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Pharmacognosy, physicochemical and preliminary phytochemical study on flower of *Plumeria rubra*

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Abstract
The purpose of present study to evaluate the morphological, microscopic, powder characteristics, fluroscence analysis, physicochemical evaluation, and phytochemical exploration of *Plumeria rubra* flower. The flower of *Plumeria rubra* were authenticated and shade dried, petals were separated and powder charecterstic, beheaviour and fluroscence analysis were studied. Dried powder was then extracted with different solvents. The macroscopic and microscopic feature of *Plumeria rubra* include the presence of starch grain, pollen grain, epidermal cells, parenchymatous cells of corolla. Powder showed characteristic fluorescent property when treated with different reagent the physicochemical investigation revealed values for moisture content, pH, ash values and extractive values, swelling index, which are within the World Health Organization standards for the crude drug from medicinal plants. From present study it can be concluded that on the dried flowers of *Plumeria rubra* the above pharmacognostical characteristics, physiochemical evaluation and phytochemical exploration, together may be utilized for the future studies

Keywords: *Plumeria rubra*, physicochemical evaluation, fluorescence analysis, phytochemical screening

Introduction
In ancient times, medicinal plants have been used all over the world as unique source of medicines and may constitute the most common human use of biodiversity. Medicinal properties of plants are due to the active therapeutic constituents present in different parts of the plant Medicinal plants continue to be an important therapeutic aid for the ailments of humankind. The search for eternal health and longevity and for remedies to relieve pain and discomfort drove early man to explore his immediate natural surroundings and led to the use of many plants, animal products and minerals, etc. and the development of a variety of therapeutic agents.

Today, there is a renewed interest in traditional medicine and increasing demands for more drugs from plant sources. This revival of interest in plant-derived drugs is mainly due to the current widespread belief that "green medicine" is safe and more dependable than the costly synthetic drugs, many of which have adverse side effects. Nature has best owed upon us a very rich botanical wealth and a large number of diverse types of plants grow wild in different parts of our country [1, 2, 3].

Plumeria rubra commonly known as frangipani. Plumeria rubra commonly grown for their ornamental purpose. Flowers large in terminal 2-3 chotomous cymes, bracts many broad, deciduous, calyx small, glandular within, lobes broad, obtuse. Corolla salver shaped, throat nacked lobes overlapping to the lefty, rarely to right, Stamen near base of tube. Seeds oblong or lanceolate. Fruite is reported to be eaten in West Indies. In India however it has been used as abortfacient. Root bark is used Drastic, Purgative, Blenorrhagia. Latex is used in toothache and for carious teeth. Flowers is used as Aromatic, Bechic and used as very popular pectoral syrup [4, 5].

Materials and Methods
Collection and Authentification of plant material
The fresh flower of plant *Pumeria rubra* were collected in bulk around area of Nashik.India.the plant were authenticated by the Botanical Survey of India, Pune. The plant was identified by the botanist C. V. Jadhav and the authentication No. is BSI/WRC/IDEN.CER/2016/403.The flowers were separated and shadow dried.

Macroscopic Description
The Plumeria rubra flowers were subjected to macroscopic studies which comprised of organoleptic characteristics *viz.* color, odor, taste, shape, surface, and size of the drug.

Microscopic evaluation of Plumeria rubra flower
Microscopic parameter such as surface preparation transverse section through corolla

Powder characteristics
On the clean glass slide, fine powder of Plumeria rubra flowers was stained with different reagents. The slide was then placed and observed under microscope different stains were used for histochemical studies such as saffranin, ferric chloride, hydrochloric acid,Iodine solution, phloroglucinol and sudan red. trinocular leica DM3000' microscope attached with, Leica DFC 295, digital camera connected to computer and leica application suite softwere was used [6, 7].

Fluorescence Analysis of *Plumeria rubra* flowers [8]
The drug powder was placed on a clean microscopic slide and 2 to 3 drops of freshly prepared different reagents were added and mixed by gentle tilting the slide. They were then subjected to fluorescence analysis in the ultraviolet (UV)-light (254 nm and 365 nm)

The Behavior of Plumeria rubra flowers Powder with Chemical Reagents [8]

The behavior of *Plumeria rubra* flowers with different chemical reagents were performed and observed color changes under ordinary daylight by a standard method

Physico-Chemical Evaluation of *Plumeria rubra* flowers

Physiochemical parameters such as total ash, acid insoluble ash, water insoluble ash, moisture content, pH, extractive values, crude fibre by Dutch method, foaming Index and swelling Index were performed according to the official method prescribed and the WHO guidelines on quality control methods for medicinal plants Material

Inorganic element detection Test

Inorganic element such as calcium, sulphate, magnesium, potassium sulphate, chloride determined by procedure describe in Khandelwal [6].

.**Preparation of extracts of *Plumeria rubra* flowers**

The dried powder material of flowers was powdered and passed through sieve no.16. Successive solvent extraction was carried out using different solvent. Extracts were filtered through muslin cloth, then the filtrate was evaporated under reduced pressure and vacuum dried. The preliminary Phytochemical screening of the extracts was then carried out

Preliminary Phytochemical Screening of flower extracts

The preliminary phytochemical screening was carried out on the different extracts of *Plumeria rubra* flowers for the detection of various phytochemicals such as Alkaloids, Glycosides, Carbohydrates, flavonoids, tannins, proteins, amino acids, fixed oil, fats, sterols and starch.

Results and Discussion

Fig 1

Macroscopy of flowers

Colour: Red

Odour: pleasant

Taste: charecterstic

Inflorescence: compound type

Microscopy of Flower: Transverse section of flower through corolla shows presence of trichome, pedicel, and parenchyma in fig 1.

Surface preparation also shows presence of paracytic stomata fig 2.

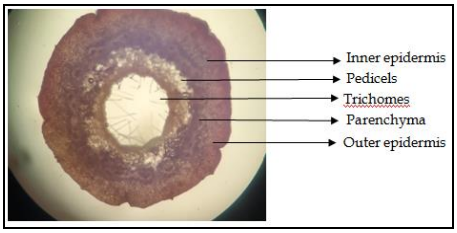


Fig 2

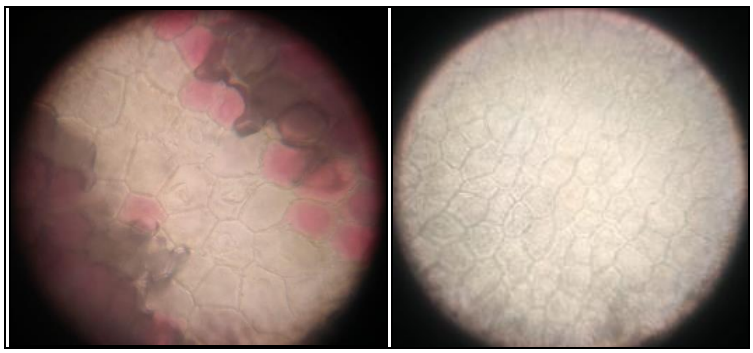
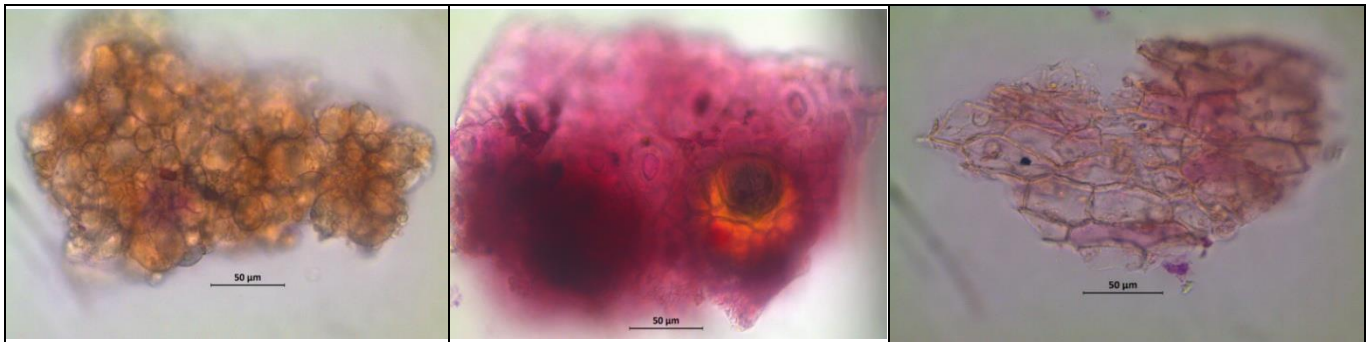


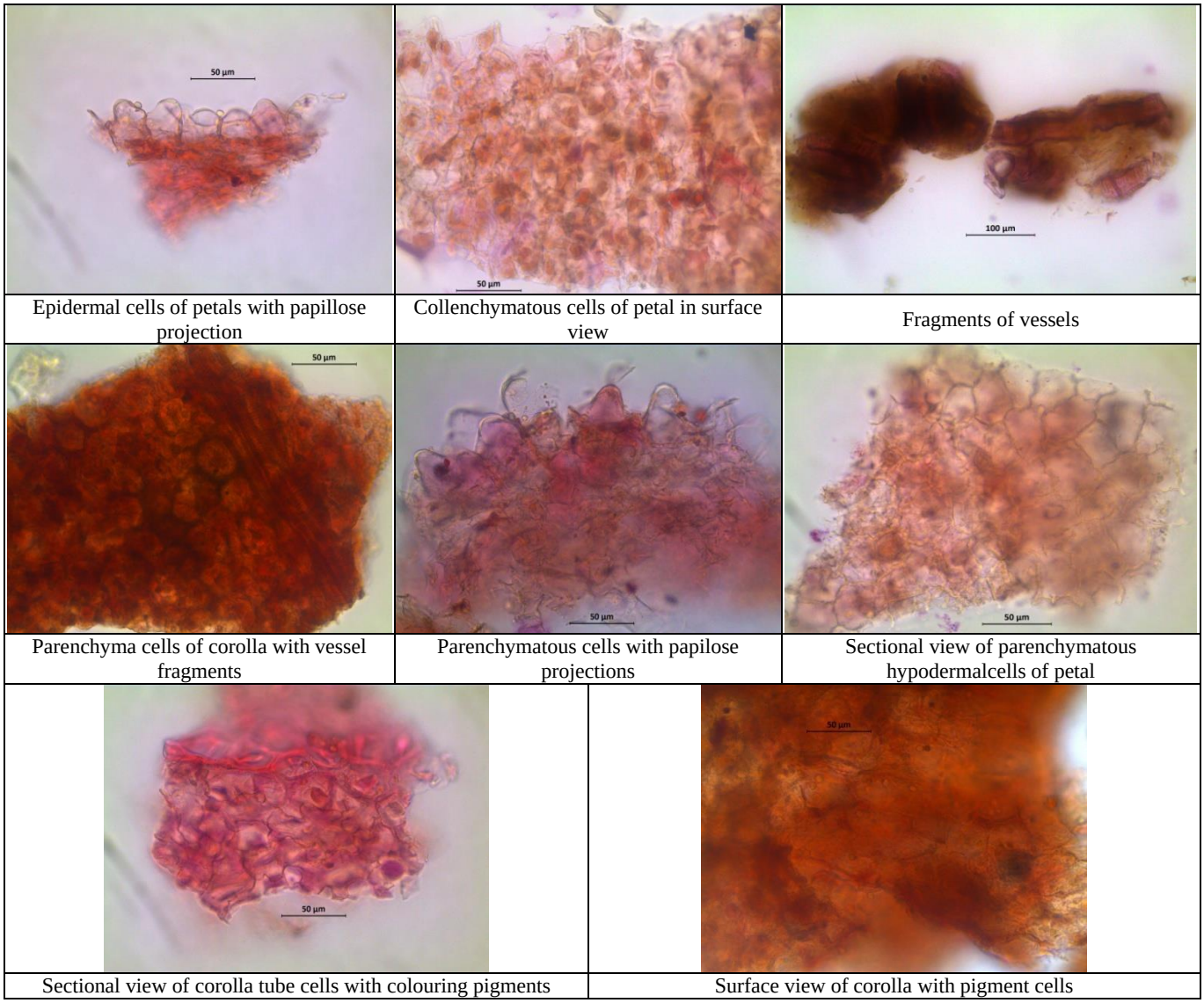
Fig 3

Powder characteristics

Powder characteristics show presence of starch grain, pollen grain, epidermal cells, stomata, vessels collenchymatous cells, parenchymatous cells, pigment cells, corolla with colouring pigment.



Cells with starch grains and pollen grains.	Epidermal cells of petal with stomata	Epidermal cells of petal



Epidermal cells of petals with papillose projection	Collenchymatous cells of petal in surface view	Fragments of vessels
Parenchyma cells of corolla with vessel fragments	Parenchymatous cells with papilose projections	Sectional view of parenchymatous hypodermalcells of petal
Sectional view of corolla tube cells with colouring pigments	Surface view of corolla with pigment cells	

Fig 4

Table 1: Behavior and fluroscence analysis

Powder of flower	Colour observed under ordinary light	254nm	365nm
Powder as such	Red	Dark red	Dark red
Powder +conc H_2so_4	Red	Dark red	Red
Powder+aq.$Fecl_3$	Reddish orange	Orange	Yellowish green
Powder +iodine	Reddish black	Black	Black
Powder +ammonia solution	Yellow	Yellowish red	Yellow green
Powder+magnesium+Hcl	Red	Dark red	brown
Powder+methanol	Dark red	Reddish black	Black
Powder+glacial acetic acid	Orange	Black	Black
Powder+Hno_3	Red	Dark red	Brown
Powder+picric acid	Blackish red	Yellow	Greenish yellow
Powder +acetone	Dark red	Black	Brown
Powder +chloroform	Brown	Dark brown	Blackish brown
Powder +lead acetate+naoh	Orange	Black	Black
Powder +Hno3	Brown	Black	Black
Powder +distill water	Reddish brown	Reddish black	Reddish black
Powder+ethyl acetate	Dark red	Brown	Dark brown
Powder+benzene	Red	Brown	Reddish brown
Powder +Naoh (alc)	Greenish black	Black	Blackish green
Powder +Pet ether	Green	Brown	Brown

Table 2: Behavior of powder with reagent

Powder as such	Red
Powder+H_2SO_4	Red
Powder+$fecl_3$	Yellow orange
Powder+iodine	Black
Powder+picric acid	Yellow black
Powder+ammonia solution	Black
Powder+magnesium +Hcl	Brown
Powder+aq.koh	Black

Table 3: Inorganic element tests

Test for flower	Hydrochloric acid	Nitric acid
Test for calcium	-ve	-ve
Test for magnesium	-ve	_-ve
Test for potassium	-ve	-ve
Test for suphate	+ve	+ve
Test for phosphate	+ve	+ve
Test for chloride	-ve	-ve

Table 4: Physico-chemical parameters

Physico-chemical parameters	Values
Loss on drying	5.3±0.264
Total ash	10.58±0.104%w/w.
Total acid insoluble ash	3.566±0.0577%w/w
Total water in soluble ash	5.33±0.288%w/w
Water soluble extractive value –hot extraction method	15.81+0.182
Alcohol soluble extractive value- hot extraction method	12.42±0.122
Water soluble extractive value –cold extraction method	9.6±0.0432
Alcohol soluble extractive value- cold extraction method	10.37±0.0461
Swelling index	Less than 100
Foaming index	Less than 1
Ph 1 %	6.12
Ph 10%	6.64
Crude fibre by dutch method	19.83±0.25

Table 5: Preliminary Phytochemical tests

Tests for flower	Pet ether extracts	Chloroform	Methanol
Test for cardiac glycosides	+ve	-ve	-ve
Keller killiani tests			
Legals test	+ve	-ve	-ve
Libbermans test	+ve	-ve	-ve
Test for anthraquinone glycosides			
Modified born tragers test	-ve	-ve	-ve
Test for saponin glycosides	-ve	+ve	+ve
Foam test	-ve	+ve	+ve
Test for flavonoids			
Shinoda test	-ve	-ve	+ve
Lead acetate test	-ve	-ve	+ve
Alkaline reagent test	-ve	-ve	+ve
Test for tannin and phenolic compounds			
Ferric chloride	-ve	+ve	+ve
Lead acetate	-ve	+ve	+ve
Bromine water test	-ve	+ve	+ve
Gelatin solution	-ve	+ve	+ve
Acetic acid	-ve	+ve	+ve
Test for protein			
Biuret test	-ve	+ve	-ve
Xanthoproteic test	-ve	+ve	-ve
Lead acetate solution	-ve	+ve	-ve
Copper sulphate solution	-ve	+ve	-ve
Test for aminoacid	-ve	+ve	-ve
Nin hydrin test	-ve	+ve	-ve
T est for fats n oils			
Filter paper stain tests	+ve	+ve	-ve
Test for sterols			
Salkowaski test	+ve	-ve	-ve
Libermann buchard test	+ve	-ve	-ve
Test for volatile oil			
Filter paper stain tests	-ve	-ve	+ve
Test for reducing sugars	-ve	+ve	+ve
Fehling test	-ve	-ve	+ve
Test for alkaloid	-ve	-ve	+ve
Dragendroffs test	-ve	-ve	+ve
Hager tests	-ve	-ve	+ve

Conclusion

It was concluded from the current investigation of *Plumeria* rubra flowers that the pharmacognostic data will provide the standards for its identification and authentication. The other parameters which are useful in the establishment of its quality control parameters are ash value, extractive values, moisture content, swelling and foaming index, fluorescence analysis and Phytochemical parameters. The findings of the current research will help in the evaluation, identification, and authentication of the plant. And also will be useful in making a monograph of the plant. Further, it will act as a tool to detect adulterants and substituent and will help in maintaining the quality, reproducibility and efficacy of natural drugs. Ash values are used to determine quality and purity of crude drug. It indicates presence of various impurities like carbonate, oxalate and silicate. The water soluble ash is used to estimate the amount of inorganic compound present in drugs. The acid insoluble ash consist mainly silica and indicate contamination with earthy material. Moisture content of drugs should be at minimal level to discourage the growth of bacteria, yeast or fungi during storage. Estimation of extractive values determines the amount of the active constituents in a given amount of plant material when extracted with a particular solvent. The extractions of any crude drug with a particular solvent yield a solution containing different phytoconstituents. The compositions of these phytoconstituents depend upon the nature of the drug and the solvent used. It also gives an indication whether the crude drug is exhausted or not

Conflict of Interest statement

We declare that we have no conflict of interest.

Acknowledgements

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