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Phytopharmacognostic Study of Leaves of *Erythrina indica*

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ABSTRACT

E. variegata also called *Erythrina indica* is a thorny deciduous tree growing 60 feet tall. A wide range of chemical compounds have been isolated from it, mainly alkaloids, flavonoids and triterpenoids. It has also been investigated for various pharmacological actions. The present work includes an exploration of morphology, qualitative and quantitative microscopy and phytochemical screening of *E. variegata*. The important diagnostic features of the powder include paracytic stomata, spiral xylem vessels, calcium oxalate crystal prisms and lignified pericyclic fibres. Phytochemical analysis showed the presence of important classes of phytoconstituents like alkaloid, flavonoids, sterols, triterpenoids and carbohydrates. Such a detailed would provide a direction for further research, which would include standardization of the leaf material used in formulations and isolation of phytoconstituents.

Keywords: Coral tree, *Erythrina indica*, *Erythrina variegata*, Paribhadra, Pharmacognosy

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INTRODUCTION

Erythrina indica syn. *E. variegata* (Family-Fabaceae) is known by many vernacular names such as Paribhadra (Sanskrit), Coral tree (English), Dadap (Hindi) and Panervo (Gujarati). The genus *Erythrina* comprises of about 110 species of trees and shrubs. It is typically found on sandy soil in littoral forest, and sometimes in coastal forest up to 250m (800ft) in elevation. It is a fast-growing, 50-60 feet tall and wide deciduous tree with green and yellow-variegated, 6-inch-long leaves [1]. Different parts of the plant have been used as traditional medicine in nervine sedation, ophthalmia, asthma, epilepsy, and also as an antiseptic. Its leaves have a cathartic, diuretic, antiseptic and anti-inflammatory action. The alkaloids extracted from the leaves of *E. variegata* are reported to have anti-inflammatory and analgesic activity [2]. Isoflavonoids isolated from *E. Indica* having antibacterial and anthelmintic activity. *E. Indica* shows several other characteristic pharmacological effects like neuromuscular blocking, smooth muscle relaxant, CNS depressant, analgesic and hydrocholerectic action, which are consistent with the reported uses of the plant extracts in the indigenous system of medicine. It has shown potential effects in convulsion, fever, inflammation, bacterial infection, insomnia, helminthiasis, cough, cuts and wounds [3-5].

MATERIALS AND METHODS

Collection and herbarium preparation

Leaves of *E. Indica* were collected from the herbal garden of RK College of Pharmacy, Rajkot, Gujarat. Herbariums and voucher sample were prepared and deposited in Department of Pharmacognosy, RK College of Pharmacy (Voucher no. RKCP/COG/14/2011).

Pharmacognostical studies

Morphology of fresh leaves of *E.indica* was studied. Photomicrography of stained and unstained transverse sections of fresh leaves was performed. Leaf constants were established using camera lucida. The leaves were dried under shade, powdered to 60#, stored in airtight containers and used for powder study and quantitative microscopy (Table 1) [6].

Table 1: Quantitative microscopy

Leaf constant	Mean value \pm SD
Stomatal Number	
Upper surface	0
Lower surface	18 \pm 1
Stomatal Index	
Upper surface	0
Lower surface	33.3 \pm 0.5
Vein islet number	9 \pm 1
Vein termination number	6 \pm 1

Number of observations = 5, SD = Standard Deviation

Phytochemical study

The powder was extracted with 50ml each of methanol and water for 30 minutes at 50°C. Various phytoconstituents present in the leaves and stem were detected by their respective chemical test using the appropriate extracts (Table 2) [7-12].

Table 2: Phytochemical screening

Phytoconstituents	Test	Result
Alkaloids	Dragendorff's test	+ve
	Hager's test	+ve
	Wagner's test	+ve
	Mayer's test	+ve
Flavonoids	Shinoda test	+ve
	Lead acetate test	+ve
Phenolics	Ferric chloride test	+ve
	Folinciocalteu test	+ve
Sterols and triterpenoids	Salkowski test	+ve
	Libermann-Buchardt test	+ve
Cardiac glycosides	Legal test	-ve
	Baljet test	-ve
	Keller Killiani test	-ve
Saponin glycosides	Foam test	-ve
	Lead acetate test	-ve
Anthraquinone glycosides	Borntrager test	-ve
	Modified Borntrager test	-ve
Carbohydrates	Fehling's test	+ve
	Molisch test	+ve

RESULTS AND DISCUSSION

Macroscopy

Leaves are compound, trifoliate, alternate; rachis is mostly 10-20cm long; shape is ovate to rhomboid, 8-18cm long; lateral ones are smaller than the terminal one, petiolules 6-13 mm long, with vegetative parts finely pubescent. Apex is acute to acuminate, margin entire, surface glabrous, venation reticulate, upper surface is dark green and lower surface is light green in color (Figure 1).



Figure 1. Leaf of *Erythrina indica*

Microscopy

Epidermal cells are thick walled, polygonal and stomata are paracytic (Figure 2). Lamina of transverse section shows an upper epidermis covered by thin cuticle. Underlying the upper epidermis are single-layered, compact, radially elongated palisade parenchyma cells followed by spongy mesophyll composed of 2-3 layers of loosely arranged parenchymatous cells. Midrib consists of well-developed collenchyma beneath the epidermis. Stele is composed of bicollateral vascular bundles, lignified pericyclic fibres and perimedullary phloem above the xylem. Ground tissue consists of loosely arranged polygonal parenchymatous cells having prism crystals of calcium oxalate. Trichomes are absent (Figure 3, 4, 5).

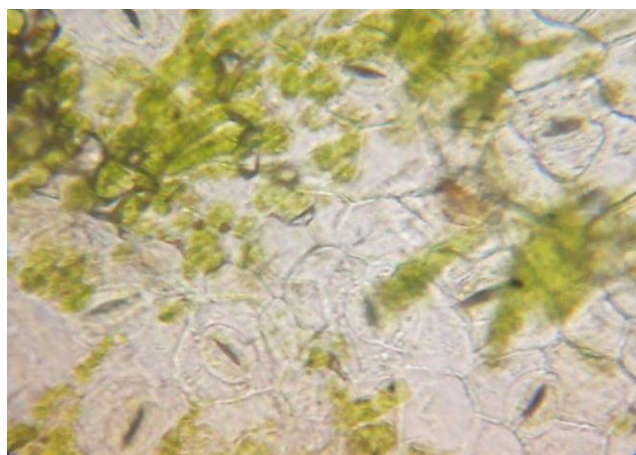


Figure 2. Surface preparation (100X)

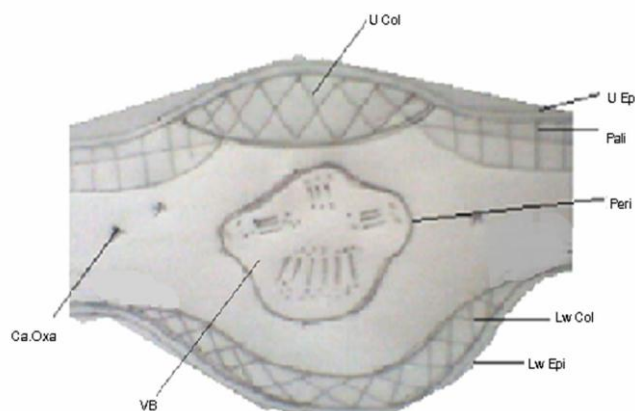


Figure 3. Schematic diagram of T. S. of leaf of *E. indica*

U Epi: Upper Epidermis; Lw Epi: Lower Epidermis; U Col: Upper Collenchyma; Lw Col: Lower Collenchyma; Pali: Palisade layer; Peri: Pericycle; VB: Vascular Bundles

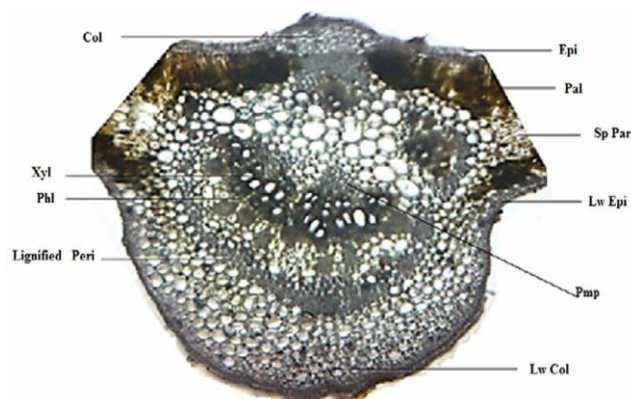


Figure 4. Detailed T.S. of leaf of *E. indica* (100X)

Epi: Upper Epidermis; Lw Epi: Lower Epidermis; Col: Upper Collenchyma; Lw Col: Lower Collenchyma; Sp Par: Spongy Parenchyma; Pali: Palisade layer; Lignified Peri: Lignified Pericycle; Xyl: Xylem; Phl: Phloem; Pmp: Perimedullary phloem

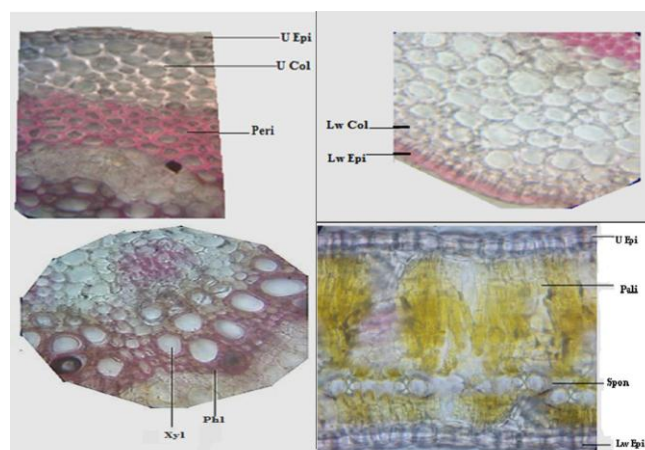


Figure 5. Enlarged portions of T. S. of *Erythrina indica* (400X)

Epi: Upper Epidermis; Lw Epi: Lower Epidermis; Col: Upper Collenchyma; Lw Col: Lower Collenchyma; Spon: Spongy Parenchyma; Pali: Palisade layer; Lignified Peri: Lignified Pericycle; Xyl: Xylem; Phl: Phloem; Pmp: Perimedullary phloem

Powder characteristics

The powdered drug is dark green with no distinct odor or taste. The important diagnostic features of the powder include parts of epidermis in surface view showing thick walled epidermal

cells and paracytic stomata, spiral xylem vessels, prism crystals of calcium oxalate and lignified pericyclic fibres (Figure 6).

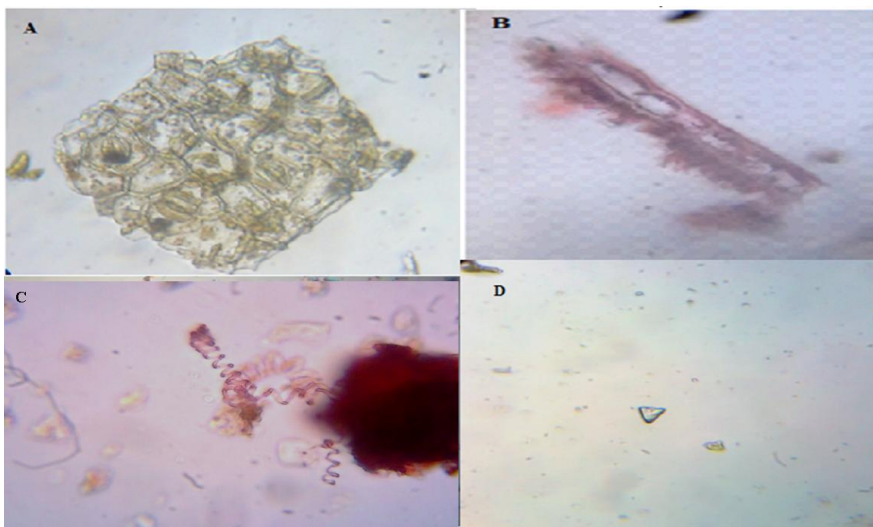


Figure 6. Powder study (400X)

A: Paracytic stomata; B: Pericyclic fibre; C: Spiral xylem vessel; D: Calcium oxalate prism crystal)

CONCLUSION

The present work deals with the microscopical and phytochemical evaluation of the leaves of *Erythrina indica*. Diagnostic characters of powder include paracytic stomata, prism crystals, lignified pericyclic fibres and spiral xylem vessels. Various leaf constants were established which can be important in detecting adulteration of the crude drug. Phytochemical analysis showed the presence of important classes of phytoconstituents like alkaloids, flavonoids, sterols, triterpenoids and carbohydrates. This indicates that the leaves can be useful for treating different diseases because the therapeutic activity of a plant is due to the presence of particular class of compounds. The present work can serve as a useful gauge in establishment of quality parameters of formulations of the leaf material of *Erythrina indica* and can also serve as a guide for further extraction of phytoconstituents from it.

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