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ORA-Experimental Research

PHARMACOGNOSTICAL STUDY OF AN EXTRA PHARMACOPEIAL DRUG *PORANOPSIS PANICULATA* (ROXB.) ROBERTY

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ABSTRACT :

Background: Traditional medicine may benefit from the use of *Porana paniculata* Roxb., a medicinal plant that has received less attention. Although it is used in ethnomedicine, a thorough pharmacognostic assessment has not yet been conducted. The aim of this study is to ascertain the pharmacognostic profile of *Porana paniculata* Roxb. by analyzing its macroscopic, microscopic, and physicochemical characteristics. **Methods**: Organoleptic tests, T.S. analysis, and particle microscopy are all parts of pharmacognostic evaluation. Physical-chemical analyses, including HPTLC analysis, extractive values, ash values, and moisture content, were performed. Bioactive compounds were found after preliminary phytochemical screening. **Results**: The investigation revealed significant microscopic characteristics, including distinct trichome formations and vascular patterns. Physicochemical measurements provided baseline norms for quality control. Phytochemical analysis of flavonoids, alkaloids, tannins, and glycosides confirmed its potential for medical use. **Conclusion**: The pharmacognostic investigation establishes a basic understanding of the identification, quality, and Ayurvedic properties of *Porana paniculata*. These findings lend credence to its standardization, quality assurance, and potential therapeutic applications in Ayurveda and herbal medicine. Additional pharmacological study is required to substantiate its traditional claims.

KEYWORDS: *Porana paniculata* Roxb., Ethno medicine, Phytochemical, Traditional Medicine

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1. INTRODUCTION

According to the WHO chapter on standardization and quality control of herbal remedies, standardization includes the physicochemical evaluation of crude pharmaceuticals, which addresses issues including the selection and treatment of crude materials. The bulk of emphasis is frequently focused on quality indicators, including chromatographic analysis, ash values, moisture content, extractive values, macro and microscopic examination, and qualitative and quantitative chemical evaluation [1].

Poronopsis paniculata Roxb., a folklore plant whose root paste is used to treat wounds and bone fractures, has been captured in a number of research articles from the ethno botanical survey in Chhattisgarh. In Chhattisgarhi, it's called "Masbandhi" which means that binds flesh. Information on such extra pharmacopeia drugs must be updated through research in order to convert information gained from folk use into knowledge that would benefit humanity [2]. The purpose of this research is to standardize *Porona Poranopsis paniculata* Roxb. by examining its macroscopic, microscopic and physicochemical characteristics.

2 MATERIALS AND METHOD

Plant material

Roots of *Poranopsis paniculata* Roxb. was collected from Herbal Garden, Government Ayurved College, Bilaspur, Chhattisgarh in *Grishma ritu* as said by *Acharya Charaka* and authenticated by Botanical Survey of India (BSI).

Chemicals

Reagents and chemicals of analytical grade of Merck Company, was procured from available authentic source.

Methods

Pharmacognostical study

Fresh roots were gathered for histological and morphological examinations. Coarse powder of dried roots? was used to study phytochemical analysis, physiochemical parameters, and microscopical features. Using accepted procedures and methods, the comprehensive pharmacognostical tests of the plant roots were carried out [3]. Thin transverse sections (T.S) of plant material were cut by hand using blades, stained with the appropriate chemicals, mounted, and viewed under a microscope. To analyse the cell structure in powdered form, dried materials were crushed into a powder, sieved, stained with the appropriate stain, mounted in glycerine, and viewed under a microscope. A digital camera was used to take pictures of each slide.

Physicochemical analysis

The amounts of total ash and acid insoluble ash are two essential markers for evaluating the quality and purity of herbal medicines. The total ash value of the root was determined by slowly burning the powdered sample between 500°C and 600°C until it turned white. After cooling, the powder was kept in desiccator and weighed. To find the amount of acid-insoluble ash, some of the total ash was dissolved in hydrochloric acid by boiling it, then collecting and washing it on filter paper, cooling it in a desiccator, and finally weighing it. Additionally, the amount of ash that was soluble in water was measured. For the extractive values, ten

grams of each finely ground sample were macerated with ethanol and water. After six hours of shaking, the mixture was left to settle for the next eighteen hours. The extracts were filtered, dried, and then weighed. The extractive and ash levels were computed in compliance with WHO guidelines. To calculate the loss on drying (LOD) values, the air-dried material was dried in an oven set at 100–105°C. Drying was continued until the subsequent two weight readings differed by 5 mg.

HPTLC-

HPTLC was performed on silica gel 60 F 254 10X10 cm HPTLC plates (EMerck, CGaA) using Toulene:Ethyl Acetate 7:3 as the mobile phase. The CAMAG-Linomat 5 automated spray-on band applicator, which included a 100 µL syringe, was used to apply the sample. It was configured with the following settings: 150 nl/s for the application rate, 4 mm for the distance between, 1.5 cm for the distance from the plate side edge, and 2 cm for the distance from the plate bottom. The CAMAG TLC Scanner "Scanner_181112" was used to measure the bands using the WIN CATS application. The following were the scanner's operational settings: Optimal wavelength: 254 nm, 366 nm, and visible range, slit size: 4.00 x 0.30 mm, mode: absorption/reflection, scanning rate: 20 mm/s, monochromatic band width: 20 nm.

3. RESULTS-

Organoleptic study-

The root of *P. paniculata* breaks readily, feels smooth to the touch, has a yellowish green powder colour, tastes bitter and astringent, and has a distinct smell, according to an organoleptic study (table 1).

Table 1- Organoleptic study

Fracture	Breaks easily
Touch	Smooth
Colour	Yellowish green
Taste	Bitter, Astringent
Odour	Characteristic

Pharmacognostical study

Macroscopic study

The root appears little wavy, unbranched with lateral hairs like secondary roots, thickness varies with age. Outer surface is brownish yellow in colour, longitudinally wrinkled. Crown consist of remains of the thick stem base, green in colour having white dots on it, wrinkled longitudinally. Fracture uneven, short, having characteristic odour and bitter, astringent teste (Fig. 01 A & B).

Fig 01 – A Fresh Root

Fig.01- B Dried Root

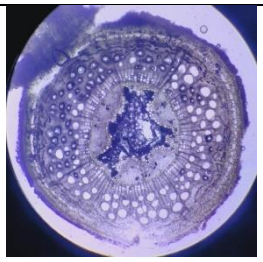


Fig.02 A- TS of Root at 4X

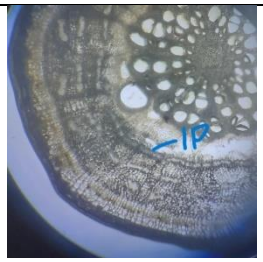


Fig.02 B- TS of Root at 10x

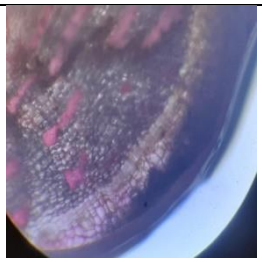


Fig.02 C TS of Rooot at 10x

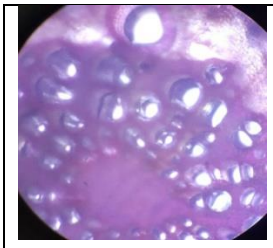
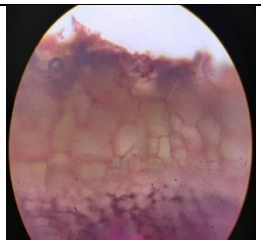
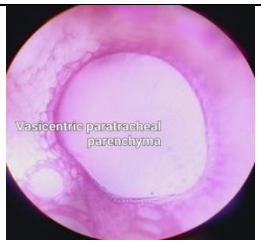
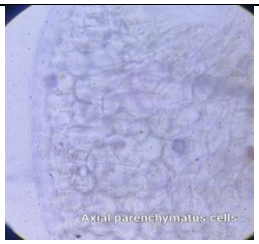
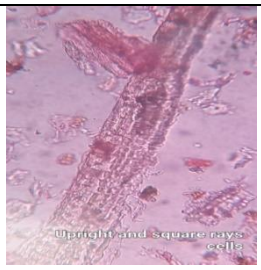
			

Fig.02 D TS of Root at 10x	Fig.02 E- TS of Root at 40x	Fig.02 F- Vesintric pratracheal parenchyama	Fig.02 G- Axial parenchymatus cells	Fig.03 A- Parenchymatus Cells
				
Fig.03 B- Vessel element	Fig.03 C- Vessel element	Fig 03 D- Vessentric tracheids	Fig.03 E- Parenchyamstus cells	Fig. 03 F-Upright and square rays cells

Microscopic study-

Poranopsis paniculata juvenile stem has a somewhat wavy contour, as seen in a T.S. The single-layered epidermis is made up of closely spaced, radially elliptical cells with an outer thin coating of cuticle. Multicellular hairs (130–350 µm) and unicellular hairs (150–500 µm) with a small stalk cell and a long terminal cell are the two forms of epidermal hairs. Multicellular hairs are made up of a long terminal cell with one or two arms and two to five stalk cells. The cortex is tiny, 3–4 cells wide, and composed of closely spaced parenchymatous cells. The presence of an endodermis layer is indicated by cells with starch granules at the inner margin of the cortex. Pericycle is represented by small, isolated clusters of sclerenchymatous cells. The ring-shaped vascular bundles are joined by the interfacicular cambium, which is open, endarch, conjoint, and collateral vascular bundles type. There are intraxylary phloem patches beneath the protoxylem. As the stem ages, intraxylary phloem derivatives multiply and become more apparent. Secretory cells are located above the vascular bundles. The presence of intraxylary phloem causes the pith to be parenchymatous and have a wavy shape (Fig.02 A-G).

Powder microscopy-

Powder microscopy revealed the broken parts, which included vascular bundles, multicellular hairs, parenchymatous cells, the endodermis layer, starch grains, sclerenchymatous cells, the interfacicular cambium, and vascular elements (Fig. 03 A- F .

Microbiological parameters-

In microbiological parameter study all bacteria and fungus found absent (Table 2).

Table 2 Microbiological parameter study

Total viable count	Absent
Enterobacteriaceae	Absent
Total fungus count	Absent
E. coli	Absent
Salmonella sp.	Absent
Staphylococcus aurous	Absent
Pseudomonas aeruginosa	Absent

Table 3. Physico-chemical analysis

Foreign matter	3%
Loss on drying	0.76%
pH value	7.9
Total Ash Value	2.61%
Acid Insoluble Ash	0.51%
Extractive value (Aqueous ext.)	19.36
Extractive value (Alcoholic ext.)	8.12

Physicochemical study-

There was 3% foreign matter, 0.76% drying loss, a pH of 7.9, 2.61% total ash, 0.51% acid insoluble ash, 19.36% water extract extractive value, and 8.12% alcoholic extract in the physicochemical analysis (table 3).

Phytochemical study-

In the study of phytochemicals Water extract contained glycoside, tannin, and flavonoids, whereas alcoholic extract contained alkaloids, flavonoids, and protein (table 4).

Table 4 Phytochemical study

Parameter	**Test**	**Aqueous ext.**	**Ethanolic ext.**
Alkaloids	Dragendroff's test, Mayer test, Wagner test	Absent	Present
Terpenoids	Salkowski test	Absent	Absent
Glycosides	Killar-killani test, Berntrager test, Legal test	Present	Present
Tanin	Ferric chloride reagent test, Lead acetate test	Present	Absent
Flavonoids	Shigoda test, Ferric chloride reagent test	Present	Present
Phenol	Ferric chloride test	Absent	Absent
Saponin	Foam test	Absent	Absent
Proteins	Xanthoproteic test, Millon's test	Absent	Present

HPTLC-

Tracks 1, 2, 3, and 4 in the HPTLC investigation showed 5, 5, 8, and 7 peaks at wavelength 245 nm, while tracks 1, 2, 3, and 4 showed 2, 2, 4, and 4 peaks at wavelength 366 nm (table 5). All tracks showed a total of 37 peaks.

Table 5 HPTLC study

Track	**Peak Observed**
At wavelength 254	
1	5
2	5
3	8
4	7
At wavelength 366	
1	2
2	2
3	4
4	4

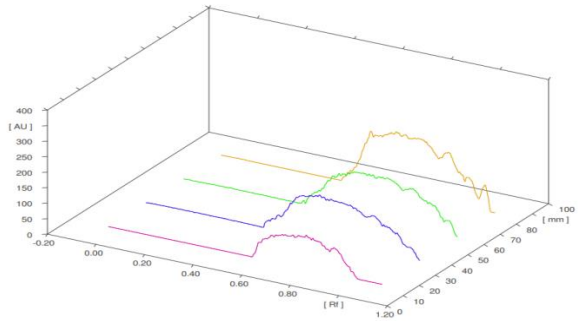
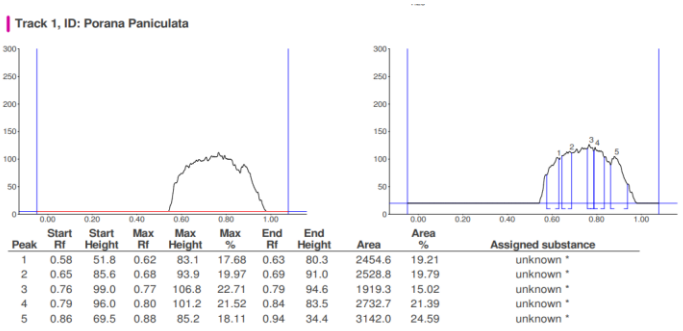
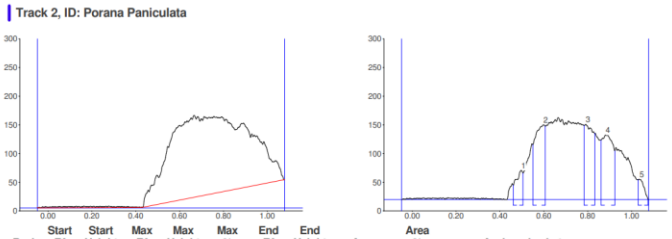


Fig.04: HPTLC at 254nm wavelength all tracks



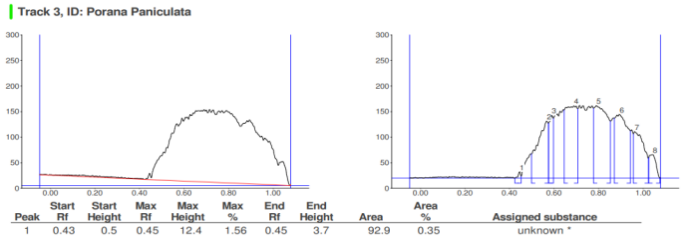
Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.58	51.8	0.62	83.1	17.68	0.63	80.3	2454.6	19.21	unknown *
2	0.65	85.6	0.68	93.9	19.97	0.69	91.0	2528.8	19.79	unknown *
3	0.76	99.0	0.77	106.8	22.71	0.79	94.6	1919.3	15.02	unknown *
4	0.79	96.0	0.80	101.2	21.52	0.84	83.5	2732.7	21.39	unknown *
5	0.86	69.5	0.88	85.2	18.11	0.94	34.4	3142.0	24.59	unknown *

Fig.05: HPTLC at 254nm wavelength track 01



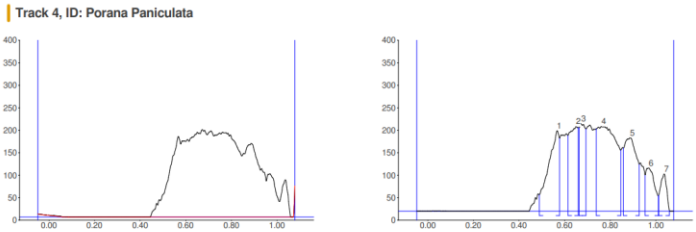
Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.46	25.2	0.50	50.8	11.04	0.51	46.3	1147.0	8.11	unknown *
2	0.55	95.7	0.60	130.3	28.30	0.61	128.2	4303.6	30.42	unknown *
3	0.79	129.2	0.79	131.0	28.46	0.83	115.7	3848.2	27.20	unknown *
4	0.86	103.7	0.88	112.4	24.42	0.93	84.9	4185.3	29.59	unknown *
5	1.03	34.6	1.04	35.8	7.77	1.08	0.3	662.5	4.68	unknown *

Fig.06: HPTLC at 254nm wavelength track 02



Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.43	0.5	0.45	12.4	1.56	0.45	3.7	92.9	0.35	unknown *
2	0.50	47.4	0.57	111.5	14.08	0.58	107.1	3826.4	14.44	unknown *
3	0.58	107.7	0.59	122.8	15.52	0.60	117.3	1618.4	6.11	unknown *
4	0.65	133.2	0.69	141.3	17.85	0.71	135.5	5402.5	20.39	unknown *
5	0.78	136.7	0.79	141.6	17.88	0.85	111.7	6296.8	23.77	unknown *
6	0.87	117.6	0.90	124.9	15.77	0.95	92.5	5156.9	19.47	unknown *
7	0.96	86.5	0.96	91.0	11.50	1.03	38.8	3100.3	11.70	unknown *
8	1.03	40.7	1.05	46.2	5.84	1.08	0.1	997.7	3.77	unknown *

Fig.07: HPTLC at 254nm wavelength track 03



Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.49	37.0	0.57	178.9	16.37	0.58	162.3	6134.6	16.32	unknown *
2	0.62	168.7	0.65	188.6	17.25	0.66	186.5	5239.7	13.94	unknown *
3	0.66	185.5	0.67	194.4	17.78	0.70	183.1	3792.2	10.09	unknown *
4	0.74	183.5	0.76	188.6	17.25	0.85	136.1	11762.0	31.29	unknown *
5	0.86	140.6	0.89	163.3	14.94	0.93	104.2	6324.8	16.83	unknown *
6	0.95	80.2	0.97	96.2	8.80	1.01	34.5	2726.5	7.25	unknown *
7	1.01	35.7	1.04	83.1	7.60	1.06	1.4	1608.8	4.28	unknown *

Fig.08: HPTLC at 254nm wavelength track 04

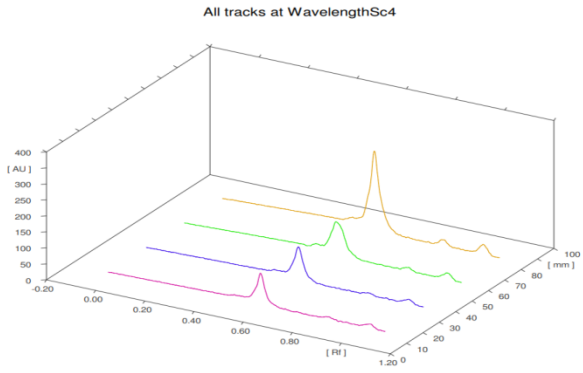
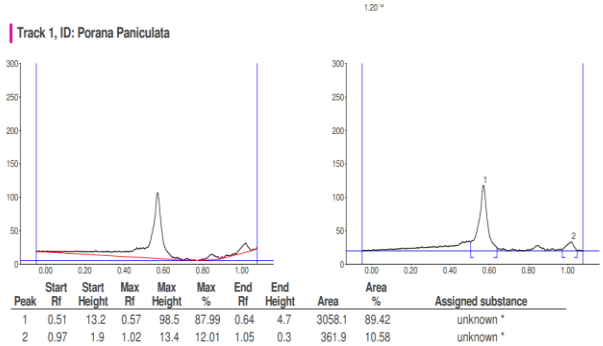
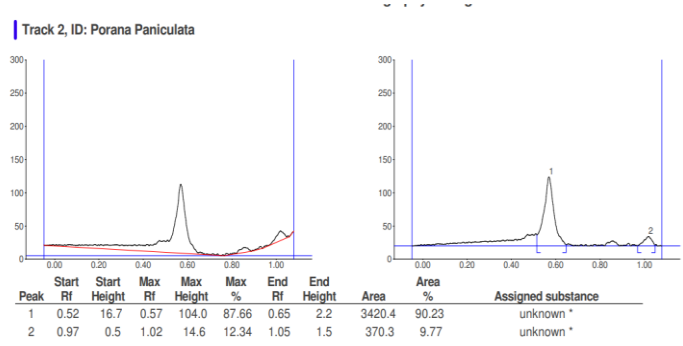


Fig.09: HPTLC at 366nm wavelength all tracks



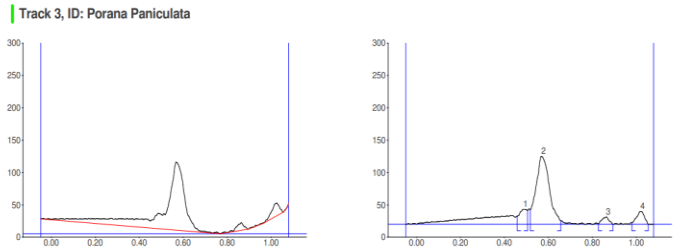
Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.51	13.2	0.57	98.5	87.99	0.64	4.7	3058.1	89.42	unknown *
2	0.97	1.9	1.02	13.4	12.01	1.05	0.3	361.9	10.58	unknown *

Fig.10: HPTLC at 366nm wavelength track 01



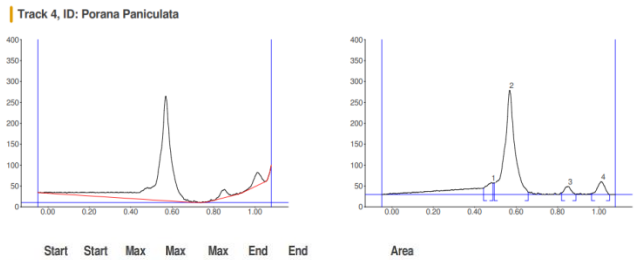
Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.52	16.7	0.57	104.0	87.66	0.65	2.2	3420.4	90.23	unknown *
2	0.97	0.5	1.02	14.6	12.34	1.05	1.5	370.3	9.77	unknown *

Fig.11: HPTLC at 366nm wavelength track 02



Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.46	12.8	0.49	23.8	14.82	0.51	21.4	597.4	9.97	unknown *
2	0.52	22.6	0.57	105.3	65.48	0.66	5.6	4614.9	77.02	unknown *
3	0.83	0.8	0.86	11.7	7.26	0.90	0.0	264.0	4.41	unknown *
4	0.98	2.4	1.02	20.0	12.44	1.06	0.0	515.9	8.61	unknown *

Fig.12: HPTLC at 366nm wavelength track 03



Peak	Start Rf	Start Height	Max Rf	Max Height	Max %	End Rf	End Height	Area	Area %	Assigned substance
1	0.44	15.3	0.48	28.8	8.73	0.49	27.0	669.5	6.30	unknown *
2	0.50	27.5	0.57	249.8	75.81	0.66	5.7	8722.9	82.03	unknown *
3	0.82	4.2	0.85	19.6	5.96	0.89	0.6	457.6	4.30	unknown *
4	0.97	2.1	1.01	31.3	9.50	1.05	0.3	784.1	7.37	unknown *

Fig.13: HPTLC at 366nm wavelength track 04

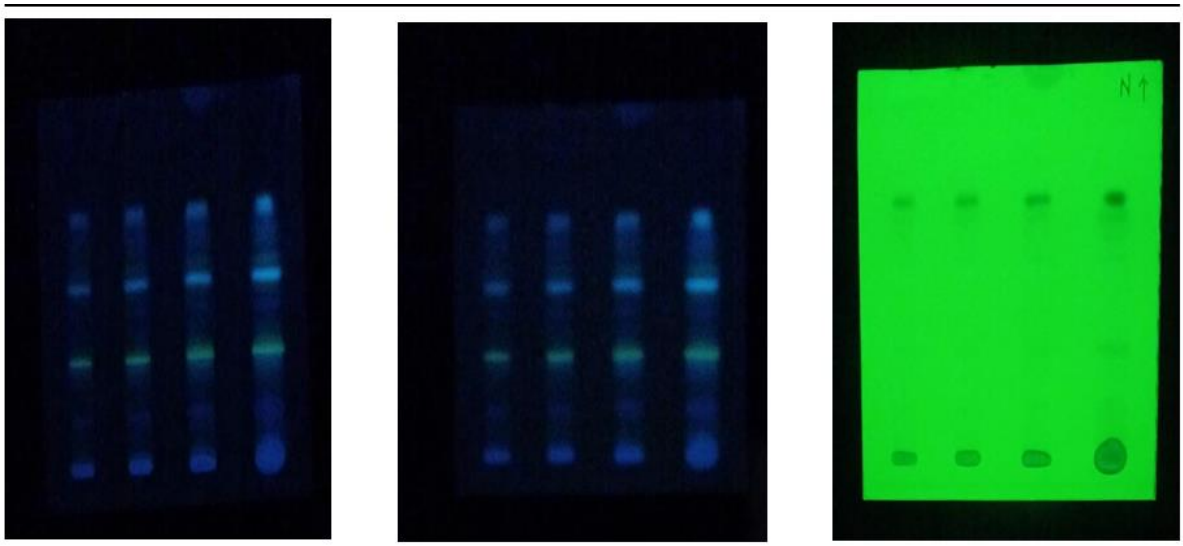


Fig.14: TLC Plates

4. DISCUSSION

In order to guarantee sample identification, quality, and purity, standardization is an essential step. The microscopic method is among the easiest and cost effective techniques to start accurately identifying the source components [4].

Anatomical study

Plant architecture is a crucial part of pharmacognosy studies since the active ingredients that give a plant its pharmacological effects are found in its tissues. This information allows for the identification of a species with medicinal value [5].

Phytochemical study-

A preliminary qualitative phytochemical analysis of *P. paniculata* root revealed the presence of alkaloids, glycosides, flavonoids, tannins, terpenoids, and proteins. Given the many biological and therapeutic properties of these secondary metabolites, it is expected that this species will have a broad variety of medical applications. The water extract had a higher yield percentage when the extraction yields of the alcoholic and water extracts were compared. It could be because water attracts a wider variety of plant elements than other solvents due to its strong polarity [6].

HPTLC-

The HPTLC analysis of the methanolic extract of P. paniculata showed the presence of many phytoconstituents in different amounts, as can be seen in the figures and tables. Figure 4 displays the three-dimensional overlay of the chromatogram for each track at 256 nm. The chromatogram scanned at 254 nm (Fig. 5-8) displays 5, 5, 8, and 7 peaks for tracks 1 and 2, track 3, and track 4, respectively. Figure 8 displays the three-dimensional overlay of the chromatogram for each track at 366 nm. The chromatogram scanned at 366 nm (Fig. 10-13) displays 2, 2, 4, and 4 peaks for tracks 1 and 2, track 3, and track 4, respectively.

The presence of many phytoconstituents is indicated by the number of peaks in the sample. The Rf values for the phytoconstituents in the examined sample would be helpful in identifying the unknown compounds by comparing them with the reference standards. The peak area values can also be used to determine the chemicals' concentration. The bands of separated compounds are visible on the TLC plates when they are exposed to white light and UV light with wavelengths of 254 nm and 366 nm (Fig. 5).

5. CONCLUSION-

Standardization is a crucial step in ensuring sample identification, quality, and purity. Although *P. paniculata* has long been used by traditional healers, standards for this plant have not yet been defined. The results of this study can therefore be used as a benchmark for this medication in subsequent research. Its conventional claims need to be supported by more pharmacological research.

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