



PHARMACOBOTANICAL STUDY OF *CAESALPINIA BONDUCELLA*

**VIJAYA LAKSHMI S^{1*}, SWAPNIKA Y^{1*}, PUJITHA Y^{1*}, VENNELA Y^{1*}, KHAGGA
S² AND NADENDLA R³**

1: UG Scholar, Chalapathi Institute of Pharmaceutical Sciences

2: Assistant Professor, Department of Pharmaceutical Analysis, Chalapathi Institute of
Pharmaceutical Sciences

3: Principal, Chalapathi Institute of Pharmaceutical Sciences

***Corresponding Author: Vijaya Lakshmi S: E Mail: vijisravva24@gmail.com; Tel:
+918688057728**

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ABSTRACT

Caesalpinia bonducella was found to be equipped with enormous beneficial effects on human biological system. It is found to be effective in treatment of PCOS and an efficient antiseptic, antibacterial, anti inflammatory, antidiuretic, anthelmintic, antipyretic, anticonvulsant, antidiarrhoeal, antiviral, antiasthmatic, anti-anaphylactic, antiamebic and antiestrogenic. It's scope in treating different ailments is immense. The pharmacognostic, phytochemical parameters and Quality parameters like microscopic and macroscopic studies were performed following the phytochemical tests carried out with ethanolic extract which revealed the presence of many chemical constituents namely flavonoids, saponins, alkaloids, steroids, resins. It is found to be having an extensive scope of research for development of effective formulations devoid of side effects due to chronic therapy, since the disorders like PCOS needs chronic use of medication resulting many unwanted side effects.

Key words: *caesalpinia bonducella*, anti inflammatory, nicker seed, *caesalpinia bonduc*,
bois, kalarcik

INTRODUCTION

Caesalpinia bonducella is a prickly shrub with Synonyms like *Caesalpinia bonduc*, *caesalpinia crista*, *Guilandina bonduc* belonging to the family -Caesalpinaceae

which is most commonly found in tropical regions of India, Sri Lanka and Andaman and Nicobar Islands thus widely distributed all over the world [1]. The term *Bonducella* which is the name of dominant species is derived from an Arabic word *Bonducea* signifies it as a little ball which denotes the globular shape of the seed [2]. *Caesalpinia bonducella* (Karanjwa) is extensively used for its medicinal properties [3-5]. It is an irregular thorny shrub consisting of large bipinnate leaves and yellowish flowers. Fruits are termed as inflated pods bearing 1–2 seeds [6]. Its leaves are conventionally being used in the treatment of topical inflammation and are found to possess antidiuretic, anthelmintic, antipyretic, antibacterial, anticonvulsant, antidiarrhoeal, antiviral, antiasthmatic, anti-anaphylactic, antiamebic and antiestrogenic [7]. The plant is rich in many therapeutically active constituents like flavonoids, carotenoids, glycosides, steroids and phenols [8].

MATERIALS AND METHODS

Attaining of Plant Materials: Seeds of *caesalpinia bonducella* were collected from fields in vinukonda town, Guntur district. They were cleaned from extraneous matter and dried under shade in room temperature. The other plant parts like stems, leaves, roots and branches are collected and dried after proper garbling. The identification of plant was done by Mrs. Suguna Kumari, A Botanist from BHHS in Guntur. The plant

specimen consisting of all plant parts is submitted in the form of herbarium. The authentication was processed by comparing its morphological and microscopical parameters with the standard reference parameters. The sample voucher specimen is kept for future use.

Aeration and Pulverisation of Plant:

Seeds were washed under running tap water then dried. Later seeds were isolated from their kernels by using certain pulverizing techniques like grind stone and other homogenization techniques. Then the seed powder was sieved for fineness. Coarse powder had been used for the extraction process.

Leaves are shade dried and properly processed to ensure that it's barren of impurities, adulterants and extraneous matter.

Pharmacognostic Studies:

Organoleptic evaluation of various physical properties of plant material were studied as follows:

Characteristics of seed:

Colour: grayish green

Odour: characteristic

Shape: ovoid

Taste: rancorous

Size: 1.3 cm

Characteristics of leaf:

Colour: green

Taste: rancorous

Texture: burnished

Size: 5 -7cms

Type: bipinnately Compound

Characteristics of stem:

Colour: brown

Size: 1.8 – 2.0 cm

Type: Hardy and woody characteristics of root:

Colour: brown

Type: deep and tap roots

MACROSCOPIC EVALUATION:

Various macroscopic characters of *caesalpinia bonducella* seeds were studied and recorded.

MICROSCOPIC EVALUATION:

Transverse section of caesalpinia leaf was examined under the microscope under the magnification (10x and 45x). By equating the standard techniques reagents like phloroglucinol, chloralhydrate, Hcl, glycerine water were utilised.

PRELIMINARY PHYTOCHEMICAL SCREENING:

Caesalpinia bonducella seeds were processed, shade dried and then pulverized. The seed powder is passed on to the sieve (120mesh) and subjected for separation of fines then the coarse powder is segregated. The coarse powder (25g) was then extracted with 90% ethanol (400ml) in soxhlet apparatus. The ethanolic extract was further processed for detection of various chemical constituents qualitatively.

Phytochemical screening:

Test for alkaloids:

Mayer's test: To the small amount of sample, add Mayer's reagent (potassium mercuric iodide solution)

Wagner's test: to the small amount of sample, add wagner's reagent (iodine potassium iodide solution)

Hager's test: to the small amount of sample, add hager's reagent (saturated solution of picric acid)

1. Test for glycosides:

Saponin glycosides:

- **Foam Test:** the powdered drug is shaken well with water, foam is formed.
- To the powder, add 80% H₂SO₄.

2. Test for tannins:

Vanillin hydrochloric acid test: to the small amount of sample, add vanillin hydrochloric acid reagent.

3. Test for resins:

To the extract, add 5ml of distilled water, turbidity is observed.

4. Test for flavonoids:

- To the sample, add lead acetate solution
- Add increasing amount of NaOH to the residue.

PHYTOCHEMICAL SCREENING:

Thin layer chromatography (TLC):

The TLC profile of the ethanolic extract of *caesalpinia bonduc* seeds confirmed the presence of 5 compounds and the R_f values obtained were 0.80, 0.43, 0.51, 0.84, 0.55

on derivatising with certain visualizing agents. The following visualizing agents were:

1. Dragendroffs reagent
2. Anisaldehyde sulphuric acid
3. Sodium nitroprusside (5%)
4. Vanillin sulphuric acid

It was observed in UV chamber at wavelengths 254nm and 365nm.

RESULTS AND DISCUSSION

Pharmacognostic characteristics:

Macroscopy:

The shape of caesalpinia bonducella is round and smooth. It has hilum and micropyle. Hilum is embraced by a dark area and a contains a funicle. Micropyle lies close to darker region. It contains a grayish seed coat (Figure 1).

Powder microscopy:

Powder microscopy of *c.bonducella* contains columnar sclerides which are thin, elongated cells (Figure 2).

Microscopy of stem:

Transverse section of stem shows 1-2 celled uniseriate trichomes and 1-1.5 cm

epidermis. 2-5 layers of thick parenchymatous cells are present in cortex. Xylem contains tracheids, vessels fibres and phloem contains fibres, sieve elements (Figure 3).

Microscopy of leaf:

Transverse section of leaf shows single layered epidermis which is covered with cuticle. It contains 1-3 celled trichomes, thin walled parenchymatous cells. Presence of vascular bundles shows secretory cavities in phloem (Figure 4).

Chemical tests for ethanolic extraction of *C.bonduc*

Chemical tests performed for ethanolic extraction have been shown in Figure 5, Table 1.

Thin layer chromatography

TLC plates was observed in UV at wavelength 254nm and 365nm shows the Rf values at 0.80, 0.43, 0.51, 0.84, 0.55 (Figure 6, Table 2).



Figure 1: morphology of *C. bonducella* seed

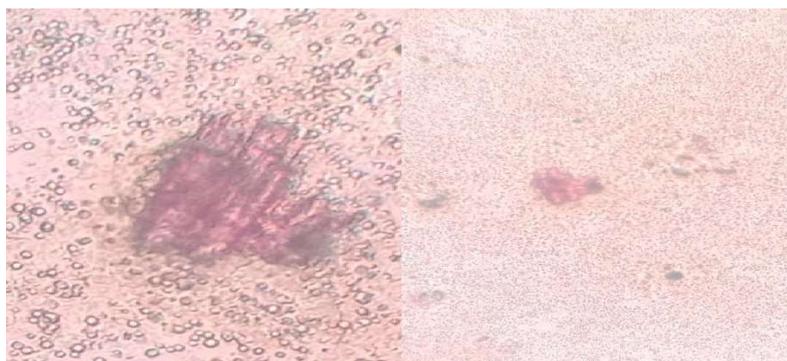


Figure 2: powder microscopy of columnar sclerides of *C. bonducella* seed

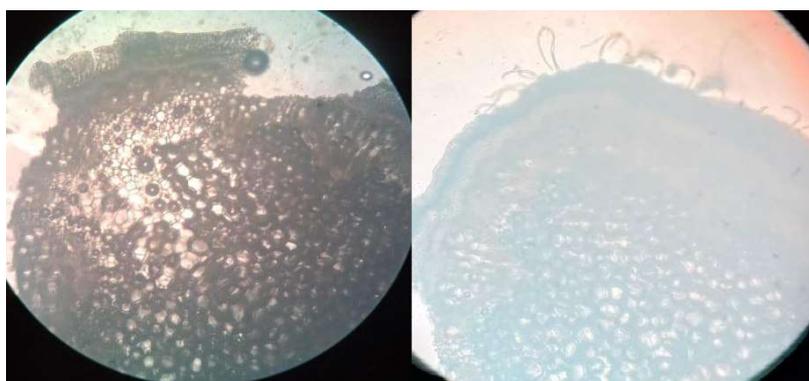


Figure 3: Transverse section of *C. bonducella* stem



Figure 4: transverse section of *C. bonducella* leaf



Figure 5: Chemical tests for *C. bonduc* seed extraction

Table 1: Tests for secondary metabolites

S. No.	Test	Observation	Inference
1	Test for Alkaloids		
	1. Mayer's Test	Cream colour precipitate reddish	Presence of alkaloids
	2. Wagner's Test	Brown colour precipitate	Presence of alkaloids
	3. Hagner's Test	Yellow colour precipitate	Presence of alkaloids
2	Test for Saponin Glycosides		
	1. Foam test	Foam is formed	Presence of saponin
	2. To the powder, add 80% H ₂ SO ₄	Shows deep yellow colour	Presence of saponin
3	Test for Tannins		
	Vanillin hydrochloric acid test	Pink or red colour is formed due to formation of phloroglucinol	Presence of tannins
4	Test for Resins		
	To the extract, add 5ml distilled water	Turbidity is formed	Presence of resins
5	Test for Flavanoids		
	1. To the sample, add lead acetate solution	Yellow colour precipitate	Presence of flavonoids
	2. Add increasing amount of NaOH to the residue	Shows yellow coloration which decolorizes after addition of acid	Presence of flavonoids
6	Powder+ acetic acid	insoluble	
7	Powder+ conc. H ₂ SO ₄	pink	
8	Powder+ dil. HCl	Soluble	
9	Powder+ dil. iodine solution	No blue colour	
10	Powder+ dil iodine solution+ conc. H ₂ SO ₄	Blue colour	
11	Powder+ water	Precipitate	
12	Powder+ conc. HCl	Soluble	
13	powder+5% NaOH	Turbidity	

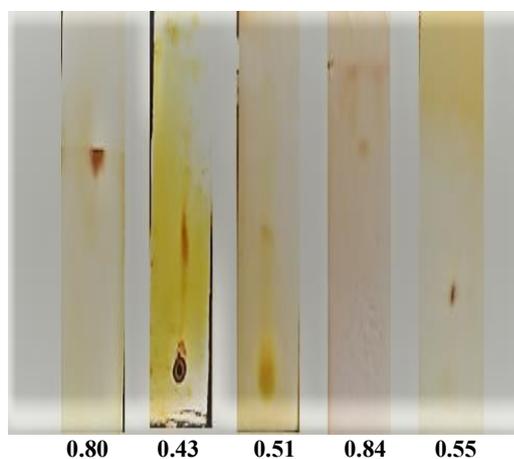


Figure 6: Thin layer chromatography

Table 2: Rf values for extract

Mobile phase	Spraying reagent	Colour of spot	Rf values for extract
Methanol: glacial acetic acid: benzene(60:20:20)	Anisaldehyde -sulphuric acid	Violet	0.80
Methanol: chloroform: Water (35:65:10)	Sodium nitroprusside (5%)	Pink	0.84
Ethylacetate: toluene (1:9)	Vanillin-sulphuric acid	Violet	0.55
Ethyl acetate: toluene: di ethyl amine	Dragendroff reagent	Brownish orange	0.43
Ethylacetate: glacial acetic acid: formic acid: water (100:11:11:26)	Anisaldehyde- sulphuric acid	Green	0.51

CONCLUSION

There is an extensive scope of research on this plant due to enormous effects and benefits, it is found to be effective in treating chronic disorders like PCOS as per detailed literature review by considering alternative system of medicine, it is best to aid in therapy for many ailments due to many effects. our study includes screening of phytochemicals, purity testing of drug, microscopic and macroscopic evaluation. This pharmacobotanical study helps to identify adulteration and provides good scope for research on this plant and bring out as an effective tool for development of medicine in treatment of certain diseases like PCOS.

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