



Pharmacognostic Study of *Caesalpinia bonduc* (L.)Roxb

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ABSTRACT

Caesalpinia bonduc (L.) Roxb. is branched scandent shrub. Leaves and Seed oil of this plant is used by Andh, Gond, Naikede, Pradhan and Kolam tribes of Mahur range forest of Nanded district to treat rheumatism. Seed oil is applied on wound for quick healing and oil is dropped in ear for tympanitis. Seed is used to treat stomach pain, dysentery and diarrhoea and its powder is used against indigestion and to expel intestinal worms and seed paste is applied on swelling. A Pharmacognostic study of seed drug is carried out for evaluation of drug and to detect the adulteration. It includes dermal characters like stomata, trichomes and anatomical features etc. The plant was analyzed for its preliminary screening of phytochemicals. The result reveals that the presence of bioactive constituents comprising flavonoids, reducing sugar, saponins and anthraquinones. The antimicrobial assay also performed to prove the proclaimed ethnobotanical claims. The present study is helpful to standardize or evaluation of drugs.

Keywords: *Caesalpinia bonduc*; Pharmacognosy; Mahur forest.

INTRODUCTION

Caesalpinia bonduc is much branched scandent shrub. Leaves are bipinnately compound. Flowers are in dense, long peduncle terminal and supra axillary racemes. Pod oblong- ellipsoid armed with prickles (Fig.1). Seed 1-3 ovoid soft or polished ash colour. Flowering occurs during August and January. Seed and leaves are used in Ayurvedic medicine. Plants are distributed in all parts of Marathwada and commonly occur in hedges of the fields. *Caesalpinia bonduc* is used in folk medicine by the rustics and tribal people of Mahur range forest for the treatment rheumatism, tympanitis, stomach pain, dysentery, diarrhea, to expel intestinal worms etc. The seeds of the plant are known as fever nut, bonduc nut and physic nut and the medicinal properties were mainly localized to the seed coat or seed kernel (Gaur et al., 2008).

MATERIAL AND METHODS

Plant material

The seeds of *Caesalpinia bonduc* were collected from Mahur range forest of Nanded district, Maharashtra. The collected plant material was taxonomically identified

by using standard floras Naik (1979), Naik et al., 1998; Chetty et al. 2008; Yadav and Sirdesai (2002). The voucher specimen of plant was preserved in Department of Botany, Dnyanopasak College, Parbhani. The powder of seed is extracted with different organic solvents. The fresh leaves and stem were used for the study of macroscopic and microscopic characters.



Figure 1: Morphology of *C. bonduc*

Preliminary phytochemical Screening

The seed extracts of *C. bonduc* in different solvents were undertaken for the analysis secondary phytoconstituents like flavonoids, reducing sugar, saponins and anthraquinones (Harborne, 1984).

Preparation of extract

Seed powder was subjected to soxhlet extraction with petroleum ether (60-80°C), solvents (Daniel, 1991). The extracted solvent is evaporated to make the final vol-

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Email: drdattadhale@gmail.com
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Received on: 29-03-2017
Revised on: 11-04-2017
Accepted on: 17-04-2017

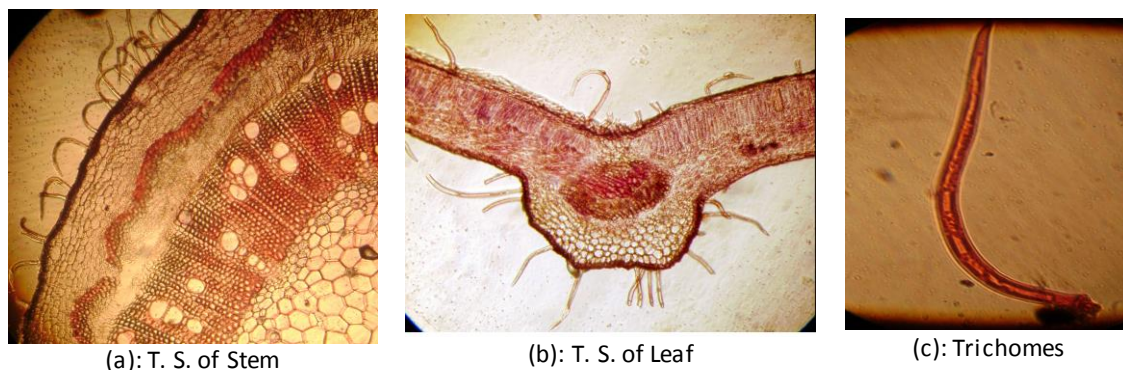


Figure 2: Anatomy of *Caesalpinia bonduc*

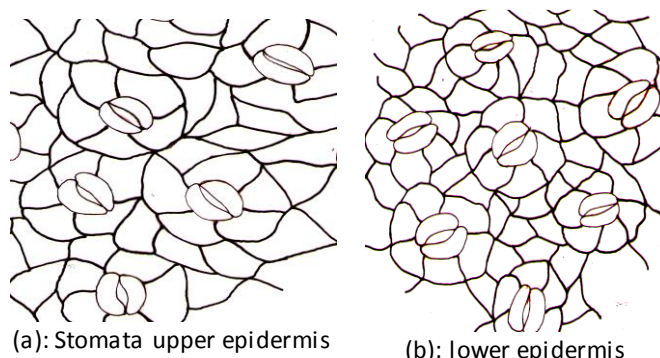


Figure 3: Epidermal Features of leaf

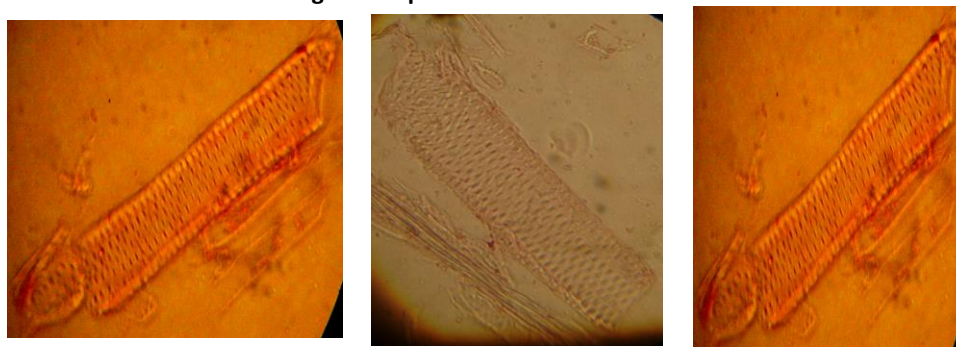


Figure 4: Stem Vessels

Table 1: Preliminary phytochemical screening of seed powder

Sl. No	Phytochemical	Test
1	Alkaloid	-
2	Glycoside	-
3	Flavonoids	+
4	Tannins	-
5	Reducing sugar	+
6	Phlobatannins	-
7	Saponins	+
8	Terpenoids	-
9	Anthraquinones	+
10	Cardiac glycosides	-

ume one fourth of its original volume. The extract is stored at 4⁰c in airtight bottles for further study.

Pharmacognostic studies

Macroscopic study

Morphological studies were done using simple

microscope. The shape, apex, base, margin, taste and odour of seed powder were observed.

Microscopic studies

The free hand transactions of leaves and stem were taken and stained by using double stained differential

Table 2: Preliminary test

Sl.No.	Test	Observation	Inference
1	Colour	White	Seed of <i>C. bonduc</i>
2	Odour	Characteristics	Aromatic crude drug
3	Taste	Mucilagenous	Mucilagenous drug

Table 3: Fluorescence analysis of the powdered seed of *C. bonduc*

Sl. No	Reagent	Observation	Characteristic
1	Powder + Phloroglucinol + conc. HCl	Pink colour	Lignified reticulate parenchyma of meso-carp
2	Powder + Ruthenium red	Red colour	Mucilage cell
3	Powder + Sudan red III	Red colour	Oil globules in the cell of endosperms
4	Powder + Acetic acid	Insoluble	Calcium oxalate crystals
5	Powder + Dil. HCl	Soluble	Calcium oxalate crystals
6	Powder + Conc. H ₂ SO ₄	Pink colour	Stone cell are absent
7	Powder + Dil. Iodine solution	No blue colour	Starch is absent
8	Powder + Dil. Iodine solution + Conc. H ₂ SO ₄	Blue colour	Hemicellulose in endospermic wall

staining technique and mounted in DPX (Johanson, 1940). The cellular and anatomical illustration was

prepared by using camera lucida and some photographs were taken with the help of digital camera.

The leaf is peeled off for the study of stomata and the trichomes of upper and lower epidermis. For the study of vessels the stem is macerated by using Jeffery's fluid and stained with aqueous 1% saffranin and mounted in glycerine and made semi-permanent by ringing with DPX mountant.

The seed powder was treated with phloroglucinol and HCl for the detection of lignin. Glycerin and iodine solution were used to determine calcium oxalate crystal and starch grains respectively. As a part of quantitative microscopy, stomatal number, stomatal index, vein islet number and vein termination number were determined by using fresh leaves of the plant (Kokate, 1997).

OBSERVATIONS

T. S. of Stem

The transverse section of the stem is wavy in outline. Epidermis is single layered composed of compactly arranged barrel shaped parenchyma cells, which are highly cuticularised, epidermis consists of uniseriate hairs. Beneath the epidermis collenchymatous hypodermis is followed by many layered loosely arranged parenchymatous cortex, inner to cortex many conjoint, collateral open vascular bundles are present in a ring. Phloem is facing toward periphery and xylem is endarch and separated by medullary rays which are radially elongated compactly arranged parenchyma cells (Fig.2:A).

T. S. of Leaf

Leaf anatomy reveals that the upper and lower epidermis composed of rectangular compactly arranged cell and is covered with thick cuticle with hairy trichomes on both the surfaces, hairs are seen on lower epidermis. The mesophyll is differentiated into palisade tissue and spongy parenchyma. Palisade tissue composed of two layers of closely arranged columnar cells present just below the upper epidermis. Inner to the palisade tissue, are loosely arranged parenchymatous cells are present. Vascular bundle is conjoint, collateral and closed. Xylem is present towards the upper epidermis and the phloem toward the lower epidermis (Fig.2:B).

Stomata

The leaf is dorsiventral and amphistomatic. The stomata on the both surfaces are restricted to the intercostal region. The stomatodes of both the surfaces are anomocytic, the guard cells are surrounded by five to six subsidiary cells which are morphologically correlated with epidermal cells (Fig. 3: A and B).

Trichome

The trichomes are present on both the adaxial and abaxial leaf surfaces. The trichomes of upper surface are unicellular with cytoplasmic content. The foot is embedded into epidermal cells; the tip of the trichome is remarkably curved. The trichome of lower surfaces are multicellular with cytoplasmic content, foot is embedded into the epidermal cell the body is remarkably curved which is 3 to 4 celled (Fig. 2:C).

Vessels

Vessels are with spiral to scalariform thickenings one end wall plate is oblique with simple perforation plate

and other end wall is transverse with simple perforation plate the length is 350 μm and diameter is 80 μm (Fig.4 A, B and C).

Phytochemical constituents

The preliminary phytochemical analysis of seed powder reveals the presence of flavonoids, reducing sugar, saponins and anthraquinones. The terpenoides, cardiac glycosides, alkaloids, glycosides, tannins and phlobatannins were not detected (Table. 1)

Powder analysis

The powder was characterized by its morphological features like yellowish white colour; presence of specific odour and bitter taste. Microscopic study of powder reveals the presence of yellow-pigmented endodermal layer, lignified and hemicellulosic cells with oil globules (Table. 2 and 3).

DISCUSSION AND CONCLUSION

The present study reveals that the seed powder extracts of *C. bonduc* contains flavonoids, reducing sugars, saponins, and anthraquinones phytochemicals. Earlier it was noticed that the ethanolic extract of seed of *C. bonduc* has significant hypoglycemic activity in both the normal and alloxan induced diabetic mice (Aswar et al., 2009).

The *C. bonduc* have unicellular trichome on upper epidermis, multicellular on lower epidermis and anomocytic stomata, these are useful in detection of adulteration of drugs. The present study enumerates the ethnomedicinal knowledge and its formulation for treating above said diseases. Further pharmacological studies are required to validate the utility which will be helpful in the development of new anti-microbial drug.

ACKNOWLEDGMENTS

Authors are thankful to Dr. Mrs. Sandhyata Dudhgaonkar, Principal, Dnyanopasak College, Parbhani for providing necessary facilities and encouragement. The authors are thankful to Dr. V.K. Kothekar former Principal and Dr. S.S. Kulkarni, Principal, Nutan Mahavidyalaya, Sailu for their constant inspiration.

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