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Pharmacognostical studies & phytochemical evaluation of the stem bark of *Caesalpinia pulcherrima* Swatz Obs

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Abstract

The main aim of present work is to investigate the pharmacognostic parameter, physico-chemical parameters, preliminary phytochemical screening of the stem bark of the plant *Caesalpinia pulcherrima* Swatz Obs. (Caesalpinaeae). The bark of the plant (*Caesalpinia pulcherrima*) was selected for the study. The results of Physico-chemical parameters such as Loss on drying, Ash values and Extractive values, Preliminary Phytochemical screening are summarized here. The present information on the Pharmacognostic evaluation of the plant drug *Caesalpinia pulcherrima* Swatz Obs. delivered the qualitative and quantitative parameters serve as a useful tool to the identity and to determine the quality and purity of the plant material.

Keywords: *Caesalpinia pulcherrima*; physico-chemical evaluation; phytochemical screening, pharmagnostic evaluation

Introduction

Caesalpinia pulcherrima Swatz Obs. syn. *Poinciana pulcherrima* (Family-Caesalpinaeae) is known as *Ratnagandhi* (Sanskrit), Peacock Flower (English), Kenjigaegidda (Kannada), Settimandaram (Malyalam), Gulutora (Hindi) and Mayirkonrai (Tamil) [1]. It is an exotic, hardy, shrub or a small tree, cultivated in gardens, throughout India. Leaves are pinnately compound 12-18 cm, leaflets 20-24 in number, sessile, close, membranous, very obtuse. Inflorescence is a raceme where petals are round, crisped, reddish yellow, with a very distinct claw. Stamens much exerted. Filaments bright red, 3-4 times the length of the corolla. Pod thin ligulate flat glabrous 6-8 seeded. The part used are Leaves, Stem bark and flowers [2].

C.pulcherrima used in the treatment of ulcers, fever, tumors, asthma and skin diseases. The leaves are laxative, the bark is highly astringent and widely used as an abortifacient and emmenagogue. The flowers are a remedy for intestinal worms, cough and catarrh [1]. In one of the studies, the bark extract showed 80-99.9% inhibition of potato virus [3].

In the present work, the Pharmagnostic evaluation and phytochemical investigation on the stem bark of *Caesalpinia pulcherrima* Swatz Obs. is done in order to know the identity and to determine the quality and purity.

Materials and Methods

Collection of sample

The fresh stem bark of *Caesalpinia pulcherrima* Swatz Obs. was collected from garden of SDM College of Ayurveda & Hospital, Hassan in the month of June 2019. Stem bark was removed, shade dried and powdered.

Place of Work

The pharmacognostical evaluation and Phytochemical screening was carried out in the Department of Dravyaguna, SDM College of Ayurveda, Hassan for the purpose of authentication.

Procedure

The obtained sample was observed macroscopically for its characteristic features and noted. Further Pharmacognostical evaluation including microscopic evaluation and extracts were carried out by free hand. Physico-chemical parameters of powdered drug such as ash value, acid insoluble ash, extractive value, foreign matter and loss on drying were performed. Chemical tests were done in preliminary phytochemical screening for various secondary metabolite such as Alkaloids, Flavonoids, Glycoside, Saponin, Tannins and Carbohydrate.

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Results and Discussion

Organoleptic evaluation

Organoleptic evaluation is primary evaluation for establishing identity and quality of crude drug. Therefore, an attempt was made to differentiate in the form of drug (Fresh and Dry). Organoleptic studies revealed that both have similarities in Taste, Shape, with some dissimilarities in odour and colour i.e Fresh drug had fresh groundnut smell and dry one had some characteristic odour. With reference to colour fresh drug was light green with inner surface being red and dry drug was grey with inner surface reddish brown. The organoleptic evaluation was carried out and results have been shown in table 1.

Physico-chemical evaluation

Helps to determine the quality and purity of the crude drug. Loss on drying helps to determine presence of moisture content in the drug. Foreign matter determines the presence of adulterated particles like sand, mud or other part of drug, as drug was self-collected there was less foreign matter. Ash value determines presence of phosphate, silicates of sodium, potassium, magnesium etc. Extractive values are useful for evaluation about the nature of the chemical constituents

present in the crude drug. The physic-chemical constants of the drug were carried out as per methods given in pharmacopeia and the results have been shown in the table 2.

Preliminary Phytochemical screening

Chemical tests are performed on the extracts obtained, using polar and non-polar solvents, for determination of organic constituents present. Screening was done using both alcohol and aqueous extract. Results showed presence of Alkaloids and tannins in both the extracts, presence of saponin in aqueous extract. Glycosides, Carbohydrates and steroid were absent. Preliminary phytochemical screening was carried per methods given in pharmacopeia and the results have been shown in the table no 3.

Microscopic and Powder microscopy evaluation

Microscopic evaluation helps to determine the identity of a crude drug. T.S of stem bark of *Caesalpinia pulcherrima* shows a layer of cork followed by phellogen, phelloderm, cortex, medullary rays, vascular bundles and fibres. Section was treated with different reagents to determine different cells.



Fig 1: Samples used for macroscopic



Fig 2: Microscopic description

Table 1: Organoleptic of *Caesalpinia pulcherrima* Swatz Obs.

| Organoleptic parameter | Observation | |
|------------------------|-------------------------------|------------------------------|
| | Fresh | Dry |
| Condition | | |
| Size Length Width | 3-5cm long 1.5cm wide | 2-4cm long 1cm wide |
| Shape | Cylindrical | Cylindrical Quill shaped |
| Surface | Smooth with warts (lenticels) | Rough with warts (lenticels) |
| Colour Outer Inner | Light green Red | Grey Reddish brown |
| Odour | Smell of fresh groundnut | Characteristic odour |
| Taste | Bitter, Sweet | Bitter |
| Fracture | Fibrous | Complete |

Table 2: Physico-chemical constants of *Caesalpinia pulcherrima* bark

| Physico-chemical parameters | Constants (%w/w) |
|-----------------------------|------------------|
| Loss on Drying | 8.1 |
| Foreign Matter | 0.54 |
| Total Ash | 5.88 |
| Acid Insoluble ash | 1.47 |
| Alcohol extract | 1.6 |
| Aqueous extract | 2.8 |

Table 3: Preliminary Phytochemical analysis

| Test for | Aqueous extract | Alcohol extract |
|---------------------|-----------------|-----------------|
| Alkaloids | | |
| Dragendroff's test | + | + |
| Mayer's test | | |
| Tannins | | |
| Bromine water test | + | + |
| Saponins | | |
| Foam test | + | - |
| Glycoside | - | - |
| Carbohydrate | | |
| Benedict's test | - | - |
| Steroid | | |
| Salkowski reaction | - | - |

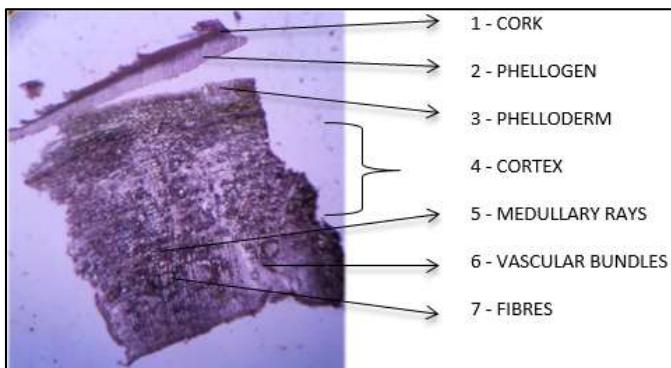
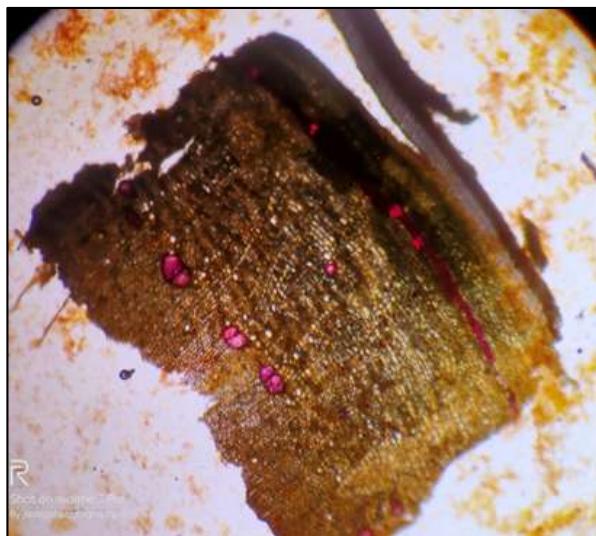
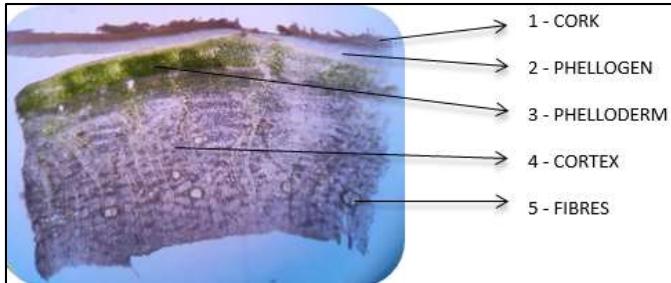
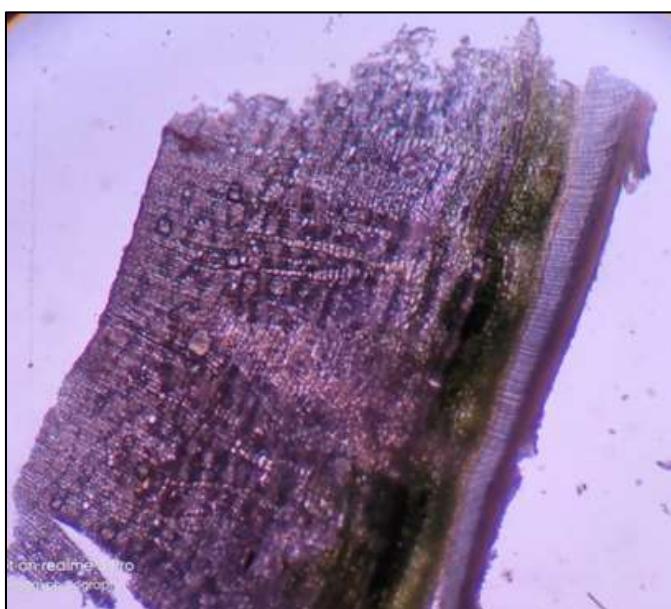
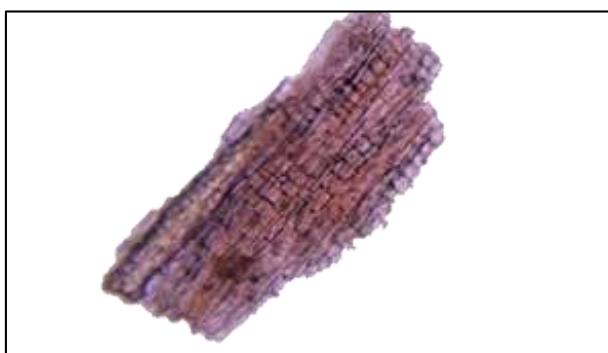
Microscopic Evaluation**Fig 3:** TS OF BARK**Fig 6:** Phloroglucinol + Con. HCl staining**Fig 4:** TS OF BARK**Powder microscopy****Fig 7:** Tangentially-longitudinally cut medullary rays**Fig 5:** Chloral Hydrate Staining**Fig 8:** Tangentially-longitudinally cut medullary rays



Fig 9: Medullary rays with fibers



Fig 10: Tracheids



Fig 11: Pitted parenchyma

Conclusion

Extra Pharmacopelial drugs are being explored for their medicinal properties owing to diverse flora of India as they may possess best therapeutic properties. The present study on pharmacognostical characters of stem bark of *Caesalpinia pulcherrima* will be useful to supplement information with regard to its identification and will be useful in establishing the standardization criteria.

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