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Pharmacognostical, Phytochemical & Biological Investigation Of Prinsepia Utilisation Royle

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Abstract
Prinsepia utilis Royle, commonly known for its extensive use in traditional medicine, has been the focus of numerous pharmacognostical, phytochemical, and biological investigations due to its potential therapeutic properties. This comprehensive study aims to delineate the pharmacognostical characteristics, phytochemical profile, and biological activities of Prinsepia utilis Royle.
Pharmacognostical analysis involves the examination of the macroscopic and microscopic features of the plant. The macroscopic evaluation provided a detailed description of the morphological aspects of leaves. Microscopic analysis revealed intricate cellular structures and tissues, offering crucial diagnostic features for the plant's identification and quality control. These findings are instrumental in ensuring the authenticity and purity of the plant material used in medicinal preparations.
Phytochemical screening was conducted to identify the diverse array of bioactive compounds present in Prinsepia utilis Royle. Preliminary qualitative tests indicated the presence of flavonoids, alkaloids, saponins, tannins, and phenolic acids. Quantitative assays further revealed significant concentrations of these metabolites, suggesting their potential contributions to the plant's medicinal properties.
Biological investigations encompassed a range of in vitro to evaluate the therapeutic potential of Prinsepia utilis Royle. The current study's analysis of antifungal activity using a cup plate method on the fungus candida albicans revealed that P. utilis Royle has modest antifungal activity in comparison to that of conventional gresiofulvin and nystatin.

Introduction

Nature contains enormous amounts of compounds that are valuable for medicine. Plants have been a major source of essential components for traditional and contemporary medicine since the Stone Age. Because they are easy to use and have few side effects, remedial herbs are still widely used to treat a wide range of infectious disorders in many developing nations. Conventional tropical medicinal plants can be a great source of novel, dependable, sustainable, and long-acting pharmaceuticals for a range of ailments. The therapeutic properties of plants are mostly due to the presence of certain phytochemicals. They are essentially plant metabolites, produced in every plant cell, and have particular functions for animals.

1.1 MedicinalPlants

A plant is defined as any organism that contains parts that are used medicinally or that act as building blocks for semi-synthetic chemicals. If a plant is called "medicinal," it indicates that it has been used as a drug, medicinal ingredient, or active part of a therapeutic preparation. A class of plants known as "medicinal plants" are those that are utilized as pharmaceuticals and therapeutic agents due to their unique qualities.

1.2 History of medicinal plant

All officially acknowledged Indian medical systems, including Ayurveda, Yoga, Unani, Siddha, Homeopathy, and Naturopathy, heavily include herbal treatments, with the exception of Allopathy. Of the 1.1 billion people in India, almost 70% still use these non-allopathic medicinal systems. Herbal medications and dietary supplements do not presently fall under a separate category as per the Indian medications Act. However, a wealth of experience data backs up a number of natural remedies. This offers great opportunities for Reverse Pharmacology and Observational Therapeutics. Herbal treatments based on evidence are widely used in many systems and are manufactured by a well-run company following pharmacopeial guidelines.[28] While scientific inquiry is not limited by human inventiveness, technological advancements can occasionally place restrictions on experimental investigation. When I was a research student researching pharmacognosy, the main chromatographic method available was paper chromatography (PC), which took 48 hours to produce. This was before the Plant Phenolics Group was founded in 1957.

"The word Pharmacognosy is derived from the Greek words "Pharmakon" (drug), and "gnosis" (knowledge)."
As long as human subjects are used in research, ethical issues could arise. Written in the perspective of an ethnobotanist field researcher, this synopsis aims to describe local knowledge (LK) of the biological resources that farming and indigenous people, together known as local communities, depend on for existence. Many indigenous communities living in remote rural areas or impoverished urban areas have deep knowledge of the biological resources in their environment, even though they are often denied access to mainstream services and facilities like markets, land rights, and legal assistance. [3]

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1.3 The value of medicinal herbs to people

(a) Medicinal plants are used to make aspirin and other contemporary drugs.
(b) The great majority of cultures, including Chinese and Indian medicine, directly employ plants as remedies.
(c) A lot of food crops, including garlic, have medicinal qualities.
(d) Medicinal plants can be used to create new drugs. It is estimated that there are more than 250 000 distinct species of flowering plants.

Therefore, by knowing plant toxicity, learning about medicinal plants can help people and animals avoid naturally occurring poisons. For example, medicinal plant cultivation and preservation safeguard plant metabolic engineering.

1.4 FutureofMedicinal Plants

The future of medicinal plants is bright, as there are 500,000 plant species in the world, most of which have not yet had their medical uses properly investigated. Additionally, the pharmacological properties of these species may play a crucial role in managing current or upcoming research.

Prinsepia utilis Royle

John Forbes Royle established the genus *Prinsepia* in 1839. He named the genus's first species, *P. utilis*, and dedicated it to his friend James *Prinsepia*, a renowned British orientalist who served as the Asiatic Society of Bengal's secretary and editor of the society's journal. Originally a monotypic group, Genera Prinsepia is currently made up of four species: *Prinsepia utilis, P. uniflora, P. sinensis,* and *P. scandens*. Geographically speaking, continental eastern Asia is the only home for the entire genus *Prinsepia.* Its range of distribution includes the following regions: southern and central China, eastern Mongolia, Russia, Korea, and western Pakistan and north-western India. Out of the four species, only *P. utilis* Royle has been documented in India. It is dispersed over the Himalayan region in this instance. Typically discovered around 1600 [1].

MATERIAL AND METHODS

PLANT MATERIAL

i) Collection and Authentication

In the month of January, plant material was collected from Kalsi, Dehradun, and validated by the Systematic Botany Discipline, Forest Botany Division, Forest Research Institute (ICFRE), P.O.New Forest in Dehradun-248006. The sample was accumulated in the record of Forest Botany Division, Forest Research of Institute.

ii) Creating a Powder from Plant Ingredients

After washing the plant leaves in water, they were left to dry in the shade until all of the water had evaporated. After drying out in the shed, the plant materials (leaves) were chopped into bits and sent to a mixer grinder or laboratory grinding mill to be pulverized into a coarse consistency. The powdered samples were stored in a clean, sealed glass container with appropriate labels for analysis.

iii) Procedure for Extracting

The leaves were washed under running water to get rid of dust. After two hours of shade drying or oven drying at 40–45°C, leaves were ground into a coarse powder with a mechanical grinder. Extraction was done using a Soxhlet apparatus with 30g of powdered leaf in 250mL of solvent for 10 hours. We used double distilled water as extraction solvents. The extracts were then concentrated at 40°C in a rotating evaporator. The dried concentrate was then stored at 4°C in a refrigerator for further use.
The crude concentrate's % yield (w/w) was estimated using the formula below:

$$\mathbf{PY = \frac{Wt\ of\ crude\ concentrate\ recovered}{Wt\ of\ powder\ taken} *100}$$

(PY= is % yield of extract)

ANTI-FUNGAL ACTIVITY BY CUP PLATE METHOD

With the help of Cup-plate method, Anti-fungal activity of *P. utilis* Royle leaf extract [5,25,50 and 100 µml]. *P. utilis* Royle leaf extract were tested against one fungal strains- Candida albicanus. Zone of inhibition of extract were compared with that of different standards like nystatin and griseofulvin for anti-fungal activity. The result showed that remarkable inhibition of the bacterial growth was shows against the tested organism. The phytochemical analyses of the plants were carried out. The anti-fungal activity of the *p. utilis*Royle was due to the presence of various secondary metabolites. Hence, these plants can be used to discover bioactive natural product that may serve as leads in the development of new pharmaceutical research activity.

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Fungal strains Aspergillus niger [MTCC282], Aspergillus clavatus [MTCC1323], and Candia albicanus [MTCC227] were chosen based on their clinical and pharmacological importance. The bacterial strains obtains from progressive Analytical & Research Laboratory PVT. LTD. Were used for evaluating antifungal activity. The fungal stock cultures were incubated for 120 hrs at 20ºC-24ºC on Sabouraud Dextrose Agar [SDA] following refrigeration storage at 4ºC the bacterial strains were grown in Sabouraud Dextrose Agar [SDA] plates at 120 hrs (the bacteria were grown in the nutrient broth at 20ºC-24ºC and maintained on nutrient agar slants 4ºC).Where's the yeast and mold were grown in Sabouraud dextrose agar [SDA] media respectively, at 20ºC-24ºC. the stock cultures were maintained at 4ºC.

Methodology

Leaves of *P. utilis* Royle

⬇

Washed and air dried under shade

⬇

Preparation of coarse powder from dried leaves using Mechanical grinder

⬇

Ectraction of phytoconstituent from Leaf powder using chloroform, di-ethyl ether, acetone, ethyl acetate, ethanol, methanol and water by Soxhlet extraction.

Assembly of Extraction of Leaves

⬇

Extract of P. utilis Royle leaves

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Results

MACROSCOPICAL EVALUATION

Figure no. 3.1: Macroscopical characters of leaf part of *Prinsepia utilis Royle*

- **Leaf Characters:-**
- **Arrangement**: Alternate
- **Shape**: Lanceolate to oblong

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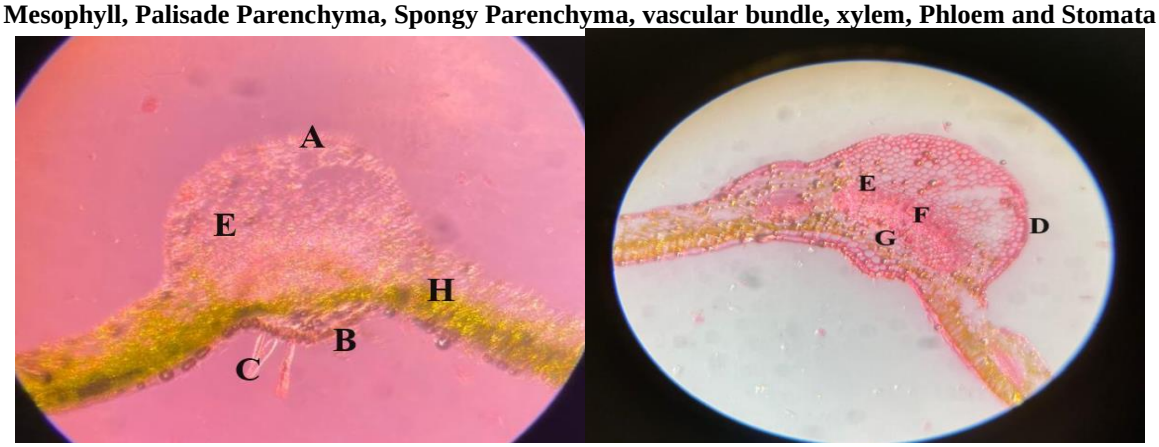
- **Size**: Typically 3 to 10 cm in length and about 1 to 3 cm in width
- **Apex**: Acute or sometimes acuminate
- **Margins**: Serrated or finely toothed
- **Texture**: The leaves are generally smooth (glabrous) but can sometimes have a slightly rough texture
- **Color**: Green during the growing season, turning yellow in the fall

MICROSCOPICAL EVALUATION

a. Microscopical Evaluation of *Prinsepia utilis* Royle

The transverse section (T.S.) of the leaf of ***Prinsepia utilis*** can be described by examining its microscopic structure. Here is a detailed description of the various tissue layers and structures observed in a T.S. of the ***Prinsepia utilis*** leaf:

Figure no. 3.12: T.S of Prinsepia utilis Royleleaf showing lower epidermis, upper epidermis, Trichome, Mesophyll, Palisade Parenchyma, Spongy Parenchyma, vascular bundle, xylem, Phloem and Stomata

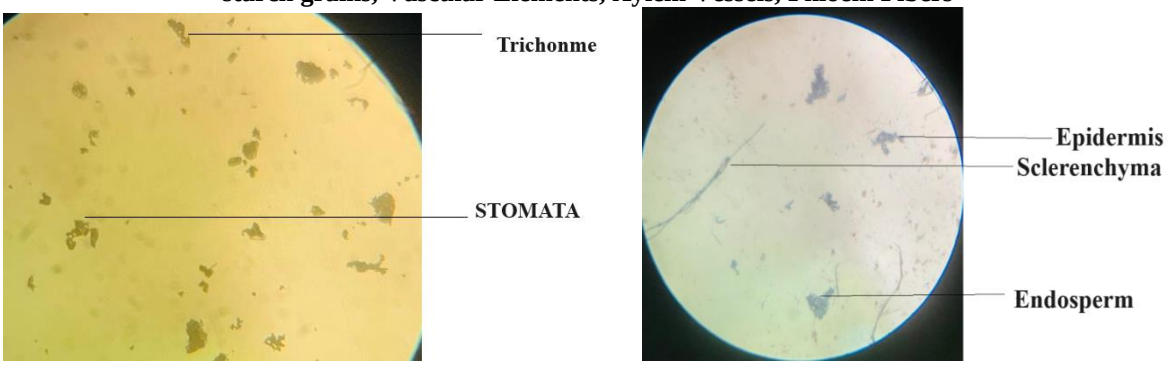


Transverse section of the *Prinsepia utilis* leaf showed highly domed mid rib in the abaxial position. Upper epidermal layer consists of the outermost layer of cells on the upper surface of the leaf. The cells are typically tightly packed and covered with a cuticle, which helps reduce water loss. Lower epidermal layer consists of the outermost layer of cells on the lower surface of the leaf. This layer also contains stomata, which are pores surrounded by guard cells that regulate gas exchange and transpiration. Palisade Parenchyma Located below the upper epidermis, this layer consists of elongated, columnar cells rich in chloroplasts. These cells are primarily responsible for photosynthesis. Spongy Parenchyma Found below the palisade layer, this region has loosely arranged, irregularly shaped cells with air spaces between them. These air spaces facilitate gas exchange within the leaf. Vascular bundles were completely often surrounded by a layer of parenchyma cells. Xylem vessels are typically found on the upper side of the vascular bundle. Phloem Located below the xylem. **Trichomes are** Hair-like structures that may be present on the epidermis, providing protection against herbivory and reducing water loss by trapping a layer of air close to the leaf surface.

This structure is optimized for efficient photosynthesis, gas exchange, and nutrient transport, reflecting the plant's adaptation to its environment.

6.3 POWDER MICROSCOPY

Figure no. 3.14: Powder photomicrograph of *Prinsepia utilis* Royleleaf powder showing epidermal cells, covering trichome, Mesophyll Fragments , Palisade Parenchyma , Spongy Parenchyma rosette calcium oxalate crystals, starch grains, Vascular Elements, Xylem Vessels, Phloem Fibers



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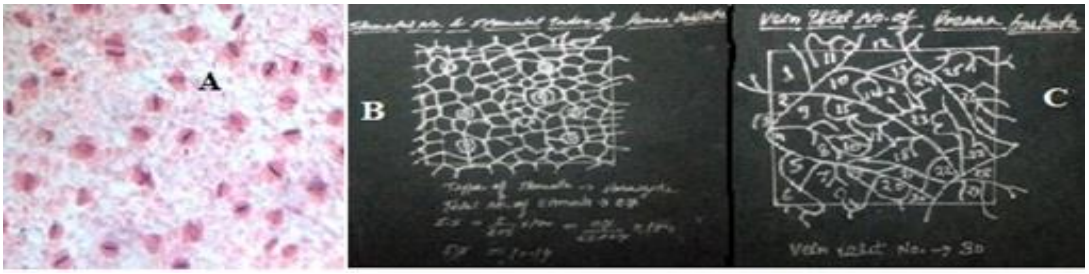
The plant material which was powdered was dark green in color, consisting of fragments of palisade cells, parenchyma, and stomata along with epidermal cells fragments. Lignified vessels having simple pits were observed. The shape of the epidermal cells was irregular. Stomata surrounded by a variable number of cells that are similar to epidermal cells. Trichome was Non-glandular and glandular types may be present.**Non-glandular Trichomes** are unicellular or multicellular, unbranched, and pointed.**Glandular Trichomes** are less common and have a stalk and a glandular head.**Palisade Parenchyma**are Cylindrical cells rich in chloroplasts.**Spongy Parenchyma** Loosely arranged cells with intercellular spaces.**Xylem Vessels** are Elongated, thick-walled cells with annular or spiral thickenings and Phloem fibers are Long, thin-walled fibers that may be present. Oval or spherical starch grains, if present, with a characteristic hilum. Rosette shaped calcium oxalate crystals were observed.
These characteristics are useful for identifying and authenticating the plant material, ensuring its proper use in traditional and medicinal applications.

6.4 DETERMINATION OF LEAF CONSTANTS

Figure no. 4.1: Leaf constant parameters of *Prinsepia utilis* Royle leaf mentioning stomata type, index of stomata and vein islet number



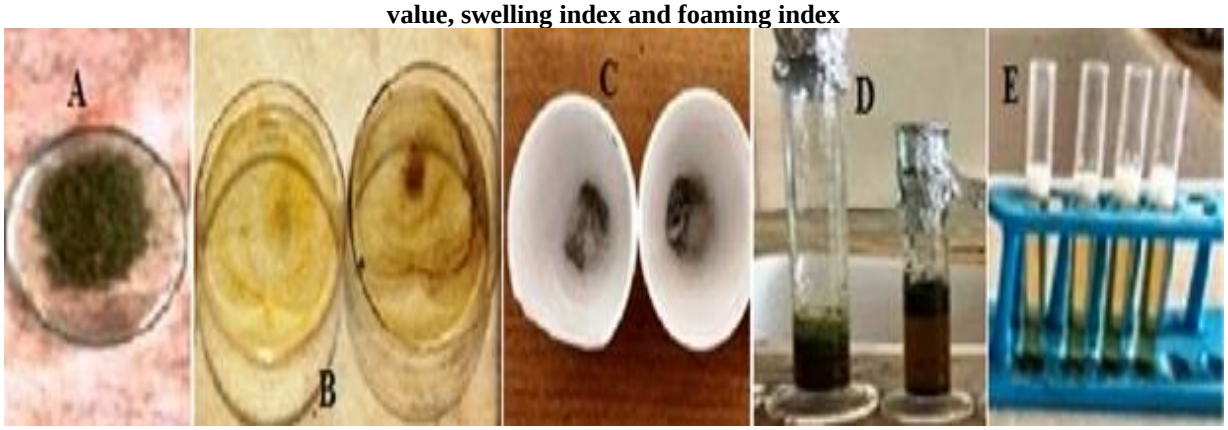
The stomata type present was Anomocytic, values of stomatal index, stomatal number and vein islet number of upper and lower epidermis of leaf was calculated and results were tabulated in below mentioned table.

Table no. 2.1: Stomatal no. and stomatal index of *Prinsepia utilis* Royle leaf

S.NO	Surface Type	No. of stomata (per mm^2)	Epidermal cells total in number	Index of Stomata (I= S÷E+S x 100) (value in $1mm^2$area)	Vein islet no. (value in $1mm^2$area)
1.	Lower	**48**	**99**	**31.89**	**27**
2	Upper	**27**	**68**	**24.0**	**29**

PHYSICO-CHEMICAL PARAMETERS

Figure no. 5.1: Physico-chemical parameters of *Prinsepia utilis* Royle leafmentioning type loss on drying, ash value, swelling index and foaming index



Loss on drying
The leaf sample value for loss on drying of the of *Prinsepia utilis*Royle was found to be 13.212 %.

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Table no. 3.1: Loss on drying of *Prinsepia utilis* Royle leaf powder

S. No.	Drug wt. + porcelain dish before drying A (g)	Drug wt.+ porcelain dish after drying B (g)	Loss on drying A- (g)	% of loss on drying
1	10.013 + 42.786	51.476	1.323	13.212

a. Calculating the Ash value

According to the official procedure, the levels of ash, or total ash, water soluble ash, and acid insoluble ash, were assessed. A raw drug's total ash content is determined by the presence of inorganic material. A higher total ash value indicated that the plant material contained more inorganic materials. The amount of inorganic particles in the medication is a gauge of its overall ash content. A high score indicates that there is more inorganic materials in the plant material.

6.032% was determined to be the total ash value of Prinsepia utilis Royle leaf. When concentrated acid is introduced to complete ash, it mixes and reacts with the crystals of calcium oxalate. The amount of material left over after acid treatment will be relatively small if the calcium oxalate crystals in the plant material are numerous.

Reduced value for acid insoluble ash indicates a high concentration of calcium oxalate crystals in plant material. The amount of acid-insoluble ash in a certain plant material indicates the amount of silica present. The acid insoluble ash value was calculated to be 1.616%. Water soluble ash, which dissolves in the medication and serves as a great indicator of the water soluble salts, makes up another portion of total ash. The calculation for water-soluble ash was 1.738%. It was discovered that the outcomes were nearly within bounds.

Table no. 3.2: Total ash value of *Prinsepia utilis* Royle leaf powder

S. No.	Drug wt. (g)	Wt. of empty china dish (g)	Crucible wt. + Wt. of ash (g)	Ash Wt. (g)	% of total ash
1	3.049	18.044	18.198	0.154	5.013

Table no. 3.3: Acid insoluble ash value of *Prinsepia utilis* Royle leaf powder

S. No.	Drug wt. (g)	Wt. of empty china dish (g)	Crucible wt. + Wt. of ash (g)	Ash Wt. (g)	% of acid insoluble ash
1	3.009	18.043	18.092	0.049	1.628

Table no. 3.4: Water soluble ash value of *Prinsepia utilis* Royle leaf powder

S. No.	Drug wt. (g)	Wt. of empty china dish (g)	Crucible wt. + Wt. of ash (g)	Ash Wt. (g)	% of water soluble ash
1	3.010	18.032	18.085	0.053	1.760

b. Swelling Index

Due to the presence of varying hemicellulose elements, such as pectin, gum, and mucilage, which result in varying swelling qualities of various plant material, distinct healing plants have definite healing values. The swelling index parameter was found and calculated in order to ascertain the quantity of raw plant material that swells after being treated with water as well as the amount of mucilage that is present in the material. Prinsepia utilis Royle leaf's swelling index was discovered to be 5.344. The results are tabulated as follows:

Table no. 3.15: Swelling index value of *Prinsepia utilis* Royle leaf powder

S.No	Powdered drug weight (gm)	Stock Volume (in ml)	Swelling factor
1	1.0	25	5.4

c. Foaming Index

Following test tube shaking and the point at which the foam in the test tube becomes persistent, the amount of foam in ten test tubes containing a decoction of plant extract and water was measured using a scale. Each test tube's foam height was measured to be less than 1 cm. Prinsepia utilis Royle leaf's foaming index was therefore determined to be less than 100, indicating a very low concentration or lack of saponins.The results are tabulated as follows:

Table no. 3.16: Foaming index value of *Prinsepia utilis* Royle leaf powder

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S. No.	Powdered drug wt. (gm)	Stock Volume (in ml)	Dilution of the test solution (in ml)										Foaming Index
			1	2	3	4	5	6	7	8	9	10	
1	1.0	100	0.3	0.5	0.6	0.7	0.4	0.5	0.6	0.7	0.6	0.9	≥ 100

EXTRACTION OF PLANT MATERIAL

30 gm coarse powders of various morphological parts of Prinsepia utilis Royle was subjected to soxhlet apparatus extraction with different solvents like chloroform, dfi-ethyl ether, acetone, ethyl acetate, methanol in for around 5 hrs per solvent but Water in for around 24 hrs for . Results are tabulated in below mentioned table.

Table no. 5.1: Data showing soxhlet apparatus extractionvalues and nature of extract of *Prinsepia utilis* Royle leaf Powder

S. No	Solvent Used	Wt. of drug (gm)	Yield (gm)	% Yield	Extract color	Property
1	Chloroform	30	36.6	83.33	Dark green	Sticky
2	Di-ethyl ether	30	10.7		Dark green	Sticky
3	Acetone	30	15.7		Dark green	Slight sticky
4	Ethyl acetate	30	10.8		Light Green	Non Sticky
5	Ethanol	30	23.5		Light Green	Non Sticky
6	Methanol	30	15.8		Dark green	Non sticky
7	Water	30	30		Darkbrown	Non sticky

Table no. 5.2: Data showing soxhlet apparatus solvent extraction values and nature of extract of *Prinsepia utilis* Royle Leaf

QUALITATIVE CHEMISTRY ANALYZATION

The extracts of leaves of *Prinsepia utilis* Royle when tested with various solvent extracts of different polarity shows the existence of different chemical constituents such as carbohydrate, protein, amino acid, steroid, glycoside, flavonoids, alkaloids and tannins.

Table no. 6.1: Preliminary phytochemical investigation of various extracts of *Prinsepia utilis* Royle leaves

Chemical Constituents	Tests	Chloroform [CF]	Di-ethyl ether [DEE]	Acetone [AC]	Ethyl acetate [EA]	Ethanol [ET]	Methanol [ME]	Water [WA]
Carbohydrates	Fehling's test	+ve	+ve	-ve	-ve	-ve	+ve	-ve
	Benedict's test	-ve	+ve	+ve	+ve	+ve	+ve	+ve
Proteins	Biuret test(general test)	-ve	+ve	-ve	-ve	-ve	-ve	+ve
	Million's test	-ve	-ve	-ve	-ve	-ve	-ve	-ve
	Xanthoprotein test	-ve	-ve	-ve	-ve	-ve	+ve	-ve
Amino acids	Ninhydrin test	-ve	-ve	-ve	-ve	+ve	+ve	+ve
	Tyrosine test	-ve	-ve	+ve	-ve	-ve	+ve	+ve
Steroid	Salkowski test	-ve	-ve	-ve	-ve	+ve	-ve	+ve
	Libermann's test	+ve	+ve	+ve	-ve	-ve	+ve	-ve
Test for glycosides	**Cardiac Glycosides**	Killer killiani test	+ve	+ve	-ve	-ve	-ve	-ve	-ve

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		Legal test	+ve	+ve	-ve	-ve	-ve	-ve	+ve
Saponins	Foam test	+ve	+ve	+ve	+ve	-ve	+ve	+ve	
Flavonoids	Shinoda test	+ve	+ve	-ve	+ve	-ve	+ve	+ve	
Tannins and Phenolic test	Ferric chloride test	+ve	+ve	+ve	+ve	ve	+ve	+ve	
	Lead acetate solution test	+ve	+ve	+ve	+ve	+ve	+ve	+ve	
	Gelatin solution test	+ve	+ve	+ve	+ve	+ve	+-ve	+ve	
Alkaloids	Dragendorff's test	-ve	-ve	-ve	-ve	-ve	-ve	-ve	
	Mayer's test	+ve	+ve	-ve	-ve	-ve	+ve	+ve	
	Tannic acid	-ve	+ve	-ve	+ve	-ve	+ve	+ve	
	Wagner's test	+ve	+ve	-ve	+ve	+ve	-ve	-ve	

ANTI-FUNGAL ACTIVITY BY CUP PLATE METHOD

A. Anti-fungal activity leaf extract of *P. utilis* Royle: An ethnomedicinal plant

a. Preliminary screening for phytochemicals

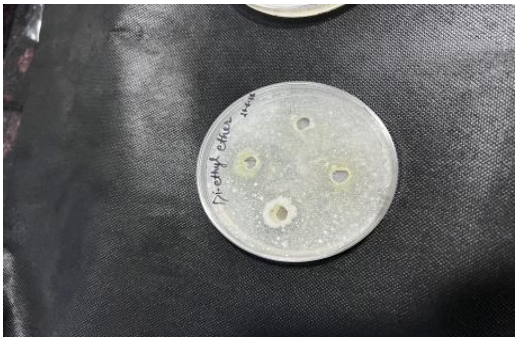
It was found that extracts of *P. utilis* Royle leaves contained tannins, flavonoids, saponins, steroids, glycosides, carbohydrates, proteins, and amino acids.

a. Anti-fungal activity

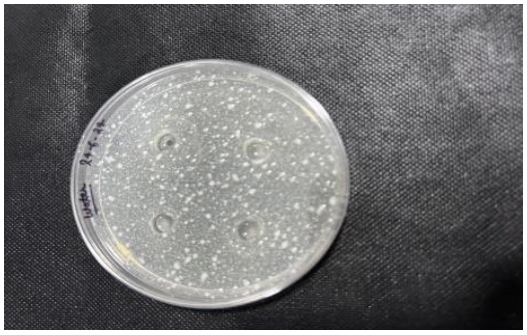
In vitro anti-fungal activity of extract of *P. utilis* Royle leaf extract was determined and was compared with that of different standards like nystatin and griseofulvin with the help of Cup-Plate method. Anti-fungal activities of plant part leaf extract against one pathogenic fungi was investigated. Each purified extract were dissolved in Nacl (Normal saline) sterilized by filtration sintered glass filter and stored at 4^{o}C for the determination of zone of inhibition. All the extract were screened for their antifungal activity against the fungi Candida albicanas (gram positive). The set of four dilution chloroform, di-ethyl ether, methanol, and water [5, 25, 50 and 100] µg/ml of *P. utilis* leaf extract and standard drug was prepared in double distilled water using nutrients agar tubes. Sabouraud dextrose agar [SDA] plates was seeded with indicator bacteria strains (10^{8}cfu) and allowed to stay at 20^{o}C-24^{o}C. Control experiment was carried out under similar condition by using nystatin and griseofulvin for antifungal activity as standard drug.

The zone of growth inhibition around the disk was measured after 120 hrs of in incubation at 20^{o}C-24^{o}C for fungi.

The sensitivities of the microorganism species to the leaf extract was determined by measuring the size of inhibitory zones (including the diameter of disk) on the agar surface around the disk, and values <8 mm was considered as not active against microorganism.



(a) Di-ethyl ether



(b)Water

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(c) Methanol M **(d) Chloroform**

The anti-fungal activity of the extract of *P. utilis* Royle was studied in different concentration (5, 20, 50 and 100) µg/ml against one pathogenic fungal stain, Gram-positive, Candida albicans [MTCC227]. These strain selected for the basis of its application purpose of further formulation study.
Anti-fungal potential of extract was assessed in terms of zone inhibition of bacterial growth. The results of the anti-fungal activities are presented in table 1-4.

Table 1Anti-fungal activity of Di-ethyl ether of leaves of *P. utilis* Royle against fungal organism

Anti-fungal activity (zone of inhibition)				
Microorganism	*P. utilis* Royle – Zone of inhibition in mm			
	Concentration in µg/ml			
	Di-ethyl ether extract(µg/ml)			
	5	25	50	100
C. albicans	15	18	20	23

Di-ethyl ether Zone of inhibition

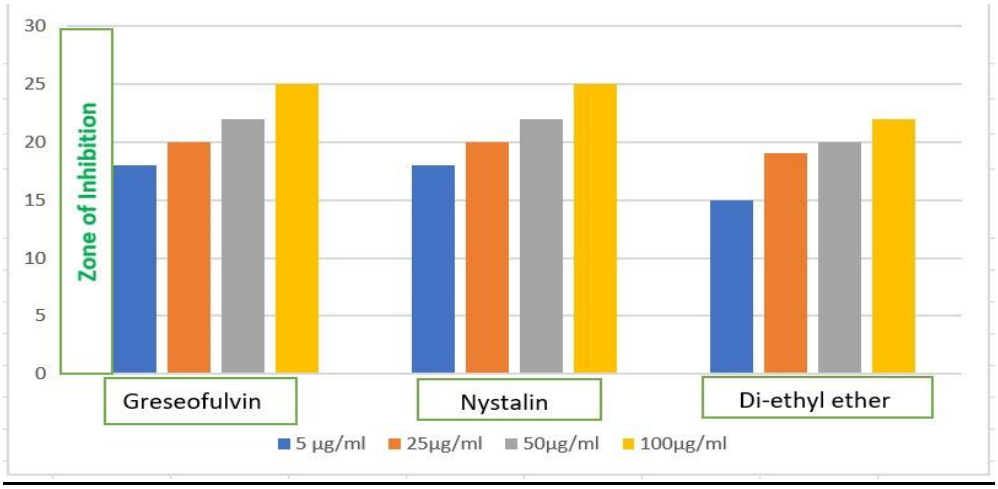

Table 2Anti-fungal activity of water of leaves of *P. utilis* Royle against fungal organism

Anti-fungal activity (zone of inhibition)				
Microorganism	*P. utilis* Royle – Zone of inhibition in mm			
	Concentration in µg/ml			
	Water extract(µg/ml)			
	5	25	50	100
C. albicans	-	09	10	11

Water No Zone of inhibition

Table 3Anti-fungal activity of methanol of leaves of *P. utilis* Royle against fungal organism

Anti-fungal activity (zone of inhibition)

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Microorganism	*P. utilis* Royle – Zone of inhibition in mm			
	Concentration in µg/ml			
	Methanol extract(µg/ml)			
	5	25	50	100
C. albicans	15	18	20	23

Methanol Zone of inhibition

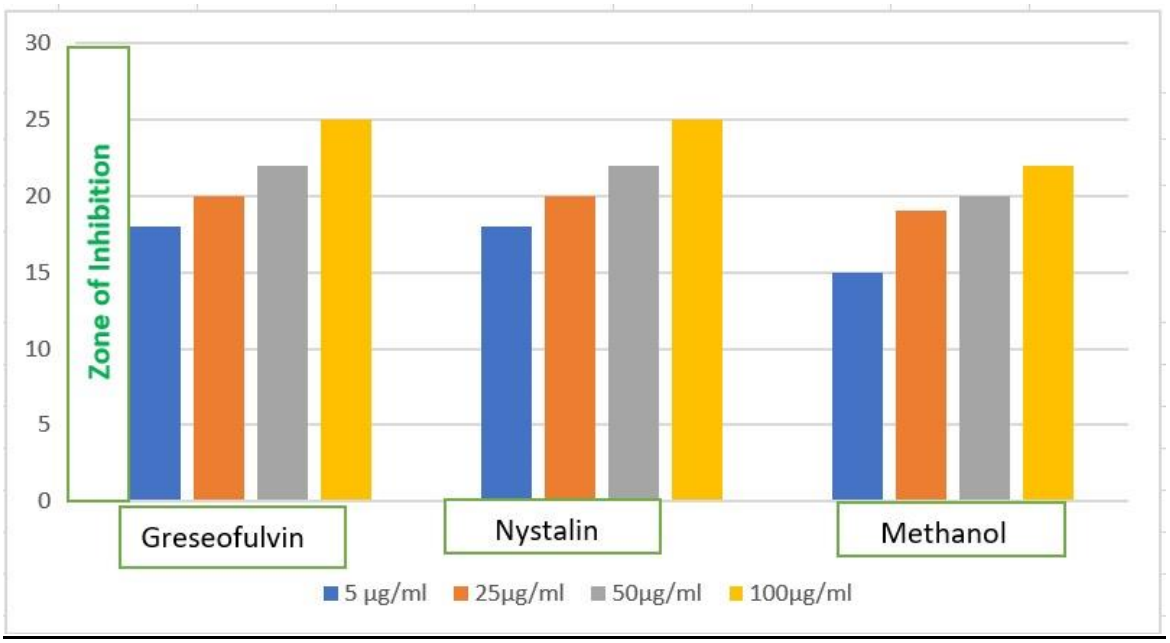

Table 4 Anti-fungal activity of chloroform of leaves of *P. utilis* Royle against fungal organism

Anti-fungal activity (zone of inhibition)				
Microorganism	*P. utilis* Royle – Zone of inhibition in mm			
	Concentration in µg/ml			
	chloroform extract(µg/ml)			
	5	25	50	100
C. albicans	-	17	18	18

Chloroform No Zone of inhibition

Antifungal activity as compared with standard drugs, the result revealed that in the leaf extracts is di-ethyl ether and methanol for fungal activity, C. albicans shows gave good results with these leaf extracts. The grow inhibition zone measured ranged from 11 to 20 mm for fungal strains.

The results show that the extracts of *P. utilis* Royle was found to be more effective against all the microbes tested.

CONCLUSION

The current study "Comparative study of Pharmacognostical, Phytochemical & biological investigation of *P. utilis* leaves," emphasizes on a herb that is often found in India and has a long history of being utilized for the treatment of a number of illnesses. There are still few studies on *P. Utilis* Royle leaves. Thus, to explore its prospective applications, the current study investigated this plant's leaves using a precise scientific methodology.

Inthechapteron **literaturereview**,detailsaboutthe microscopy,macroscopy,phytoconstituents, physicochemical & biological action of the leaves of the *P. utilis* plant are covered.

Highlightsfrom**pharmacognosticstudies** include:

- ✓ Macroscopical characteristics were examined, and it was discovered that they adhered to the Family rosacea general characteristics.
- ✓ Microscopical analysis of the leaves demonstrates the lanceolate to oblong in shape, epidermal cells have a thick cuticle covering them. On the epidermis, there are long unicellular trichomes. Following them are six to eight stacked. Vascular bundles are randomly distributed throughout the large cortex. The endodermis delineates the inner boundary

of the cortex, each vascular bundle is encircled bya conspicuous fibrous sheath, and pericycles are followed byvascular bundles that lack bundle sheaths and are grouped in a ring. The cortical region also contains many resin cells, which are distinguished by their dusky orange-colored contents.

- ✓ MicroscopicalanalysisoftheLeafindicatesthepresenceof

A single-layered, cuticle-coated epidermis that is perforated by stomata. The epidermis on the top and bottom is same. Mesophyll: The mesophyll, which is completely chlorophylls with intermittent oil pores, combines the palisade with spongy parenchyma. The clearly defined wall of oil cavities is composed of epithelial cells.Both the upper and lower epidermis are single-layered, stomata-pierced structures coated in cuticle. They both contain vascular bundles that are associated with oil cavities and each of which contains an arch of sclerenchyma over the xylem.

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