

PHARMACOGNOSTICAL AND PHYSICO-CHEMICAL STANDARDIZATION OF LEAVES OF *CAESALPINIA PULCHERRIMA*

C. R. Pawar^{1*}, R. B. Kadtan¹, A. A. Gaikwad¹ and D. B. Kadtan²

¹S.N.D. College of Pharmacy, Babhulgaon, Yeola, Nasik (Dt.), Maharashtra, India.

²R.C. Patel institute of pharmacy, Shirpur, Dhule, Maharashtra, India.

*Corresponding Author: chaitalipawar.2006@rediffmail.com

ABSTRACT

Caesalpinia pulcherrima belonging to family Caesalpiniaceae is distributed throughout India. Commonly it is known as Peacock-flower. Plant shows diterpenoids, isovouacaperol, sitosterol and flavonoids. The plant is considered as emmenagogue, purgative and stimulant, abortifacient and also used in bronchitis, asthma and malarial fever, leaves used as antipyretic, antimicrobial. Flower also shows antioxidant and antiviral activity. The present study deals with the macroscopical and microscopical studies of *Caesalpinia pulcherrima* leaf. Macroscopically, the *Caesalpinia pulcherrima* is compound leaf, ovate shape, entire margin and glabrous surface, asymmetrical base, small petiole. The microscopic study showed presence of collenchyma, vascular bundle, spongy parenchyma, palisade cells, stomata. Some distinct characters were observed while studying the transverse sections. Physicochemical studies revealed total ash, acid insoluble ash, water insoluble ash, loss on drying, alcohol soluble extractive, water soluble extractive and preliminary phytochemical studies of the leaves were also carried out. The present study might be useful to supplement information in regard to its identification parameters.

Keywords: *Caesalpinia pulcherrima*, physico-chemical analysis, phytochemical study.

INTRODUCTION

Caesalpinia pulcherrima is also known as peacock flower¹ is the type of genus fabaceae sub family Caesalpiniaceae². It is an ever green shrub growing to 3 m tall. It is a striking ornamental plant, widely grown in tropical gardens. The leaves are bipinnate, 20-40 cm long, bearing 3-10 pairs of pinnae, each with 6-10 pairs of leaflets 15-25 mm long and 10-15 mm broad with oblong to ovate shape. In India, it is known by the names Radhachura in Bengal, Kenjige in Kannada, Settimandaram in Malayalam, Krishnachura in Manipuri, Sankasur in Marathi. Leaves contain gallic acid, gum, tannin, resin, benzoic acid and its salt³.⁴ Flavonoid as quercetin and

diterpenoids, isovouacaperol, sitosterol also present. *Caesalpinia pulcherrima* is used for a various purpose of herbal medicine. It is used as emmenagogue, purgative, stimulant, and abortifacient, also used in bronchitis, asthma, malarial fever, and used against kidney stone. The different parts of this herb have been used in common remedies for treatment of a number of disorders including pyrexia, menoxenia, wheezing⁵. It shows antiviral activity⁶. Leaves used as antipyretic, antimicrobial⁷, antibacterial⁸, antioxidant⁹. cytotoxic activity were attributed to total phenolic content of the wood. It is used for the treatment of inflammatory conditions in traditional medicine¹⁰, also shows

antitubercular activity¹¹. The Leaves shows Gastric antiulcer activity¹². Flowers for Analgesic and Anti-inflammatory activities¹³. Establishment of the pharmacognostic profile of leaves of *Caesalpinia pulcherrima* will assist in standardization which can guarantee quality, purity and identification of sample.

MATERIAL AND METHOD

The plant material of *Caesalpinia pulcherrima* (Caesalpinaceae) collected from garden of Government Hospital, Yeola, Nasik, Maharashtra, India. The plant was authenticated by Mr. P. G. Diwakar, Botanical Survey of India, Koregaon Road, Pune, India. Specimens (Voucher no. CRP-2). Pharmacognostical evaluation including histological tests, extracts and powder studies were carried out by free hand. Reagents like Sudan red 3, phloroglucinol, conc.HCL, Iodine solution were used for histological tests. Photographs were obtained by observing under Motic DMWB2-223 Digital Microscope (Motic Instruments Inc., Canada). Quantitative leaf microscopy to determine stomatal number, stomatal index and physico-chemical parameters of the powdered drug such as ash value, extractive value and loss on drying were performed. Examination of powder starch grain, calcium oxalate crystals, were carried out as per standard procedure¹⁵. Chemical tests were employed in preliminary phytochemical screening for various secondary metabolite such as Alkaloids, Flavonoids, Glycoside, Phenolic compound, saponin, sterols Tannins, Triterpene¹⁴.

Statistical Analysis

All values shown as mean \pm SEM. Statistical analysis was performed using one-way analysis of variance (ANOVA) followed by Dunnett's test $P < 0.05$ was considered statistically significant.

RESULT

'Morphological and Microscopical characters of leaves'

Caesalpinia pulcherrima is an ornamental plant found through out in India (Figure 1).

Morphologically leaves are bipinnate, 20-40 cm long, bearing 3-10 pairs of pinnae, each with 6-10 pairs of leaflets 15-25 mm long and 10-15 mm broad with oblong to ovate shape (Figure 2). Apiculate apex, entire margin, asymmetrical base, glabrous surface, upper epidermis dark green in color, lower epidermis

light green in color with characteristics odour and taste, reported in Table 1

Microscopically Transverse section of leaf consists of lamina and midrib region (Figure 3). Lamina exhibits upper and lower epidermis, epidermal cells are wavy walled. Epidermis covered with cuticle. Anamocytic stomata found on epidermis, mesophyll comprises of palisade and spongy parenchyma. Palisade cells are columnar one layered except only small region on midrib. Midrib exhibits arc shaped vascular bundle enclosed by pericyclic fibre. Vascular bundle consist of xylem and phloem (Figure 4). Xylem consisting lignified fibre and covered by non lignified fibre i.e. phloem collenchymatous cells are multilayered thick walled parenchymatous cell present above the lower epidermis in midrib portion. calcium oxalate crystals present in non lignified fibre.

Table 1: Morphology of *Caesalpinia pulcherrima* leaves

Morphological parameter	Observation
Condition	Fresh
Size: length	15-25 mm
Width	10-15 mm
Shape	Ovate
Apex	Apiculate
Margin	Entire
Base	Asymmetrical
Petiole	Small
Surface	Glabrous
Color: outer	Dark green in color
Inner	Light green in color
Odour	characteristics
Taste	characteristics



Fig. 1: *Caesalpinia Pulcherrima* Plant

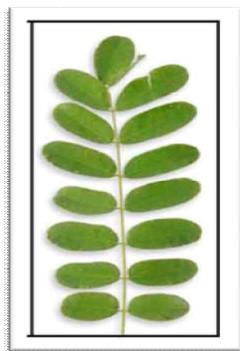


Fig. 2: Pinnae of *Caesalpinia pulcherrima*



Fig. 5: Stomatal number of *Caesalpinia pulcherrima* leaves present on epidermal surface

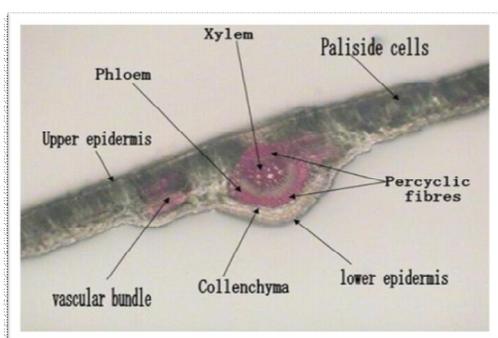


Fig. 3: Transverse section of leaf of *Caesalpinia pulcherrima*



Fig. 4: Transverse section of leaf of *Caesalpinia pulcherrima* showing xylem and phloem

Histological tests

Sections were treated with different reagents and result reported in Table 2

Powder characters

Powder of *caesalpinia pulcherrima* leaves having green colour that shows different characters as xylem fibre, stomatas, epidermal cells. Powder drug treated with different chemical shows the distinguishing characters as described in Table 2

Quantitative leaf microscopy

Fragment of lamina showing stomatas and venation. Stomatal index was found for upper and lower epidermis is 20, Stomatal number upper epidermis 28 and Stomatal number lower epidermis 31. Described in Figure 5.

Physio-chemical study

Results of physio-chemical study are reported in Table 3.

Preliminary phytochemical Analysis

Preliminary phytochemical analysis revealed presence of alkaloids, glycoside, Phenolic compound, flavonoids, sterols, saponin, tannins, triterpene. Table 4.

Table 2: Histological test of *Caesalpinia pulcherrima* leaves

Drug	Reagent	Test for	Reaction	Result
Transverse Section	Phloroglucinol+ conc.HCL(1:1)	Lignine	Pink color	+
Transverse Section	Iodine solution	Starch	No blue color	-
Transverse Section	Sudan red III	Cuticle	Red	+
Transverse Section	Pizzoloto test	Calcium oxalate	Crystals Black against red	+

+ = Present; - = absent

Table 3: Physico-chemical constants of *Caesalpinia pulcherrima* leaves

Parameter	Physio-chemical constant (% w/w)
Total ash	5 ± 0.288
Acid insoluble ash	1.375 ± 0.125
Water insoluble ash	1.25 ± 0.25
Loss on drying	8.33 ± 0.88
Alcohol soluble extractive	8.2
Water soluble extractive	14.4
Pet.ether soluble extractive	1.4
Chloroform soluble extractive	5
Benzene soluble extractive	5
Aceton soluble extractive	6

Each value is presented as Mean ± SEM (P<0.05) one way ANOVA followed by Dunnett's tes

Table 4: Preliminary phytochemical Analysis of *Caesalpinia pulcherrima* leaves

Test for	Acetone extract	Aqueous extract	Ethanol extract	Benzene extract	Chloroform extract	Pet. ether extract
Alkaloids	-	-	-	-	-	-
Flavonoids	+	+	+	-	-	+
Glycoside	+	-	-	-	-	+
Phenolic compound	+	-	-	-	-	-
Saponin	-	+	+	-	-	-
Sterols	+	+	-	-	+	+
Tannins	+	+	+	-	-	-
Triterpene	+	+	-	-	+	+

+ = Present; - = absent

CONCLUSION

The present study on pharmacognostical characters of *Caesalpinia pulcherrima* may be useful to supplement information with regard to its identification and will be helpful in establishing the standardization criteria.

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