvind Prasanth

Abstract
Medicinal plants are having important role in modern medical and ayurvedha practices. In recent days, various components are produced from plant materials and its extracts. In this study, from different plant namely *Zizipus oenoplia, Uraria rufescence, Susbania grandiflora* and *Sansevieria roxbergiana* which was collected from Hogenakkal forest location. The collected plants were used for pharmacological studies like antidiabetic, anti-inflammatory, antimicrobial and phytochemical analysis. A wide range of phytochemicals has been identified in collected plant materials. Comprehensive number of phytochemical constituents, pharmacological effect and antimicrobial activities are presented. The antimicrobial results have been collected and the results are remarkable because of it works against of all pathogenic bacterial stains it works equal to standard antibiotic.

Keywords: Phytochemicals, Antimicrobial activity, antidiabetic, anti-inflammatory

Introduction
Herbals or medicinal plants are widely used to cure or control the diseases which is produced by various microorganisms. It also used to treat inflammations, infections and some disorders. Especially few types of plant materials or plant parts used as pain relieving, antimicrobial and anti-inflammatory purposes [1]. In developing countries, plant materials are widely used to control diseases either direct or indirect forms. The modern medicines are produced by the combination of plant substances. These substances contain many different types of phytochemicals that reveals therapeutic activities [2].
Many countries are depending mountain region for their ethanomedicine for treating of many diseases and their health problems [3]. For example, Nepal peoples used nearly 1950 medicinal plant species for medicinal issues [3]. Traditional plant medicines are prepared by many methods like ticokshan, extraction, powdering and etc., that cause pharmacological actions in human body when treated by it [4]. According to Krishnaiah (2007) [5] the phytochemicals are divided into two groups one is sugars, chlorophyll, amino acids and proteins. Another one is secondary metabolites consist of flavonoids, alkaloids, tannins, saponins and phenolic components. There are few components considered as main phytochemicals that present in plant materials such as alkaloids, steroids, tannins, cardiac glycosides, phlobatannins, reducing sugars, anthraquinones and WHO reported that maximum number of developing countries depends these types of phytochemical components to treat the many medical issues [6]. In this study, different types of plant extract were used to identification of phytochemicals and its antimicrobial activity.

Materials Methods
Good and healthy *Zizipus oenoplia (ZO), Uraria rufescence (UR), Susbania grandiflora (SG)* and *Sansevieria roxbergiana (SR)* plant samples were collected from Hogenakkal forest which located on Dharmapuri district, Tamilnadu state, India. The plant samples were collected during December 2024. Collected plant samples were washed with tap water and then distilled water. The washed plant materials are separated as root and shoot for extraction purposes.

Extraction
Collected plant materials (shoot) were dried on shadow area and powdered. The powdered plant materials were loaded in Soxhlet apparatus at 80 to 90 ^{O}C for 3 hours. Ethanol used as solvent for the extraction process [7]. The collected extracts were cooled in room temperature and stored in 4^{O}C for further uses.

Analysis of Secondary Metabolites
The preliminary qualitative phytochemical analysis was carried for the identification of secondary metabolites from the collected plant extract [8, 9].

Fehling's Test
Equal volution of Fehling A and Fehling B solutions taken in the test tube and added with 2 ml of plant extract. The mixture was mixed together and gently boiled. A red colored precipitate formed under the test tube, that mentioned that the presence of carbohydrate.

Benedict's Test
2 ml of Benedict reagent mixed with crude extract and slowly boiled. A formation of red color in the tube is positive for the carbohydrate in the extract.

Iodine Test
Crude extracts were mixed with 2 ml of iodine solution. If there is starch presence in the sample it turned into blue or purple color.

Millon's Test
This test was carried for identification of protein which present in the plant extract. The crude extract was mixed

with 2 ml of Millon's reagent. If white colored precipitate formed and turned into red color while gentle heating, if confirmed that the presence of protein.

Ninhydrin Test
Crude extracts were mixed with 2 ml of 2% ninhydrin solution and heat it up to boiling point. Voilet color formation mentioned that the presence of amino acids and proteins.

Phenol and Tannins Test
Crude extracts were mixed with 2 ml of 2% FeCl3 solution. A blue green or black color formation confirmed the presence of phenols and tannins.

Shinoda Test
This test done for identification of flavonoids from the plant extracts. The crude extract mixed with few fragments of magnesium ribbon and concentrated HCl added drop by drop. Pink color formation indicated the presence of flavonoids.

Alkaline Test
2 ml of 2% NaoH solution mixed with crude extracts. Yellow color was formed then changed into white color while the addition of few drops of acid which indicates the presence of flavonoids.

Test for Saponins
5 ml of distilled water and crude extract was mixed and shaken vigorously stable foam formation indicated that the presence of saponins.

Salkowski's Test
Crude extract was mixed with 2 ml of chloroform, 2 ml of H2SO4 and mixed slowly. Reddish brown color formation indicates the presence of steroidal ring.

Liebermann's Test
2 ml of chloroform and 2 ml of acetic acid mixed with crude extract. The reaction mixture was cooled in ice and then H2So4 was added. Color change from blue to green, that mentioned the presence of steroidal nucleus.

Keller-Kilani Test
2 ml of glacial acetic acid which contains 2% Fecl3 solution was mixed with plant extract. 2 ml of H2SO4 taken in another test tube and reaction mixture was added to the H2SO4 tube. In interphase location brown color ring formation indicated the presence of glycosides.

Test of Alkaloids
2 ml of 1% HCl mixed with extract and slowly heated. Mayar's and Wagner's reagent added to the reaction mixture. Turbidity and precipitate formation indicate the presence of alkaloids.

Test for Steroids
Crude extract was mixed with 2ml of chloroform and H2So4. Red color formed in lower chloroform layer that indicates presence of steroids.

Quantitative analysis of phytochemicals
Total phenol content
The amount of phenol in the plant extract was determined by Folin-Ciocalten reagent method. 2.5 ml of 10% Folin-Ciocalten and 2 ml of 2% NaCo3 were added with 1 ml of plant extract. The reaction mixture was incubated in room temperature for 15-20 minutes. The absorbance of the sample was measured at 765 nm. Gallic acid used as standard. 1 mg of gallic acid dissolved in 1 ml of double distilled water [10].

Total flavonoid content
Aluminum chloride colorimetric method was used to identify the total flavonoid content in the extract. Quercetin was used as standard and 1 mg of quercetin dissolved in 1ml of double distilled water. 1 ml of plant extract mixed with 3ml of methanol, 0.2 ml of 10% aluminum chloride, 0.2ml of 1M potassium acetate and 5-6 ml of distilled water. The reaction mixture was allowed in room temperature for 30 minutes. The absorbance was measured at 420nm [11].

DPPH
Evaluation of Antioxidant Activity
The antioxidant activity was evaluated by DPPH () methods because of it is rapid and inexpensive [12, 13]. 4 mg of DPPH was dissolved in 100 ml of methanol and it used for further analysis. Standard was prepared with ascorbic acid, which was 50 mg of ascorbic acid dissolved in 100 ml of methanol. For the test, different concentration (in µg) of samples were used like 25, 50, 75 and 100 of each plant extract were taken then mixed with 1.6 ml of DPPH and the final volume of each solution it adjusted to 4 ml with 80% aqueous methanol. The reaction mixture kept in dark for 30 mins and finally measured at 517nm. Measurement were performed in triplicates. The DPPH scavenging activity was determined using the formula:
% Inhibition = $[(A_{DPPH} - A_{Sample}) / A_{DPPH}] X 100$

***In Vitro* Anti-Diabetic Activity**
α-Glycosidase inhibition assay
Single concentration of plant extracts (10, 20, 30, 40 and 50 µg/ml) and 100 µl of α-glucosidase (0.5 mg/ml) in 0.1 M phosphate buffer (pH 6.9) solution were added and incubated at 25°C for 10 minutes. 50 µl of 5 M p-nitrophenyl-α-D-glucopyranoside in 0.1 M phosphate buffer (pH6.9) solution was added to the mixture. Then the Reaction mixture was incubated at 25°C for 5 min. Then the absorbance was taken at 405 nm by using spectrophotometer. The percentage of α-glucosidase inhibitory activity was calculated with following formula [14]:

$$\text{Inhibition (\%)} = \frac{\text{Control} - \text{Sample}}{\text{Control}} X\ 100$$

α-Amylase Inhibition Assay
Single concentrations of the plant extracts (10, 20, 30, 40 and 50 µg/ml) and 500 µl of 0.02 M sodium phosphate buffer (pH 6.9 with 0.006 M NaCl) which containing porcine pancreatic α-amylase enzyme (0.5 mg/ml) were incubated at 25°C for 10 min. After the proper incubation, 500µl of 1% starch solution in 0.02 M sodium phosphate buffer (pH 6.9 with 0.006 M NaCl) was added to the reaction mixture. Then, the reaction mixture was incubated at 25°C for 10 min then it followed by addition of 1.0 ml of dinitrosalicylic acid (DNSA). The mixture was kept in boiling water bath for stop the reaction and cool down to room temperature. 10 ml of distilled water added to the

reaction mixture for dilution purposes then the absorbance was measured at 540 nm in spectrophotometer. The α-amylase inhibitory activity was expressed as percentage inhibition [15].

$$\text{Inhibition (\%)} = \frac{\text{Control} - \text{Sample}}{\text{Control}} \text{X } 100$$

Anti-Inflammatory Activity

Bovine Serum Albumin (BSA) Denaturation Assay

The anti-inflammatory activity of the CTLA nanogel was evaluated as described by Das *et al*., (2019). To assess the anti-inflammatory activity with the following procedure. 0.05 mL of nanogel was taken, and various concentrations of sample (2.5µg/mL, 5µg/mL, 7.5µg/mL and 10µg/mL) were added to 0.45 mL of a 1% aqueous solution of bovine serum albumin. The pH was maintained in 6.3 by using necessary solvents. Then the mixtures were incubated at room temperature for 20 minutes, followed by the mixtures were 55°C for 30 minutes in a water bath. Then samples were allowed to cool down and the absorbance was measured in spectrophotometer at 660 nm. For comparative purposes, diclofenac sodium was used as standard drug [16].

Antibacterial activity of plant extraction against of pathogenic bacteria

The collected plant materials were used for extraction purposes and the collected plant extract were used against of bacterial pathogens which was isolated from urinary tract infection. Two Gram positive bacteria namely *Staphylococcus aureus, Streptococcus sp.,* Two Gram negative bacteria namely *Klebsiella sp., Salmonella sp.,* and one fungi namely *Candida albicans* were used in this antimicrobial analysis.

Disc Diffusion Method

The paper disc (No.1 Whatmann) was cut down into small discs (6mm diameter) and sterilized at 180ºC for 30 minutes in hot air oven. After sterilization the discs were impregnated with plant extraction in single (20µl and CTX used as control against bacteria and Ketoconazole used as control against fungi) concentration. The disc was left standing for 1-2 hours, at room temperature for drying. The dried discs were placed on the surface MHA medium which was inoculated with isolated bacterial pathogens. Subsequently the inoculated plates were incubated for about 18 - 24 hours at 37ºC. After incubation the diameter of the circular zones of inhibition were measured. This Disc Diffusion method used for identification of antimicrobial activity.

Result and Discussion

Zizipus oenoplia (ZO), Uraria rufescence (UR), Susbania grandiflora (SG) and *Sansevieria roxbergiana* (SR) plant samples were collected from Hogenakkal forest which located on Dharmapuri district, Tamilnadu state, India. The plant material used for extraction with the application of Soxhlet apparatus. The collected plant extract used to identification of carbohydrate, protein, amino acids, phenolic components, tannin, flavonoids, saponin and etc. finally, quantification of phenol and flavonoids in the sample.

The chemical reaction methods were performed and the results of phytochemical analysis of *Sansevieria roxburghiana* plant extract tabulated in table 1.

Table 1: phytochemical analysis of plant extract

S.No	Name of the test	ZO	UR	SG	SR
1	Fehling's Test	-ve	-ve	+ve	- ve
2	Benedict's Test	-ve	-ve	+ve (++)	-ve
3	Iodine Test	-ve	-ve	-ve	+ve
4	Millon's Test	-ve	-ve	+ve	+ve
5	Ninhydrin Test	-ve	-ve	-ve	-ve
6	Tests For Phenolic and Tanin	+ve	+ve	+ve	+ve
7	Shinoda Test	+ve	-ve	-ve	-ve
8	Alkaline Reagent Test	-ve	+ve	+ve	+ve
9	Test for Saponins	+ve	+ve	+ve	+ve
10	Salkowski Test	+ve	+ve	+ve	+ve
11	Liebermann's Test	-ve	+ve	+ve	+ve
12	Keller-Kilani Test	+ve	+ve	+ve	+ve
13	Tests for Alkaloids	+ve	-ve	+ve	+ve
14	Test for Steroid	+ve	+ve	+ve	+ve

Quantitative analysis of phytochemicals

Total phenol and flavonoids

Table 2: Total phenol and flavonoids in the plant extract

Plant Material	Test Sample	Total Phenol Content Mean ⁿ ± S.D	Total Flavonoids Content Mean ⁿ ± S.D
Zizipus oenoplia	Ethanolic Extract	11.54 ± 0.47	03.12 ± 0.23
Uraria rufescence		18.12 ± 0.21	05.45 ± 0.13
Susbania grandiflora		23.32 ± 0.54	11.02 ± 0.65
Sansevieria roxbergiana		32.16 ± 0.19	19.56 ± 0.25

All the collected plant extracts results were presented with notable phytochemicals presence. It confirmed with the remarkable color changes in the tubes. The color changes were strongly indicated that, presence of flavonoids, alkaloids and other important phytochemical in the SG, SR, ZO and UR, respectively. Flavonoid, alkaloid and Phenolic components was most commonly present in all the collected plant extract. According to Anbu *et al*., [17] alkaloids, flavonoids, glycosidase and phenolic components were present in the *Ziziphus oenoplia* plant extract. They also used GCMS instrumentations for the confirmation of phytochemicals in the plant extract. Deepthi *et al*., [18] reported that, *S. grandiflora* is rich in various bioactive components such as flavonoids, steroids, alkaloids, saponins and phenols. Babu *et al*., [19] reported that, alcohol dissolves primarily polar constituents together with medium and low polar compounds extracted by cosolubilization, in *Uraria rufescence* plant extract major phytochemical components identified in mass volume.

Muthu Mohamed *et al*., [20] reported that, The *Sansevieria roxburghiana* plant extract having several chemical compounds such as alkaloids, flavonoids, tannins, saponins, carotenoids. In our findings, phenolic components, flavonoids, glycosides, tannin, saponins, alkaloids, terpenoids and Steroids components were very commonly present in the all plants extract which collected from all

locations. Sansevieria species contain various bioactive compounds such as alkaloids, flavonoids, saponins, steroids, tannins, and glycosides. These phytochemicals contribute to their antimicrobial properties by disrupting microbial cell walls, inhibiting protein synthesis, or interfering with microbial enzymatic activities [21].

Quantification of phenol and flavonoids were listed in the table. SR and SG plant extract were showed high level of phenol and flavonoids contents when it compared with other two plants.

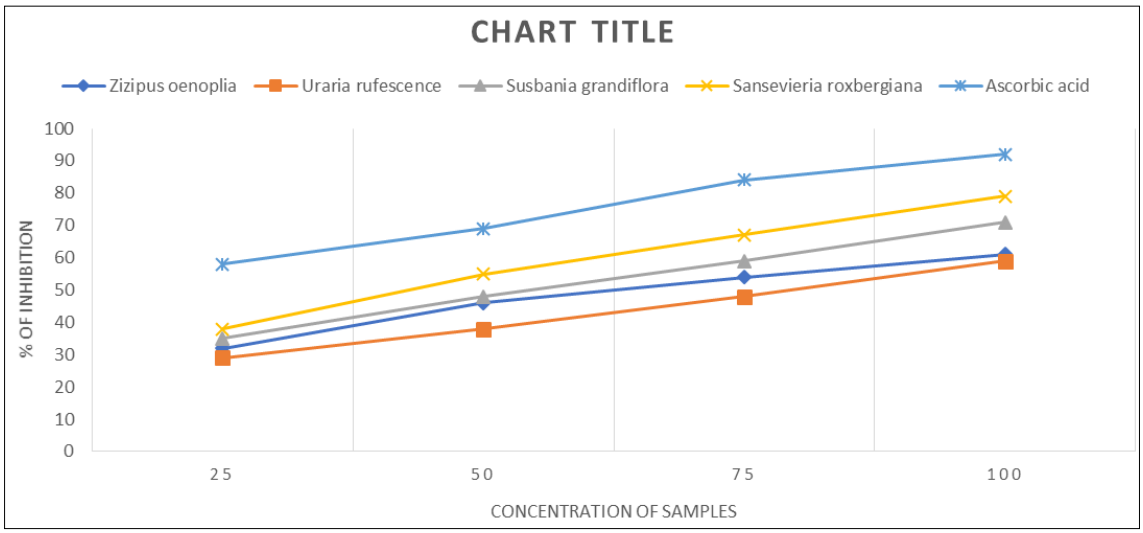

Fig 1: Antioxidant activity of plant extracts

Table 3: Antioxidant activity of plant extracts

S.No	Plant name	IC50 for DPPH assay (µg/mL)
1	*Zizipus oenoplia*	56.81 ± 0.26
2	*Uraria rufescence*	49.35 ± 0.89
3	*Susbania grandiflora*	58.19 ± 0.17
4	*Sansevieria roxbergiana*	61.22 ± 0.23
5	*Standard (Ascorbic acid)*	19.42 ± 0.45

α-Glycosidase inhibition assay

In α-Glycosidase inhibition activity assay plant extract which makes minimal level of inhibitory activity against of alpha glycosidase. The values which show that the *in vitro* microbial extracts showed a dose dependent increase in percentage inhibitory activity against α Glucosidase enzyme. At SR sample, high percentage of inhibition 47.31 was observed.

Table 4: α-Glycosidase inhibition assay

Dose	% of Inhibition			
	ZO	UR	SG	SR
10 µg/ml	19.09	18.23	17.65	20.32
20 µg/ml	19.97	22.41	21.42	25.74
30 µg/ml	23.18	26.29	25.87	31.56
40 µg/ml	29.09	31.03	29.81	39.69
50 µg/ml	34.55	35.66	34.08	47.31

α-Amylase Inhibition Assay

In α-Amylase inhibition activity assay, plant extract which makes minimal level of inhibitory activity against of alpha amylase. The *in vitro* ethanol plant extracts revealed a significant inhibitory action on α-amylase enzyme. The values are presented in the table [3] and it shows that the extracts showed a concentration dependent increase in percentage inhibition. The highest percentage 35.33 which was observed in SR sample.

Table 5: α-Amylase Inhibition Assay

Dose	% of Inhibition			
	ZO	UR	SG	SR
10 µg/ml	16.22	15.78	16.41	17.88
20 µg/ml	19.87	18.56	19.23	21.14
30 µg/ml	23.54	22.32	22.19	26.33
40 µg/ml	28.65	26.49	25.65	30.41
50 µg/ml	33.51	30.86	29.20	35.33

Anti-inflammatory activity

The albumin denaturation assay done with serum albumin and the maximum denaturation showed in 10 µg/ml in the range of 86.11 ± 1.85.

Table 6: Anti-inflammatory activity of plant extract

Extract	Concentration µg/ml	Protection% Mean ± SD
ZO	2.5	67.41 ± 1.45
	5.0	71.45 ± 1.47
	7.5	76.23 ± 1.89
	10.0	81.78 ± 1.41
UR	2.5	62.49 ± 1.12
	5.0	67.44 ± 1.78
	7.5	73.67 ± 1.63
	10.0	79.56 ± 1.25
SG	2.5	65.13 ± 1.52
	5.0	70.42 ± 1.31
	7.5	76.45 ± 1.60
	10.0	82.32 ± 1.39
SR	2.5	72.71 ± 1.25
	5.0	77.23 ± 1.56
	7.5	81.23 ± 1.56
	10.0	86.11 ± 1.85
Standard	5	80.43 ± 1.36

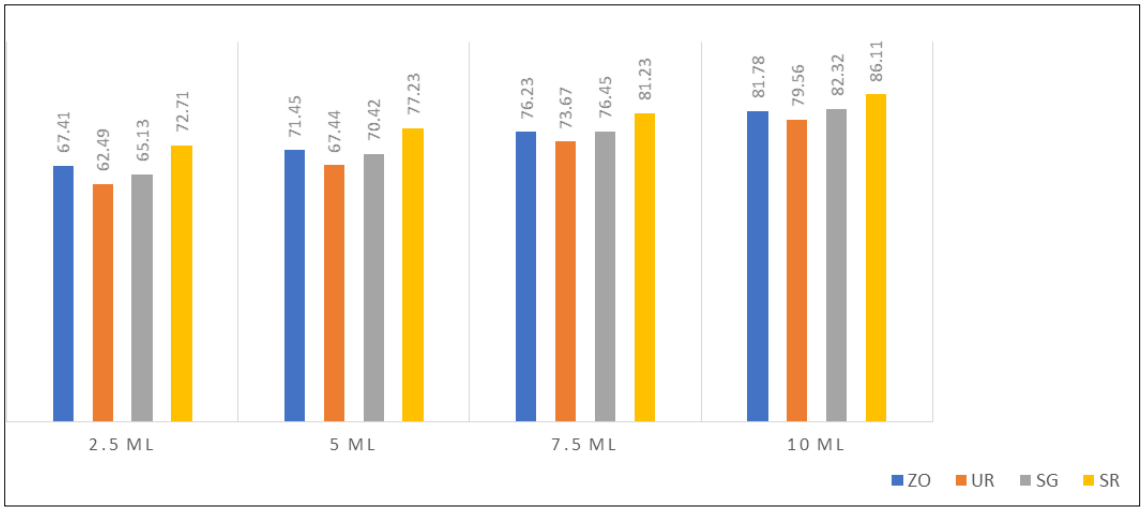

Fig 2: Chart of Anti-inflammatory activity

Antibacterial activity of plant extraction against of pathogenic bacteria

Among the selected plant species, collected plant extract were used against of pathogenic bacteria for the identification of potential antimicrobial activity of plant extract. The zone of inhibition was measured and presented in the table.

Table 7: Antimicrobial Sensitivity Test

	ZO	UR	SG	SR	Control
S.aureus	18mm	16mm	16mm	19mm	22mm
Streptococcus	15mm	16mm	16mm	21mm	21mm
Klebsiella sp.,	12mm	12mm	13mm	17mm	16mm
Salmonella	18mm	15mm	14mm	16mm	20mm
Candida albicans	12mm	09mm	10mm	13mm	16mm

The extracts of leaves and flowers of *S. grandiflora* revealed a potent inhibitory activity with varied diameters against of all pathogens from the clinical samples. The antibacterial potential of leaves and flower extracts of *S. grandiflora* was scrutinized against pathogens including both gram-positive and gram-negative bacteria. Well diffusion methodology was adopted for determining the *in vitro* antibacterial activity [18].

Philip *et al*., [21] reported that, ethanolic extract showed strong antibacterial effects against of *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Escherichia coli*. *Sansevieria roxburghiana* plant extract showed antifungal activity against of *Candida albicans* and *Cryptococcus neoformans*. SR plant extract showed better antimicrobial activity when it compared with standard antibiotics.

Conclusion

The preliminary phytochemical screening of different plant extract such as *Zizipus oenoplia*, *Uraria rufescence*, *Susbania grandiflora* and *Sansevieria roxbergiana* showed the various phytochemical compounds present in it. In qualitative analysis of plant extract examined presence of various phytochemical compounds such as alkaloids, flavonoids, glycosides, phenols, terpenoids, quinones, saponins and tannins. All the plant extract had strong antibacterial activity against gram-positive and gram-negative bacteria. *Sansevieria roxburghiana* plant extract showed high number of phytochemical constituents when it compared with other plant extract. In the overall study, *Sansevieria roxburghiana* plant extract played well in antidiabetic activity, anti-inflammatory activity and antimicrobial activity. These discoveries may useful to developing new medicines based on the medicinal plant to treat variety of illness and many more diseases.

Reference

1. Mamta PS, Poonam S, Jyotika S, Payal B, Dhirendra PS. Antimicrobial activity of *Ficus Religiosa* against some pathogenic microorganisms. Int. J. Progress. Res. Sci Eng.,2021:2(8):759-763.
2. Panda SK, Padhi LP, Mohanty G. Antibacterial activities and phytochemical analysis of *Cassia fistula* (Linn.) leaf. J. Adv. Pharm. Technol. Res.,2011:2(1):62-67. 10.41032F2231-4040.79814
3. Chavan, Bedekar G, Miniyar P, Gawande V, Nerkar A. Phytochemical screening and antimicrobial investigation of *Ficus Religiosa* leaves. Curr. Trends Pharm and Pharm Chem.,2019:1(1):31-42.
4. Mbachu IF, Pearl MT, Omuero R, Chikwem OJ. Evaluation of the antimicrobial activity of curry leaves (*Murraya koenigii*). Lincoln Uni. J. Sci,2018:7(1):17-23.
5. Gibbons S. Anti-staphylococcal plant natural products. Nat Prod Rep,2004:21:263–77. doi: 10.1039/b212695h.
6. Ayachi A, Alloui N, Bennoune O, Yakhlef G, Daas Amiour S, Bouzid W, *et al*. Antibacterial activity of some fruits; berries and medicinal herb extracts against poultry strains of Salmonella. Am-Eurasian J Agric Environ Sci,2009:6:12–5.
7. Bobbarala VV, Katikala PK, Naidu KC, Penumajji S. Antifungal activity of selected plant extracts against phytopathogenic fungi *Aspergillus niger* F2723. Indian J Sci Technol,2009:2:6839–46.
8. Fathima S, Jambiga PC, Thumm Ra, Ahmadi S, Askani S, Mohammed BS, *et al*. Phytochemical screening and antimicrobial activity of the plant extracts *Andrographis paniculata* against selected microbes. J Phytopharmacol,2023:12(5):305-310. doi: 10.31254/phyto.2023.12505
9. Abdullah R, Younas Q, Kaleem A, Iqtedar M, Aftab M, Saleem F. Phytochemical and antimicrobial properties of different plants and in silico investigation of their bioactive compounds in wound healing and

rheumatism. Saudi Journal of Biological Sciences,2024:31(3):103942.
10. Salama ZA, Aboul-Enein AM, Gaafar AA, Asker S, Aly HF, Ahmed H. *In-vitro* antioxidant, antimicrobial and anticancer activities of banana leaves (*Musa acuminata*) and olive leaves (*Olea europaea* L.) as by-products. Res. J. Pharm. Technol.,2020:13(2):687-696.
11. Soni, Sosa S. Phytochemical analysis and free radical scavenging potential of herbal and medicinal plant extracts. J. Pharmacogn. Phytochem.,2013:2(4):22-29.
12. Sabudak T, Demirkiran O, Ozturk M, Topcu G. Phenolic compounds from *Trifolium echinatum* Bieb. and investigation of their tyrosinase inhibitory and antioxidant activities. Phytochemistry,2013:96:305–311.
13. Subedi A, Amatya MP, Shrestha TM, Mishra SK, Pokhrel BM. Antioxidant and antibacterial activity of methanolic extract of *Machilus odoratissima*. Kathmandu University Journal of Science, Engineering and Technology,1970:8(1):73–80. doi.org/10.3126/kuset.v8i1.6045.
14. Kulkarni, Govindappa M, Chandrappa CP, Ramachandra YL, Koka PS. Phytochemical analysis of *Cassia fistula* and its *in vitro* antimicrobial, antioxidant and anti-inflammatory activities. Adv. Med. Plant Res.,2015:3(1):8-17.
15. Bashary R, Khatik GL. Design, and facile synthesis of 1,3 diaryl-3-(arylamino)propan-1-one derivatives as the potential alpha-amylase inhibitors and antioxidants. Bioorg. Chem.,2019:82:156-162.
16. Verma S. Medicinal plants with anti-inflammatory activity. J Phytopharmacol,2016:5(4):157-159.
17. Anbu S, Boomiga S, Suresh A, Padma J. Phytochemical Screening and Antimicrobial Activity of *Ziziphus oenoplia* Extract. Research Journal of Pharmacy and Technology,2022:15(2):615-0. doi: 10.52711/0974-360X.2022.00101
18. Deepthi K, Renjith PK, Shameem K, *et al*. Phytochemical screening of leaves and flower extracts of *Sesbania grandiflora* (L.) Pers. and its antimicrobial activity against fish pathogens. Vegetos,2023:36:626–633. https://doi.org/10.1007/s42535-022-00448-6
19. Babu TD, Sasidharan N, Vijayan FP, Padikkala J. Comparative phytochemical and biological analysis to detect the genuineness of substitutes of the plant Moovila in drug preparations. J Basic Clin Physiol Pharmacol,2008:19(2):119-30. doi: 10.1515/jbcpp.2008.19.2.119.
20. Pillalamarri M, Vaddemani S, Pasumarti M, Madhurna T, Pasupula D, Lolla S. "The Phytochemical Profile of *Sansevieria Roxburghiana*: A Key to Unlocking Its Therapeutic Applications". Journal of Advances in Medical and Pharmaceutical Sciences,2025:27(5):1–7. https://doi.org/10.9734/jamps/2025/v27i5774.
21. Philip D, Kaleena PK, Valivittan K, Kumar CPG. phytochemical screening and antimicrobial activity of *Sansevieria roxburghiana* Schult and Schult. Middle East Journal of Scientific Research,2011:10(4):512-518.