RESEARCH PAPER

Qualitative And Quantitative Phytochemical Analysis and Antimicrobial Activities of Leaf Extract of *Cayratia Mollissima (Wall.) Gagnep. - Vitaceae*.

S. Shwetha[1], M. K. Mahesh[2]*

[1] Research Scholar, Department of Botany, Yuvaraja's College (Autonomous), University of Mysore, Mysuru – 570005, Karnataka, India.
Email: 9916261246.shwetha24june@gmail.com
[2] Professor, Department of Botany, Yuvaraja's College (Autonomous), University of Mysore, Mysuru – 570005, Karnataka, India.
Email: maheshkapanaiah@gmail.com
Corresponding Author:
M. K. Mahesh
Professor, Department of Botany, Yuvaraja's College (Autonomous), University of Mysore, Mysuru – 570005, Karnataka, India.
Email: maheshkapanaiah@gmail.com

ABSTRACT
Objective : The present work mainly emphasizes the phytochemical analysis, quantification of phytochemicals and antimicrobial activitiy of the leaf extract by using seven different solvents like Hexane, Petroleum ether, and Ethyl acetate, Chloroform Acetone, Ethanol and Water.
Methodology : The phytochemical analysis was carried out using preliminary phytochemical test and quantification of the solvents was done by basic dillution method and spectral analysis.Antimicrobial activities were performed using Agar well diffusion method against different pathogens.
Results : Cayratia mollissima were represents the presence of carbohydrates, alkaloids, flavonoids, terpenoids, tannins, phenolic compounds and steroids and quantitative analysis shows variation in total contents in seven solvents. In antimicrobial assays, the hexane, chloroform and acetone extracts have shown inhibition zones against *S. auerus, B. subtilis, E.coli and P. aeruginosa*. Ethanol and chloroform extracts have shown moderate inhibition against all four pathogens and ethyl acetate and aqueous extracts have shown no inhibition against all four pathogens.
Conclusion : The present study results provides an impetus for further isolation and identification of bioactive compounds which may be present in different solvent extracts of Cayratia mollissima leaf and it can be conclude that they have a great importance in pharmacological products.
Keywords Cayratia mollissima, phytochemical analysis, Antimicrobial activity, bioactive compound, Pharmaceuticals
How to cite this article: Shwetha S, Mahesh MK., Qualitative And Quantitative Phytochemical Analysis and Antimicrobial Activities of Leaf Extract of Cayratia Mollissima (Wall.) Gagnep. - Vitaceae. Int J Drug Deliv Technol. 2026;16(76s): 1590; DOI: 10.25258/ijddt.16.76s.148
Source of support: Nil.
Conflict of interest: Nil.

INTRODUCTION

Plants have valuable bioactive compounds in their roots, stems, barks, leaves and flowers which have played a vital role in many fields and have contributed in healing some of the major diseases. The primary and secondary metabolites present in them have contributed for pharmaceutical industries in the preparation of drugs. Medicinal plants have a long-standing history in many indigenous communities and persist to provide useful tools for treating various diseases and the natural products are mainly used for the discovery of new drugs and medicines (Patil *et al*., 2014).Herbal or plant based antimicrobial agents have the active properties and enormous therapeutic potentials that controlling the growth of microbes and these microbes are more causative agents for many acute and chronic diseases (Retnam *et al*., 2007).

Vitaceae is a family comprising medium-sized plants with about 950 species belonging to 16 extant genera that include dominant climbers in both tropical and temperate zones (Sussengutt, 1953 and Wen, 2015b). Vitaceae members are well known for containing one of the most economically important fruit crops, the grape as the source for wine and raisins. Red wines of the Vitaceae family have biological properties like favoring protection against major cause of adult mortality such as coronary heart disease and cancers. Proanthocyanidines are well-established components of the vitaceae family(hhtp://en.m.wikipedia.org./wiki/vitaceae). Genus *Cayratia* is having about 55 species. Some of the species of this are edible (Putz, 1991) and used in Ayurvedic and homemade preparations, natural pesticides and having economic value (Asolkar *et al.,* 1992).But regarding *Cayratia mollissima* spceies leaf extract it is the first report concerned with phytochemical investigation.Berries of this plant are used to treat swelling and itching and the fruits are consumed in traditional way (Bhagya *et al.*, 2013). And treated against some microbial contamination originated by some pathogens. *C. mollissima* (Planch.) is generally known as kannakallate kai (or) Kaadu

*Author for Correspondence: maheshkapanaiah@gmail.com

drakshi belonging to the family vitaceae and it is very famous in tulunadu. It is widely distributed in evergreen forests in Western Ghats up to 1000m. Height. Arunachal Pradesh, Karnataka, Tamilnadu and Kerala, and also Myanmar, Thailand, Cambodia, Vietnam and Malaysia.(eFlora of India ,India Biodiversity Portal).The plant body is softly hairy, climber, leaves trifoliate, leaflets elliptic-obovate, serrate, acuminate, lateral leaflets oblique at base, central subcordate. Flowers have petals, bluish green and a white disc. The berry is sparsely hairy, round and seeds are smooth and oblong (Yeo *et al*., 2012).

Materials and methods:

Plant collection and identification:

The plant samples of *Cayratia mollissima* were collected in Manjeshwara taluk, Kasaragod district, Kerala and plant was identified by taxonomists at BSI,TNAU Campus, Coimbatore, Tamil nadu, India.The voucher number is BSI/SRC/5/23/2022/Tech./315.Plant materials were washed primarly under tap water and after followed by sterilized distilled water and dried under shady places. The dried leaf material is powered using a mechanical grinder and stored in air tight container.

Preparation of leaf extract:

10gm each of dry leaves powder was subjected to extraction with 150ml of different solvents based on their polarities which include Hexane(0.1), Petroleum ether(0.1), Ethyl acetate(4.4), Chloroform(4.1), Acetone(5.1), Ethanol(4.3) and water(10.2) using soxhlet apparatus. The extract was then dried under reduced pressure using rotary vacuum evaporator. The dried residue was stored in desiccators until further use.

Preliminary phytochemical analysis of Leaf extract

Phytochemical screening was carried out using the crude extract to detect the presence of primary metabolites like carbohydrates, proteins and aminoacids, and secondary metabolites like tannins, phenolic compounds, saponins, flavonoids, terpenoids, alkaloids, cardiac glycosides, steroids and Anthraquinones using standard procedures described by Harborne (1998) and Trease and Evans (1987).

Quantitative estimation of leaf extract of *Cayratia mollissima* with seven solvents

TOTAL PHENOLIC CONTENT (TPC)

Leaf extract (20 µl stock) was taken and the volume was made upto 200µl using distilled water. The sample was mixed with 1 ml of 10% FC reagent and incubated at 37□C for 5 min. Later, 1 ml of 6% Na_2CO_3 was added and incubated at 37□C for 30 min. After incubation, the absorbance was measured against reagent blank at 750 nm using UV-Vis spectrophotometer. The total phenolic content was calculated using the correlation equation y = 0.0845x generated by standard graph with various concentrations of gallic acid (0.2-1.0 µg). Phenolic content was expressed as milligrams(mg) of gallic acid equaivalents(GAE) per gram(g) of extract **(**Gao *et al*., 2000).

TOTAL FLAVONOID CONTENT (TFC)

Leaf extract (100 µl stock) was mixed with 4 ml of distilled water, followed by addition of 0.3 ml of 5% $NaNO_2$ and 0.3 ml of 10% $AlCl_3$. The mixture was incubated for 5 min at room temperature. After incubation 2 ml of 1 mM NaOH was added and the total volume was made upto 10 ml using distilled water. The absorbance was measured at 510 nm using UV-Vis spectrophotometer against reagent blank. The total flavonoid content was calculated using correlation equation y = 0.001x generated with various concentrations of quercetin (200-1000 µg). Flavonoid content is expressed as milligram(mg) of quercetin equivalents (QE)per gram(g) of extract **(**Kim *et al*., 2003)

TOTAL TANNIN CONTENT (TTC)

Total tannin content was estimated in given sample according to the method described by Makkar *et al*. (2003). Briefly, an aliquot of the sample (0.05 ml) was taken in test tubes and the volume was made up to 0.5 ml with distilled water. Later, 0.25 ml of the Folin-Ciocalteu reagent (1N) was added and then mixed with 1.25 ml of the sodium carbonate solution (20%). The tubes were vortexed and absorbance were recorded at 725 nm after 40 min. The total tannin content was calculated using the correlation equation y = 0.0058x generated by standard graph with various concentrations of tannic acid (0.2-1.0 µg) and expressed as milligram(mg) of tannic acid equivalent(TAE) per gram(g) of dry matter basis.

TOTAL ALKALOID CONTENT (TAC)

Total alkaloid content in each extract was estimated according to Ezeonu and Ejikene (2016) with slight modification. The reaction was initiated by mixing 40 ml of 10% acetic acid in ethanol with 1g of extract, and then allowed to stand for 4 hrs. After incubation, filtrate was collected and concentrated on a water bath to $1/4^{th}$ of its original volume. Concentrated ammonium hydroxide was added drop wise to the extract until the precipitate was complete. The whole solution was allowed to settle, collected precipitate was washed with 0.1M ammonium hydroxide and filtered. The residue was dried and weighed.

Alkaloids (%) = [(weight of Alkaloids) / (Volume of sample)] * 100

TOTAL TERPENOIDS CONTENT (TTC)

Total terpenoids in each extract was determined according to method described by Suica-Bunghez *et al* (2016). The extract (200 µl) was thoroughly mixed with 1.5 ml of chloroform and kept at room temperature for 3 min. After 3 min, 100 µl of concentrated Sulphuric acid was added carefully by keeping the test tubes on ice. Test tubes were placed in dark for 1.5-2 hrs without disturbing the tubes. After incubation, the supernatant was decanted and reddish-brown precipitate was retained. The precipitate was dissolved in 1.5 ml of methanol, vortexed thoroughly and the absorbance was read at 538 nm. The mixture containing distilled water instead of extract was considered as blank. The amount of total terpenoids as tocopherol equivalent was calculated from the calibration equation (y=0.0124x)

generated for tocopherol and results were expressed as milligrams(mg)of tocopherol equivalent(TE)per gram(g)of extract.

Antimicrobial activity :

Antibacterial activity of leaf extracts: The pathogenic organisms employed in antimicrobial study are: *Staphylococcus aureus* MTCC96, *Escherichia coli* MTCC118*, Bacillus subtilis 168, Pseudomonas aeruginosa* MTCC424 which were grown in Brain heart Infusion (BHI) media for 24 h at 37□C under constant shaking (150 rpm). BHI agar (1.5% w/v agar) pre-inoculated with bacterial pathogen (1% v/v) was pour plated into sterile petri-dish and allowed to solidify. Wells of 4 mm were bored using sterile cork borer and inoculated with 50 µl of given extracts (stock 100 mg/ml). The plates were kept for 30 min at 4□C for proper diffusion. Later, plates were incubated at 37°C for 24 h and observed for zone of inhibition (mm in diameter). Antibiotic gentamycin (1 mg/ml) was used as positive control and DMSO is used as negative control (Valgas *et al*., 2007).

Antifungal activity of leaf extracts: The pathogenic organisms employed in antifungal study are**:** *Fusarium oxysporum* MTCC 1755, *Aspergillus niger* MTCC1344, which were grown in potato dextrose broth for 3 days at 30□C under constant shaking (150 rpm).PDA agar pre inoculated with fungal pathogen (1%) was pour plated into sterile petri-dish and allowed to solidify. Wells of 4 mm were bored using sterile cork borer and inoculated with 50 µL of given sample (stock 100 mg/ml). The plates were kept for 30 min at 4□C for proper diffusion. Later, plates were incubated at 30°C for 2-3 days and observed for zone of inhibition (mm in diameter). Antibiotic fuconozole (1 mg/ml) was used as positive control and DMSO is used as negative control (Brantner *et al.,* 1994).

Statistical analysis :

Antimicrobial and quantitative analysis were conducted in triplicates and results were expressed as mean ± standard deviation .Compassion of mean and significance was determined by SPSS software by one way ANOVA with Geisser-Greenhouse model.The significances level was measure with $p<0.05$.

Results and Discussion:

Preliminary phytochemical analysis of leaf extract : The extraction yield of leaf of *Cayratia mollissima* is varies depending upon the solvent used Water extraction gave highest yield 8.6(%),followed by Hexane(6.4%) Ethyl acetate(5.8 %), Acetone(4.4%), Ethanol (4.2%),Chloroform (3.4%) and Petroleum ether (1.9%). Phytochemical analysis was mainly carried out to detect the diverse form of compounds such as carbohydrates, alkaloids, flavonoids, terpenoids, tannins, phenolic compounds and steroids. The results of present biochemical study of leaf extracts of *C. molissima* shows the presence of alkaloids, flavonoids, tannins, phenols, terpenoids, steroids, carbohydrates, glycosides and cardiac glycosides. Mainly alkaloids, carbohydrates, tannins, phenols, flavonoid, terpenoids and cardiac glycosides were present in most of the leaf solvent extracts. Saponins were mainly present in aqueous and petroleum ether extracts. Finally steroids were confirmed in acetone and aqueous extracts(Table 1).These compounds are effectively used in the production of several natural products and they have scientific and pharmaceutical health benefits towards several ailments (Lutterodt *et al*.,1999; Cowan.M.M.1999; Stanley *et al*.,2012).

Quantitative Estimation of Leaf Extract:

Quantitative estimation of leaf extract with different solvents revealed that the presence of various constituents with variation in the contents like alkaloids, flavonoids, phenols, tannin and terpenoids. These variations are mainly due to some environmental factors like climate, altitude, rainfall etc. (Kokate *et al*., 2004).Total phenol content of leaves extracts was expressed as gallic acid equivalent (mgGAE/g) and the highest amount of phenolic content being present in water extract (15.68 ± 0.012) these are major diverse secondary metabolites found in plants and have shown important role in defense response in plants and used to cure diabetes (You *et al*., 2005).And Total flavonoid content was measured with the Aluminium chloride colorimetric assay using quercetin as the standard.The highest flavonoids content is present in ethyl acetate exatract(33.00 ±0.007). Flavonoids are active group of compounds present in most of the *Cayratia* species and they act as antioxidants (Henry *et al.,*2015; Yusuf *et al.,*2018; Sowmya *et al*.,2019). The amount of total tannin content was determined using Folin-Ciocalteau reagent and tannic acid was used as standard.And the amount is ranges highest in water (57.24±0.012) to lowest in hexane(3.79±0.000). The results of total tannin content were obtained by acetone, ethyl acetate, chloroform, petroleum ether, ethanol and hexane leaf extracts and these secondary metabolites are responsible for antimicrobial activity and shows inhibition zones by some medicinal plants (Fewell *et al*., 1993; Barnabas *et al*., 1988; Burapedjo *et al*., 1995).In this analysis an appreciable amount of alkaloids quantities were obtained with highest amount in ethyl acetate leaf extract (2.83%) and lower percentage in chloroform extract (0.18%).Some of the literature gives the valuable medicinal properties of alkaloids like antimalarial (Kittakoop *et al*., 2014), antibacterial (Cushnie *et al*., 2014) and anti-hyperglycemic (Qiu *et al*., 2014) activities and carry out various metabolic activities in human and animals (Rhoades 1979).Total terpenoids content was represented as (mgTPE/g) or a-tocopherol equivalent. Terpenoids were highest in Petroleum ether (73.06 ± 0.023 mgTPE/g). Qualitative analysis of some *Cayratia* species shows active metabolites like terpenoids and have certain pharmacological properties (Sharmila *et al*., 2018; Kumar *et al*., 2011)

Antimicrobial activity:

The present study shows the antimicrobial activities of leaf extract of *Cayratia mollissima* (Table 3-4) in seven solvents. Chloroform and hexane extracts have shown beneficial activity, acetone and ethanol extracts have

modest activity and ethyl acetate, Aqueous and petroleum ether extracts are completely inert against *S.aureus.* Chloroform, hexane and ethanol have shown more effectiveness compared to acetone and petroleum ether extracts. Ethyl acetate and water extracts have not shown any inhibition zones against *B.subtilis*. Acetone, chloroform and hexane extract have high rate of activity. Ethanol and petroleum ether are inactive against the different pathogens. And ethyl acetate and water extract were completely inactive against *E. coli.* Chloroform extract has shown good anti-microbial activity compared to acetone, hexane and petroleum ether. Ethyl acetate and aqueous extracts have no effective activity against the *P.aeruginosa*. All results were compared with the standard antibiotic Gentamycin and negative control also used. Antibacterial activity of all seven extracts were tested for antifungal activity, extracts were completely permissive towards the *A.niger* and *F.oxysporum* microbes.So These medicinal herb were used to cure or treat the destructive diseases caused by the pathogenic microbes and for the discovery of new drugs for a variety of treatments.Nayak *et al*., revealed the antimicrobial activity of leaf extract of *Cayratia pedata* against different pathogens such *E.coli* and *Staphylococcus aureus* and found the effective sensitivity. *Cayratia carnosa* is also shown good results against *S. aureus* and *E.coli* (Dhanamani *et al.,)* and Cowan *et al*., reported that presence of phytochemical constituents like Flavonoids and tannins have the antimicrobial activity. Therefore *Cayratia mollissima* leaf also showing important constituents that may be controlling the antibacterial potentials of the plant and this effects may control by the action of plant extract.

Acknowledgement: The authors will like to acknowledge the Research Supervisor and Head of the Department, Department of Botany, Yuvaraja's College, University of Mysore, Mysuru, Karnataka, India. And also Thanks to SC-ST special cell, University of Mysore, Mysuru for awarding me the Fellowship for my Ph.D. Degree.

.

Table 1: Yield of *Cayratia mollissima* leaf extracts using different solvents and Phytochemical analysis of Leaf extract

Phytoconstituents	**Test**	**Chl**	**Hex**	**Ace**	**Eth**	**Wat**	**P.ether**	**Ety.ac**
Yield(%w/w)	**-**	**3.4**	**6.4**	**4.4**	**4.2**	**8.6**	**1.9**	**5.8**
Carbohydrate	Benedict's test	+	+	+	+	+	+	+
Proteins and aminoacids	Biuret test	-	-	-	-	-	-	-
Tanninsand phenols	$FeCl_3$ test	+	+	+	+	+	+	+
	Gelatin test	+	+	+	+	+	+	+
Saponins	Foam test	-	-	-	-	+	+	-
Flavonoids	Lead acetate test	+	+	+	+	+	+	+
Terpenoids	Salkowski's test	+	+	+	+	+	+	+
Alkaloids	Dragendroff's test	+	+	+	-	+	+	+
Glycosides	Liebermann's test	+	+	+	+	-	+	+
Cardiac glycosides	Keller kiliani's test	+	+	+	+	+	+	-
Steroids	Liebermann-burchard's test	-	-	+	-	+	-	-
Anthraquinones	Borntrager's test	-	-	-	-	-	-	-

+ = Present **- = Absent**

Table 2: Quantitative Estimation of Different Leaf extracts of *Cayratia mollissima* .

	Hexane	chloroform	Acetone	Ethanol	Ethyl acetate	Pet.ether	Water
Total phenol content(mgGAE/g)	1.01 ± 0.012[a]	1.78 ± 0.02[c]	5.38 ± 0.006[e]	1.48 ± 0.000[b]	9.11 ± 0.017[f]	2.01 ± 0.012[d]	15.68 ± 0.012[g]
Total Flavonoid content (mgQE/g)	2.00 ± 0.021[b]	4.00 ± 0.007[d]	13.00 ± 0.021[f]	3.00 ± 0.000[c]	33.00 ± 0.007[g]	1.00 ± 0.007[a]	6.00 ± 0.007[e]
Total Tannin content(mgTAE/g)	3.79 ± 0.000[a]	19.66 ± 0.006[d]	31.90 ± 0.017[f]	8.45 ± 0.012[b]	25.69 ± 0.012[e]	15.17 ± 0.017[c]	57.24 ± 0.012[g]
Total Alkaolid content (%).	0.40 ± 0.046[c]	0.18 ± 0.023[a]	0.85 ± 0.162[d]	0.00± 0.00	2.83 ± 0.052[f]	0.21 ± 0.035[b]	0.99 ± 0.012[e]
Total Terpenoid content(mgTPE/g)	34.84 ± 0.023[d]	5.32 ± 0.035[a]	28.39 ± 0.023[c]	68.55 ± 0.023[e]	10.97 ± 0.023[b]	73.06 ± 0.023[f]	12.74 ± 0.046[b]

Table 3: Antibacterial activity of *Cayratia mollissima* leaf extracts against different pathogens.

Pathogens	Zone of Inhibition (mm in dia)							
	Acet	Chlor	Eth.acet	Eth	Hex	Pet.et	Wat	Antibiotic
S. aureus	12 ± 0.00[a]	14 ± 0.00[b]	0 ± 0.00	12 ± 0.89[a]	14± 0.36[b]	0 ± 0.00	0±0.00	20 ± 0.00[c]
B. subtilis	12 ± 0.45[b]	14 ± 0.89[c]	0 ± 0.00	14 ± 0.00[a]	14± 0.27[c]	10 ± 0.00[a]	0 ± 0.00	20 ± 0.18[d]
E. coli	14 ± 0.00[c]	14 ± 0.45[c]	0 ± 0.00	8 ± 0.27[a]	14± 0.00[c]	10 ± 0.00[b]	0 ± 0.00	15 ± 0.36[d]
P.aeruginosa	12 ± 0.00[a]	14 ± 0.00[b]	0 ± 0.00	0 ± 0.00	12± 0.00[a]	12 ± 0.00[a]	0 ± 0.00	15 ± 0.00[c]

'00' No zone of inhibition. Antibiotic Gentamycin used as Positive control.Values are average of three independent experiment.Different superscripts in the same row for specific pathogen are statistically different($p<0.05$).

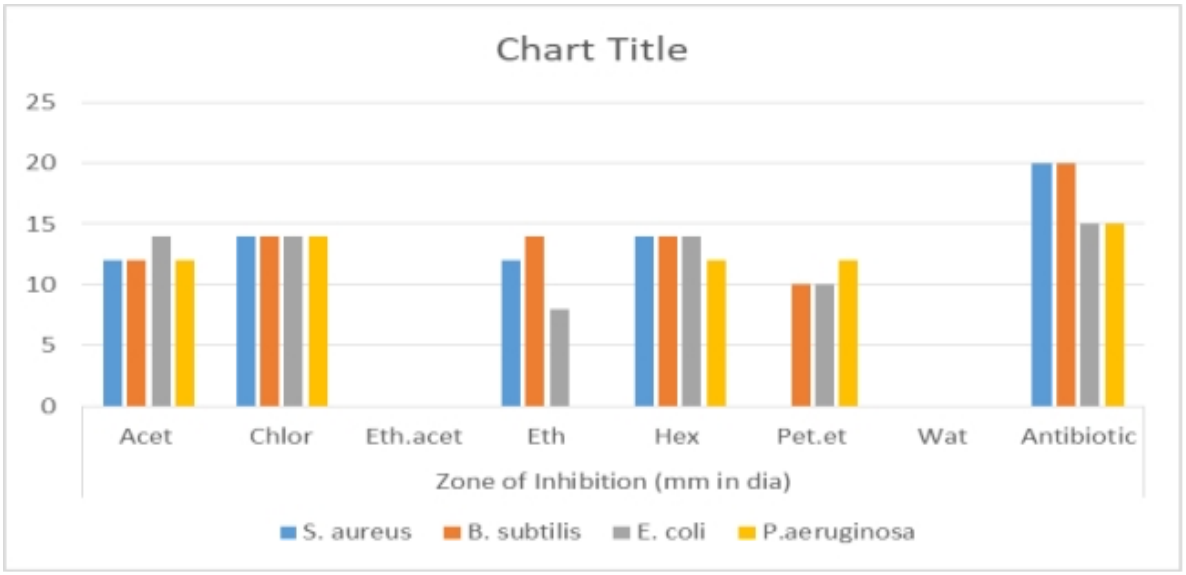
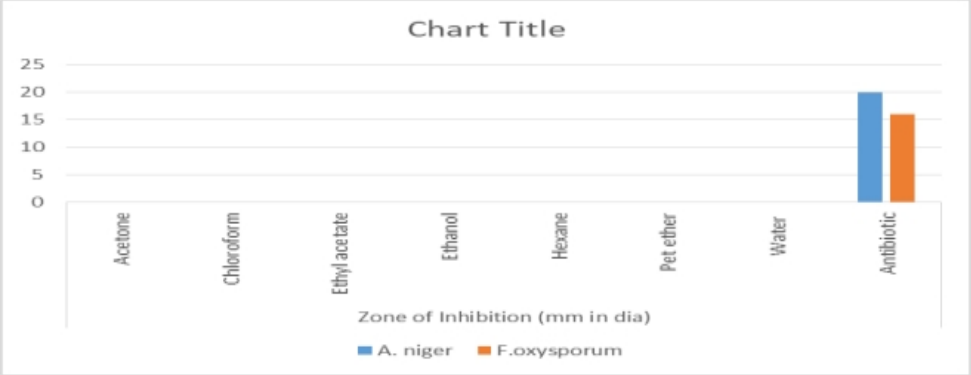


Table 4: Antifungal activity of *Cayratia mollissima* leaf extracts against different pathogens.

Pathogens	Zone of Inhibition (mm in dia)							
	Acetone	Chloroform	Ethyl acetate	Ethanol	Hexane	Pet ether	Water	Antibiotic
A. niger	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	20 ± 0.00
F.oxysporum	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	0 ± 0.00	16 ± 0.61

'-'No zone of inhibition .Antibiotic Fluconazole used as Positive control.The data represent mean values of triplicate determinations.



FIGURES

Figure 1: Standard graph for Total Phenols

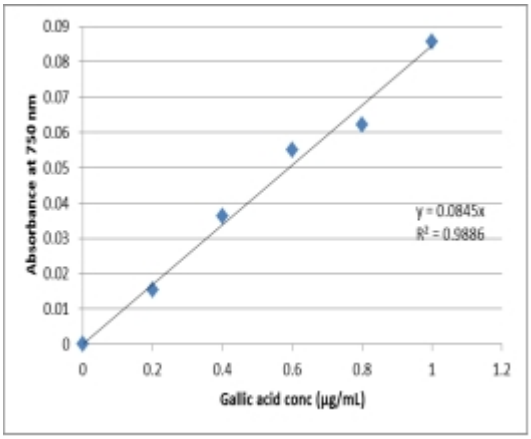


Figure 2: Standard graph for Total Flavonoids

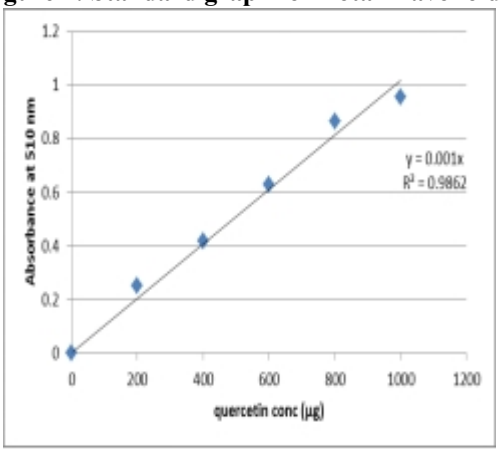


Figure 3: Standard graph for Total Tannins

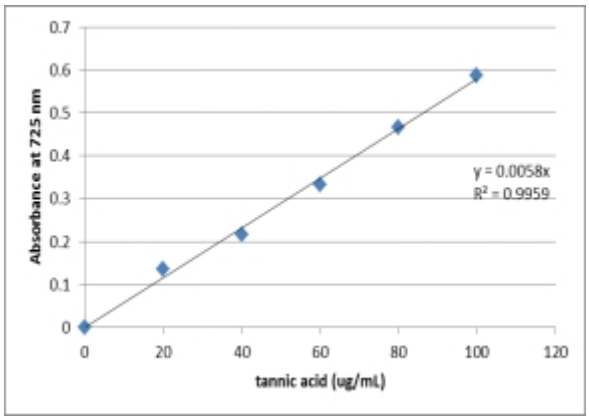
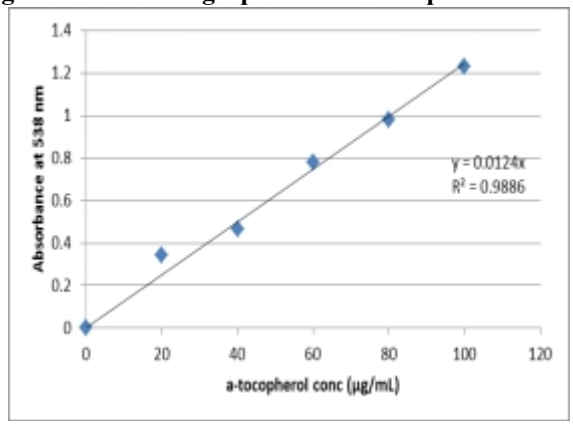


Figure 4: Standard graph for Total Terpenoids



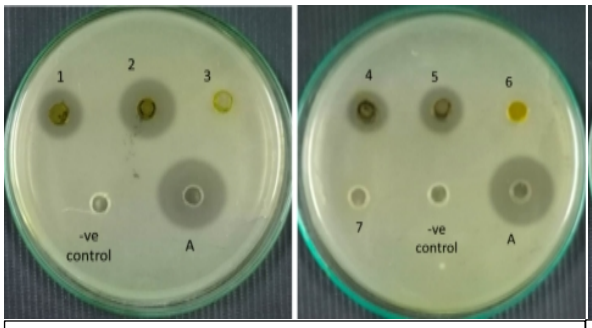


Figure 5: Antibacterial activity of leaf extracts against *S. aureus*; A-Antibiotic Gentamycin (1) Acetone extract (2) Chloroform extract (3) Ethyl acetate extract (4) Ethanol extract (5) Hexane extract (6) Petroleum ether extract (7) Water extract

\

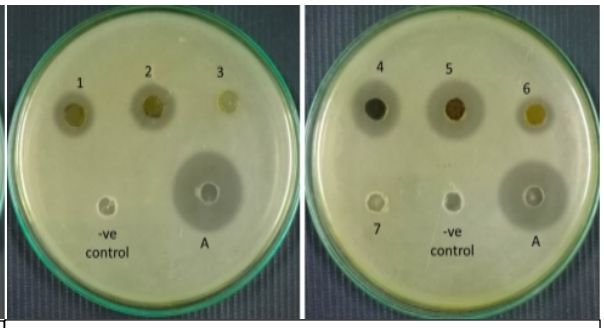


Figure 6: Antibacterial activity of leaf extracts against *B. subtilis*; A-Antibiotic Gentamycin, (1) Acetone extract (2) Chloroform extract (3) Ethyl acetate extract (4) Ethanol extract (5) Hexane extract (6) Petroleum ether extract (7) Water extract.

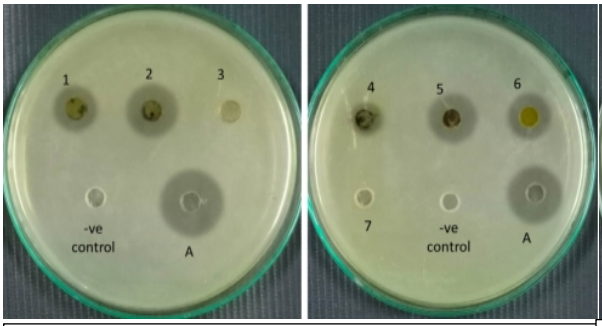


Figure 7 : Antibacterial activity of leaf extracts against *E. coli*; A-Antibiotic Gentamycin , (1)Acetone extract (2) Chloroform extract (3) Ethyl acetate extract (4) Ethanol extract (5) Hexane extract (6) Petroleum ether extract (7) Water extract.

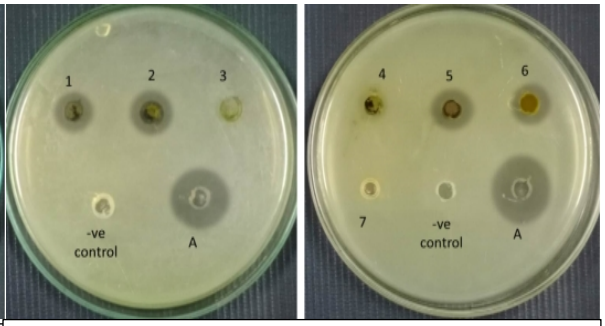


Figure 8 : Antibacterial activity of leaf extracts against *P. aeruginosa*; A-Antibiotic Gentamycin, (1) Acetone extract(2) Chloroform extract (3) Ethyl acetate extract (4) Ethanol extract (5) Hexane extract (6) Petroleum ether extract (7) Water extract.

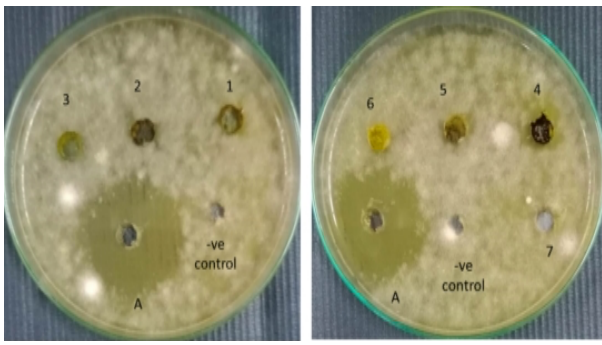


Figure 9: Antifungal activity of leaf extracts against *A. niger* . A-Antibiotic- fluconazole **(1mg/ml)(1) Acetone extract (2) Chloroform extract (3) Ethyl acetate extract (4) Ethanol extract (5) Hexane extract (6) Petroleum ether extract (7) Water extract.**

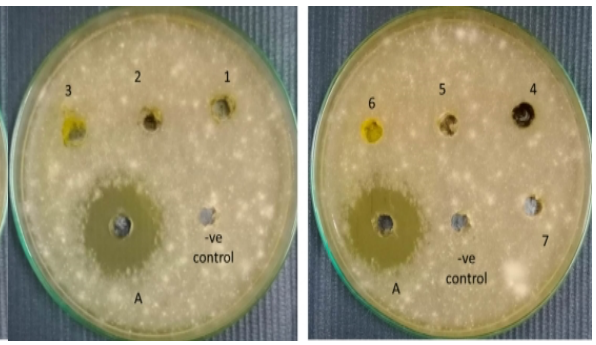


Figure 10: Antifungal activity of leaf extracts against *F.oxysporum* .A-Antibiotic- fluconazole **(1mg/ml)(1)Acetone extract; (2) Chloroform extract; (3) Ethyl acetate extract; (4) Ethanol extract; (5) Hexane extract; (6) Petroleum ether extract; (7) Water extract.**

Equation: Alkaloids (%) = [(weight of Alkaloids) / (Volume of sample)] * 100
Units: gm-grams, ml - mililiter, M-Molar, min-minute, nm-nanometer, h- hours, mM-minimolar.℃ -degree celsius, %-percentage, µl-Microliter, µg-micrograms.
Nomenclature: Kingdom : Plantae
Clade : Rosids
Order : Vitales
Family : Vitaceae
Genus : *Cayratia* Juss
Species : *Cayratia mollissima* (Wall.)Gagnep.

Ethical statement: Nil
Conflict of interest: The authors declare that they have no conflict of interests.
Authors Contribution: The role of author contribution to the paper: Data curation, formation analysis, methodology, validation, visualization, writing - original draft and writing, review and editing. The research supervisor mainly contributed in the data analysis and manuscript correction.
Authorship issue: Nil
Conclusion: Based on the above report *Cayratia mollissima* holds a rich source of phytochemicals and have some folk medicinal properties. And leaf extracts have shown good results and this will also be useful in identifying total alkaloids, flavonoids, terpenoids, tannins and phenol contents with varied amounts. Antimicrobial susceptibility tests also reveals the effective inhibition zones with different plants extracts against human pathogens therefore, further research work should be carried out to determine the active lead compounds which are useful in pharmacological industries and serve to produced the therapeutic agents.

REFERENCE

1. Arunkumar, K. and Chandrashekar, K.R.2017.Phytochemical evaluation and invitro antimicrobial and antioxidant studies of leaf and stem bark extract of Polyalthioa fragrans (dalz.)BEDD-An endemic species of Western Ghats. International journal of pharmacy and pharmaceutical science, 9(8):20-24.
2. Aswathy,T.R.,Gayathri,E.,Praveen,J., Achuthsankar, S.Nair. and Sugunana, V.S.2019.Phytoprolifiling of medicinal plant Cayratia pedata by qualiataive and quantitative method. Journal of Pharmacognosy and phytochemistry, 8(2):1637-1642.
3. Asholkar,L.V.,Kakkar,K.K. and Chakre,O.J.1992.Glossary of Indian medicinal plants with active principals.PartI –Pid,CSIR,New Delhi,60.
4. Barnabas, C.G. and Nagarajan, S.1988.Role of flavonoids and tannins in some medicinal plants: A review.Fitoterapia, 3:508-10.
5. Bhagya, B., Ramaksrishna, A.and Sridhar, K.R.2013.Traditional seasonal health food practices in southwest India: Nutritional and medicinal perspectives. Nitte University Journal of health Science, 3(1): 30-34.
6. Brantner, A., Pfeiffer, K.P. and Brantner, H. P. 1994. Applicability of diffusion methods required by the pharmacopoeias for testing antibacterial activity of natural compounds. 49(7): 512-6.
7. Burapedjo,S. and Bunchoo,A.1995.Antimicrobial activity of tannins from Terminalia citrine.Plant med,61:365-6.
8. Cowan, M.M. 1999.Plant produt as antimicrobial agents. Clinical Microbiology Review, 12(4): 564-582.
9. Cushnie,T.P.T., Chshnie,B. and Lamb,A.J.2014.Alkaoids:an overview of their antibacterial,antibiotic-enhancing and antivirulence activities. International journal of antimicrobial agents, 44(5):377-386.
10. Cherfia,R., Ali,M.K., Talhi,I., Benaissa,A. and Chaouche,N.K.2017.Phytochemical analysis,antoxidant and antimicrobial activities of leaves and flower ethyl acetate and n-butanol fraction from an Algerian endemic plant Calycotome spinosa(L.)Link. Journal of Pharmacognosy and phytotherapy, 9(12): 185-196.
11. Dhanmani, M., Lakshmidevi, S. and Karpagavalli. 2011. Evaluation of antibacterial activity on Cayratia carnosa.Journal of chemical and pharmaceutical Research, 3(20):432-434.
12. Evans, W.C. Trease and Evans. 1987. Pharmacognosy.Bailliere Tindal Publisher,Londan.
13. Ezeonu, C.S. and Ejikeme, C.M. 2016. Qualitative and Quantitative Determination of Phytochemical Contents of Indigenous Nigerian Softwoods. New Journal of Science, 1–9. Article ID 5601327.
14. Fewell,A.M. and Roddick,J.G.1993.Interactive activity of the glycialkaloids,solanine and chaconine.Phytochemicals,33:323-8.
15. Gao, X., Ohlander, M., Jeppsson, N., Bjork, L. and Trajkovski, V. 2000. Changes in antioxidant effects and their relationship to phytonutrients in fruits of sea buckthorn (Hippophae rhamnoides L.) during maturation. Journal of Agriculture and Food Chemistry, 48: 1485-1490.
16. Harborne, J.B. 1998. Phytochemical methods: A guide to modern techniques on plant analysis, third edition, Chapman and Hall Ltd., London, 1-302.
17. Henry,E.,Jemilat,I.,Kudirat,M.,Uche,E. and Samuel,O. 2015 . Phytochemical, pharmacgnostic and elemental analysis of Cayratia gracilis(Guill.and Perr)Suesseng. Journal Applied Sciences, 048-52.
18. hhtp://en.m.wikipedia.org./wiki/vitaceae
19. Kim, D.O., Jeong, S.W. and Lee, C.Y. 2003. Antioxidant capacity of phenolic phytochemicals from various cultivars of plums. Food Chemistry, 81: 321-326.
20. Kokate, C.K., Puruhot, A.P. and Gokhale,S.B. 2004. Practical pharmacognosy, 2: 466-470.
21. Kumar, D.,Gupta,J.,Gupta,A.,Kumar,S. and Arya,R.2011.A review on chemical and biological properties of cayratia trifolia linn (vitaceae).Pharmacognosy Review,5(10):184.
22. Kittakoop, P.,mahidol,C. and Ruchirawat,S.2014.Alkaloids as important scaffolds in therapeutic drug for the treatment of cancer,tuberculosis and smoking cessation. Current topic in medicinal Chemistry,14(20):239-252.

23. Lutterodt, G.D., Ismail, A.and Basheer, R.H. 1990.Antimicrobial effect of Psidium guajava extract as one mechanism of its antidiarrhoeal action. Malaysian Journal of Medical Sciences, 6(2): 17-20.
24. Makkar, H.P.S. 2003. Measurement of Total Phenolics and Tannins Using Folin-Ciocalteu Method. In: Quantification of Tannins in Tree and Shrub Foliage. Springer, Dordrecht.
25. Nayak,B.K. and Lazar,J.2014.Antimicrobial efficacy of extract of Cayratia pedata Lam.,vitaceae.International Journal of Chemi Tech Rsesearch,6(14):5721-5725.
26. Patil, R.S., Godghate, A.G. and Sawant, R.S. 2014 .Phytochemicals and antimicrobial activity of leaves of Homonia riparia. International Journal of.Pharm and BioSciences, 5(2): 352-356.
27. Putz, Francis, E.1991.The Biology of vines.Press syndicate of the University of Cambridge, England, 465.
28. Qiu,S.,Sun,H.and Zhang,A.H.2014.Natural alakoids :basic aspects,biological roles and future perspectives. Chinese journal of natural medicines,12(6):401-406.
29. Retnam,R.K. and Britto,J.D.2007.Natural Product radiance,6(50):366-368.
30. Rhoades,D.F. 1979. Evolution of plant chemical defence against herbivores in their interaction with secondary plant metabolites.41.Academic press,New York,NY.USA.
31. Surulichamy,L., Dakshinamurthy,A., Murkunde,Y.K., Devavanand,V. and Maheshkumar,K.2021.Phytochemical Screening and evaluation of cytotoxicity and acute toxicity of ethanolic leaf extract of cayaratia auriculata. Intenational journal of current reseach and review, 13(13): 101-107.
32. Santhi,K. and Sengottuvel,R. 2016.Qualitaive and quantitative phytochemical analysis of Moringa concanensis Nimmo.International Journal of current microbiology and applied science,5(1):633-640.
33. Sharmila, S., kalaichelvi, K. and Divya, S.M.2018.Pharmacognostical and phytochemical analysis of cayratiapedata Linn.(vitaceae).International Journal of pharmaceutical Sciences and research,8:218-26.
34. Sowmya,S.,Perumal,P.C.,Anusooriya,P.,Vidya,B. ,Pratibha,P. and Gopolakrishna, V.K. 2019.Quantitative analysis and Invitro Free radical scavenging activity of Cayratia trifolia. World Journal of pharmaceutical research,3(6):16.
35. Stanley, A.L.,Ramani,V.A.and Ramahandean,A.2012.A phytochemical screening and GC-MS studies on the Ethanolic extract of cayratia pedata.International Journal of Pharmaceutical and Phytopharmacological research,1(3):112-116.
36. Suica-Bunghez, I.R., Teodorescu, S., Dulama, I.D., Voinea, O.C., Imionescu, S. and Ion, R.M. 2016. Antioxidant activity and phytochemical compounds of snake fruit (Salacca Zalacca), IOP Conference Series: Material Science and Engineering, 133(1): 012-051.
37. Sussenguth K. 1953. Vitaceae. In Engler A, Prantl K eds. Die NateurlichenPflanzenfamilien. Berlin: Dunker & Humblot. 20d: 174–333.
38. Swamiathan, C. and Santhi, M.2019.Phytochemical analysis and antimicrobial activity of roots of withania smnifera(L.)Dunal. International Journal of ChemTech research, 12(2): 218-222.
39. Tetali,S. and Karkamkar,S.P.2016.Cayratia sps. Of vitaceae utilization in grape improvement programme. International journal of munor fruits, medicinal and aromatic plants,2(2):14-21.
40. Valgas,C., De Souza, S.M. and Smânia, E.F.A. 2007 .Screening methods to determine antibacterial activity of natural products. Brazilian Journal of Microbiology, 38:369-380.
41. Yakubu, A.H., Mohammed, M.M., Bababe, A.B. and Braimah, H.Y.2021.Phytochemical screening, antioxidant and antibacterial activities of the root extract of Cyphostemma adenocaule (Steud,ex A.Rich.)Wild & R.b.Drumm. Biology, medicine, &natural product chemistry, 10(2): 105-110.
42. Yeo,C.K.,Ang,W.F.,Alvin,F.S.L.Lok. and Ong,K.H.2012.cayratia Juss.(vitaceae)of Singapore: with aspecial note on Cayratia Japonica(thumb.)Gagep. Nature in Singapore, 5:331-338.
43. You,Q.,Chen,F.,Wang,X.,Jiang,Y. and Lin,S.2012.Anti-diabetic activitiesbof phenolic compounds in muscadine against alpha-glucosidase and pancreatic lipase. LWT- Food science and technology, 46(1):164-168.
44. Yusuf,M.I., Wahyuni, W.W.,Sri Susanty,S.,Ruslan,R.R. and Fawwaz, M.(2018). Antioxidant and antidiabetic potential of Galing stem extract (CayratiatrifoliaDomin).Pharmacognosy Journal,10(40):686-90.
45. Zhang, N., Wen, J. and Zimmer, E.A. 2015b. Expression patterns of AP1, FUL, FT and LEAFY orthologs in Vitaceae support the homology of tendrils and inflorescences throughout the grape family. Journal of Systematics and Evolution, 53: 469–476