

A STUDY ON THE STANDARDIZATION PARAMETERS OF *CASSIA ANGUSTIFOLIA*PRAGATI KHARE^{1*}, KAMAL KISHORE², DINESH KUMAR SHARMA³

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ABSTRACT

Objective: Now-a-days, the herbal medicines are much efficient for the treatment of various disorders as they have minimal side effects in comparison to the allopathic medicines. *Cassia angustifolia*, commonly called Senna belongs to the family Leguminosae and is a well-known laxative throughout the world. Senna is mostly found in Tirunelveli, Madurai, and Ramnathpuram districts of Tamil Nadu. Carbohydrates, tannins, alkaloids, flavonoids, and amino acid are the important chemical constituents of *C. angustifolia*. The objectives of the present study are to investigate various pharmacognostic, phytochemical analysis, and pharmacological properties of *C. angustifolia*.

Methods: The powdered drug was used for estimating the loss on drying, ash values, fluorescence studies, chemical tests, and extractive values. Macroscopic and microscopic studies were also performed.

Results: The transverse section (T.S.) of leaf showed isobilateral structure along with paracytic stomata, nonlignified unicellular trichomes with warty walls, and fibrovascular bundle. The fluorescence characteristics of leaf powder were studied both in visible light and ultraviolet (UV) light (254 nm and 365 nm) after treatment with various reagents. Senna is composed of carbohydrates, tannins, alkaloids, flavonoids, and amino acid. It was reported that the total ash value was 11.23 ± 0.25 w/w. The acid insoluble ash value was $1.4 \pm 0.1\%$ w/w. Water soluble, ethanol, methanol, petroleum ether, and chloroform extractive values were $16.6 \pm 0.26\%$ w/w, $3.7 \pm 1.75\%$ w/w, $0.83 \pm 0.05\%$ w/w, $1.6 \pm 0.1\%$ w/w, and $3.2 \pm 0.25\%$ w/w, respectively.

Conclusion: The main pharmacological activities of *Bauhinia variegata* are anthelmintic, antiulcer, antitumor, antimicrobial, antidiabetic, anti-inflammatory, antigoutrogenic, and hepatoprotective. The present investigation provides the information on its pharmacognostic, phytochemical analysis, and pharmacological properties.

Keywords: Senna, Sennosides, Laxative, Flavonoids, Ash value.

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INTRODUCTION

Cassia angustifolia (senna) and it belongs to Leguminosae family. Senna is used for the treatment of constipation mostly in Eastern and Western countries [1,2]. The laxative activity of senna is due to the presence of two anthraquinone glycosides, i.e., sennoside A and sennoside B. *C. angustifolia* is also composed of rhein-8-diglucoside, sennosides C and D, rhein, rhein-8-glucoside, aloe-emodin and anthrone diglucoside, and naphthalene glycosides such as tinnevellin glycoside and 6-hydroxy musizin glycoside, flavonoid (kaempferol), phytosterols, resin, and calcium oxalate [3,4]. It was reported that the first variety of senna was found along the Nile River in Egypt and Sudan. Commercially, it is cultivated in Kutch (Gujarat) and Jodhpur (Rajasthan), India. It can be grown as a perennial crop for duration of about 2-3 years [2]. The flowers and leaves of *Cassia angustifolia* are represented in (Fig. 1). The leaves of *Cassia angustifolia* are represented in (Fig. 2). The plant of *Cassia angustifolia* is represented in (Fig. 3).

Taxonomical classification [6]

Kingdom	Plantae
Sub division	Spermatophyta
Division	Magnoliophyta
Class	Magnoliopsida
Sub class	Rosidae
Order	Fabales
Family	Fabaceae/Leguminoceae
Genus	Cassia
Species	Angustifolia

Synonyms [6]

Sanskrit	Swarn patti
Hindi	Sanai
Telugu	Sunamukhi
Tamil	Nilavarai, nelavakai
Malayalam	Sunnamukki, connamukki
Kannada	Nela tangedu
Gujarati	Nat ki sana

Medicinal uses

C. angustifolia is used for the treatment of splenic enlargements, anemia, typhoid, cholera as a febrifuge, as blood purifier, as an anthelmintic, and as remedy for constipation [6]. Senna has been already included in I.P. as a purgative due to the presence of rhein, aloe-emodin, kaempferol, and isormamnetin [7].

Macroscopic characters

Senna leaves are delicate and grayish-green. The pods and fruits are oblong in shape. The compound leaves are composed of 5-8 pairs of oval lanceolate leaflets (2.5 cm × 1.5 cm). Flowers are large and yellow. Senna produces medium-sized pods. The seeds are flat and yellowish [2]. The leaflets possess short and stout petioles which may be rarely broken. The length of leaflets is about 1.5-6.0 cm long and width is 0.5-1.5 cm. They have a specific odor and mucilage-like/slightly bitter taste [4,8].

METHODS

The leaves of *C. angustifolia* were collected from Guttumal and Company, Shivaji Marg, Bareilly, Uttar Pradesh, India and identified (specimen

number-RU/PS/2016/415) by Professor A.K. Jaitly, HOD, Department of Plant Science, Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh.

Powdered drug was used for moisture content, ash values, swelling index, and fluorescence studies were carried out by treating 0.5 g of powdered drug with different reagents and observation in color was made in visible light, UV light of short (254 nm), and long wavelength (365 nm) under UV chamber. Photomicrography was performed using Olympus C7070 camera [9].

RESULTS AND DISCUSSION

Microscopical examination of leaf

The T.S. of leaf showed isobilateral structure alongwith paracytic stomata, nonlignified unicellular trichomes with warty walls, fibrovascular bundle lined with abundant prisms of calcium oxalate, 4-5 tier palisade, and sclerenchyma. The transverse section of leaf of *Cassia angustifolia* is represented in (Fig. 4).

Pharmacognostic evaluation of the plant

The plant material was used for quantitative determination of physicochemical values. ash values, loss on drying, and extractive values of *Cassia angustifolia* are represented in Table 4.

Phytochemical screening

The dried leaves were powdered and extracted with petroleum ether, chloroform, ethanol, and water in soxhlet apparatus. The percentage yield was analyzed. The phytochemical tests were performed for the estimation of alkaloids, glycosides, flavonoids, and tannins in various plant extracts and resulted in the presence of carbohydrates, gums, proteins, alkaloid, saponins, flavonoids, and tannins and results are given in Table 1.



Fig. 1: Flowers and leaves of *Cassia angustifolia*



Fig. 2: Leaves of senna

Fluorescent studies of powder drugs

The fluorescence characteristics of leaf powder were studied both in visible light and UV light (254 nm and 365 nm) after treatment with various reagents and is represented in Table 2 [10-12].

The physicochemical parameters of leaf of *C. angustifolia* Linn are tabulated in Table 3. The loss on drying at 105°C in leaf was found to be 1.90%. Total ash value of leaf represents minerals and earthy materials attached in the plant material. It was reported that the total ash value was 11.2%. The acid insoluble ash value was 1.5%. The water-soluble ash value represents the presence of acids, sugar, and inorganic compounds and was found to be 4.7%. The results are given in Table 3.

CONCLUSIONS

Preliminary phytochemical and physicochemical investigations of *C. angustifolia* were performed in this study. These parameters are necessary for the identification of drugs and investigation of the bioactive constituents in medicinal herbs [13]. The presence of various chemical constituents in *C. angustifolia* may be a potential cause of treatment of various disorders. The quality of the plant can be estimated by determining the physical parameters. These investigations are of



Fig. 3: Plant of *Cassia angustifolia*
Geographical source: Senna is mostly found in Tirunelveli, Madurai, and Ramnathpuram districts of Tamil Nadu. It is cultivated in Kadapa District of Andhra Pradesh, Rajasthan, and Gujarat State [5].

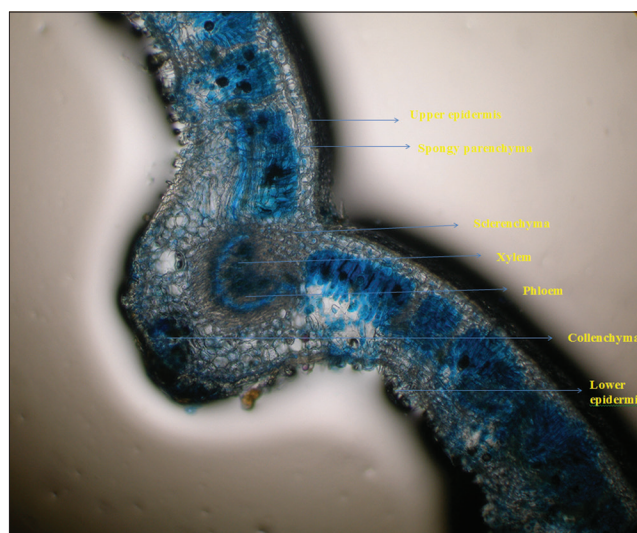


Fig. 4: The transverse section of leaf of *Cassia angustifolia*

Table 1: Chemical tests

Phytochemical tests	Petroleum ether	Methanol	Water	Ethanol	Chloroform
Carbohydrates					
Molish test	+	+	+	+	-
Fehling's test	-	+	-	+	-
Benedict's test	-	+	-	+	-
Barfoed's test	-	-	-	-	+
Proteins					
Biuret test	+	+	+	+	-
Millon's test	-	+	-	+	-
Xanthoprotein test	+	+	+	-	-
Amino acids					
Ninhydrin test	+	+	+	+	+
Tyrosin test	-	-	-	+	-
Cystein test	-	-	-	+	-
Triterpenoid					
Noller's test	-	+	+	-	-
Steroid					
Salkowski reaction	-	+	+	+	-
Liebermann-burchard reaction	+	+	+	-	-
Cardiac glycosides					
Baljet's test	+	+	+	+	+
Legal's test	-	+	-	+	-
Keller-Killiani test	-	+	+	+	-
Anthraquinone glycosides					
Borntrager's test	-	-	-	-	-
Modified Borntrager's test	-	-	-	-	-
Saponin glycosides					
Foam test	+	+	+	+	+
Cyanogenetic glycosides					
Na - picrate test	+	+	+	+	+
Flavonoids					
Shinoda test	-	+	+	+	-
Lead acetate	-	+	+	+	-
NaOH	+	+	+	+	-
Alkaloids					
Dragendorff's test	+	+	+	+	-
Mayer's test	-	+	-	+	-
Wagner's test	+	+	+	+	-
Hager's test	-	+	+	+	-
Tannins					
5% FeCl ₃	+	+	-	+	-
Lead acetate	-	+	+	+	+
Dil. HNO ₃	-	+	+	+	-
Acetic acid	-	+	+	+	-

Table 2: Fluorescence activity of *C. angustifolia* leaves

Material/treatment	Observation under UV cabinet		
	Visible light	Short UV 254 nm	Long UV 365 nm
Drug powder as such	Muddy green	Green	Light brown
Powder treated with concentrated HCl	Golden	Dark green	Blackish green
Powder treated with 1 molar NaOH in water	Dark green	Black	Brownish black
Powder treated with concentrated ethanol	Golden	Green	Light green
Powder treated with concentrated acetic acid	Golden	Dark green	Light green
Powder treated with 5% FeCl ₃	Pine forest	Dark green	Dark green
Powder treated with concentrated benzene	Golden	Green	Reddish green
Powder treated with methanol	Golden	Pine forest	Green
Powder treated with 1 M H ₂ SO ₄	Red	Reddish brown	Brown
Powder treated with concentrated HNO ₃	Red	Reddish black	Black
Powder treated with chloroform	Golden	Dark brown	Reddish brown
Powder treated with distilled water	Green	Greenish brown	Brown

UV: Ultraviolet, *C. angustifolia*: *Cassia angustifolia*

great importance for carrying out the revalidation and estimation of its other pharmacological activities. It was concluded from the phytochemical study that the ethanolic extract contains flavonoids, glycosides, carbohydrates, and tannins which are responsible for various pharmacological activities such as anti-inflammatory, chemoprotective activity, antioxidant, antidiabetic, antianxiety, and antidepressant.

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Table 3: Physiochemical parameters

Parameters	Values (% w/w)	Values (% w/w)	Values (% w/w)	Mean±SD (% w/w)
Total ash value	11.2	11.5	11.0	11.23±0.25
Water - insoluble ash value	6.5	6.75	6.1	6.45±0.32
Water - soluble ash value	4.7	4.5	4.2	4.46±0.25
Acid- insoluble ash value	1.5	1.3	1.4	1.4±0.1
Loss on drying	1.90	1.8	1.9	1.86±0.05

UV: Ultraviolet, SD: Standard deviation

Table 4: Extractive values of *C. angustifolia* L

Solvent	Extractive value (% w/w)	Extractive value (% w/w)	Extractive value (% w/w)	Mean±SD (% w/w)
Water	16.5	16.9	16.4	16.6±0.26
Ethanol	3.8	3.9	3.6	3.7±1.75
Chloroform	0.8	0.9	0.8	0.83±0.05
Petroleum-ether	1.5	1.6	1.7	1.6±0.1
Methanol	3.0	3.2	3.5	3.2±0.25

C. angustifolia: *Cassia angustifolia*, SD: Standard deviation

REFERENCES

- Wallis TE, editor. Text Book of Pharmacognosy. 5th ed. London: United States Pharmacopoeia; 2004. p. 136-8.
- Balasanekar D, Vanilarasu K, Preetha PS, Rajeswari S, Umadevi M, Bhowmik D. Senna-A medical miracle plant. *J Med Plants Stud* 2013;1(3):41-7.
- Kokate CK, Purohit AP, Gokhale SB, editors. Pharmacognosy. 25th ed. India: Nirali Prakashan; 2003. p. 157-60.
- Agarwal V, Bajpai M. Pharmacognostical and biological studies on senna and its products: An overview. *Int J Pharm Bio Sci* 2010;6(2):1-10.
- Sultana S, Ahmad M, Zafar M, Khan MA, Arshad M. Authentication of herbal drug Senna (*Cassia angustifolia* Vahl.): A village pharmacy for Indo-Pak subcontinent. *Afr J Pharm Pharmacol* 2012;6(30):2299-308.
- Deshpande HA, Bhalsing SR. Recent advances in the phytochemistry of some medicinally important *Cassia* species: A review. *Int J Pharm Med Bio Sci* 2013;2(3):60-78.
- Khare CP. Indian Medicinal Plants: An Illustrated Dictionary. New York: Springer; 2007.
- Handa SS, Kapoor VK, editors. Text Book of Pharmacognosy. 2nd ed. Delhi: Vallabh Prakashan; 2003. p. 80-3.
- Sunita P, Jha S, Pattanayak SP. Anti-inflammatory and *in-vivo* antioxidant activities of *Cressa cretica* Linn. A halophytic plant. *Middle East J Sci Res* 2011;8(1):129-40.
- Prasad V, Kadam R, Deoda S, Rakesh S. Pharmacognostic, phytochemical and physiochemical studies of *Mimusops elengi* Linn stem bark (*Sapotaceae*). *Pharm Lett* 2012;4(2):607-13.
- Arulanandraj N, Gopal V. Phytochemical screening of roots extracts of Marva (*Maerua oblongifolia*). *Int J Univ Pharm Life Sci* 2011;1(2):282-93.
- Katara A, Pradhan CK, Tyagi AK, Singh P. Phytochemical investigation and antimicrobial activity of *Leucas cephalotes* Roth, Spreng whole herb. *Pharm Chem* 2010;2(4):284-96.
- Yadav M, Chatterji S, Gupta SK, Watal G. Preliminary phytochemical screening of six medicinal plants used in traditional medicine. *Int J Pharm Pharm Sci* 2014;6(5):539-42.