Research Article

Available online through
www.ijrap.net

IJRAP
ISSN 2229-3566

EVALUATION OF PHYSICOCHEMICAL AND PRELIMINARY PHYTOCHEMICAL STUDIES ON THE ROOT OF *BOMBAX CEIBA* LINN.

Garg Nitika[1], Meena Ajay[2], Nain Jaspreet[1]*
[1]M. M. College of Pharmacy, M. M University, Mullana, Ambala, Haryana, India
[2]National Institute of Ayurvedic Pharmaceutical Research, Patiala, Punjab, India

Received on: 09/04/2011 Revised on: 19/05/2011 Accepted on: 02/06/2011

ABSTRACT
The present communication attempts to evaluate the physicochemical and preliminary phytochemical studies on the roots of Bombax *ceiba* Linn. or the silk cotton tree. This tropical tree has a straight tall trunk and its leaves are deciduous in winter. Red flower with 5 petals appear in the spring before the new foliage. The whole plant of *Bombax ceiba* used as traditional folk medicines for the treatment of antidysenteric, antidiahorreal and antipyretic effects. *Bombax ceiba* Linn. Contains glycosides, tannins, flavanoid, b-sitosterol and lupeol. The present study deals with phytochemical investigations of *Bombax ceiba* root including determination of loss on drying, ash values, TLC and extractive values. The preliminary phytochemical screening of powdered drug was also carried out. The qualitative chemical examinations revealed the presence of various phytoconstituents like flavanoid, terpenoid saponins, phenolic compounds and mucilage's in the extracts. The study revealed specific identities for the particular crude drug which will be useful in identification and control to adulterations of the raw drug.
KEYWORDS: *Bombax ceiba*, Extractive values, Phytochemical, Antimicrobial,

***Address for correspondence**
Email: preetisidana@gmail.com; ajaysheera@gmail.com

INTRODUCTION

Bombax ceiba Linn. (Syn. *Bombax malabaricum* Dc., *Salamalia malabarica* DC. Schott & Endl.) Belongs to the family Bombacaceae. It is an important ayurvedic medicinal plant cultivated in Pakistan, India, China and Australia[1]. The family Bombacaceae consists of about 22 tropical genera and 150 species. It is a large deciduous tree which is found throughout India and other parts of tropical and subtropical Asia. Indian kapok tree (English), Shalmali (Sanskrit), Semal (Hindi), Shimul (Bengali), mullilavu (Malyalam)[2]. Bark of Semal looks pale ashy to silver grey, 1.8 - 2.5 cm thick. Semal tree has the compound leaves which are palmate, digitate, large, spreading, glabrous which has common petiole, and the size of leaf is 15-30 cm long. Five leaflets are common in one leaf but sometimes up to the seven leaflets could be found. The size of leaflets varies from 10 to 20 cm. The leaflets are lanceolate, acuminate, more or less coriaceous and entirely glabrous. The bright red flowers, which appear in January to March, are large. Flowers are numerous, large, 10-12.5 cm across. It has the thick, fleshy and cup shaped Sepals. It bears generally 5 petals in one flower which are 7.5-15 cm long oblong, recurved above, and fleshy, of bright crimson (rarely yellow or orange) colour. The pods are about 10-18 cm in length, oblong-oval in shape [3]. According to ayurveda it has stimulant, haemostatic, astringent diuretic, diahorreal, cardiotonic, demulcent, antidysentric, antidiahorreal, and antipyretic effects[4,5]. Bark is mucilaginous and its infusion given as demulcent, emetic. A paste of flowers and leaves is employed as external application for skin trouble [6]. Roots are used as tonic in syphilis and gum is used in menorrhagia and leucorrhoea[7, 8]. ''Mocha ras (juice)'' used for medicinal proposes. Young flowers and calyces used by people for vegetables and prickles. Seed oil is used in the manufacture of soaps and lubrication substances [9]. Stem bark used as tonic in boils and acne/pimples[10]. Seeds are applied on the skin in small pox and chicken pox[11]. Leaves are used in rheumatism laxative, haematinic[12]. TLC and HPTLC are methods commonly applied for the identification, the assay and the testing for purity, stability, dissolution or content uniformity of raw materials (herbal and animal extracts,

fermentation mixtures, drugs and excipients) and formulated products (pharmaceuticals, cosmetics, nutriments)[13]. These flexible and cost-effective techniques present the advantage of the simultaneous processing of standards and samples with versatile detection possibilities, including a great variety of post-chromatographic derivatization reagents. The validation of analytical methods is largely recognized as the best safeguard against the generation of unreliable data and is becoming an absolute requirement in many fields. Validation is the process by which it is established, by laboratory studies, that the performance characteristics of an analytical method meet the requirements for the intended applications[14]. Depending on the objective of the analytical procedure, the typical validation characteristics which can be considered through a statistical approach are accuracy, precision, specificity or selectivity, detection limit, quantification limit, linearity and ruggedness[15]. *Bombax ceiba* Linn has threats due, to harvest for medicines loss of habitat and trade. Therefore, the present paper attempts to evaluate the physicochemical parameters and preliminary phytochemical screening for root of *Bombax ceiba* for identification of the drug in dry form and control the adulterants.

MATERIAL AND METHODS

The Root of *Bombax ceiba* Linn were collected in September, 2010 from Yamuna Nagar (Haryana), specimen was identified and authenticated at the National Institute of Ayurvedic Pharmaceutical Research (NIAPR), Patiala (Punjab). Roots were washed in running water and air-dried. The fresh root was then studied for physiochemical evaluation.

RESULTS AND DISCUSSIONS

The root of *Bombax ceiba* Linn were collected and analyzed as per the various standardization parameters. Preliminary phytochemical results showed the presence or absence of certain phytochemical constituents in the sample. The tests performed using methanol, ethyl acetate, and petroleum ether extracts. Phytochemical test revealed the presence or absence of Alkaloid, glycoside, saponins, flavanoid, carbohydrates, Steroid, Tannin and results are given in Table No.1.

Physiochemical parameters of the root of *Bombax ceiba* Linn are tabulated in Table 2. Deterioration time of the plant material depends upon the amount of water present in plant material. If the water content is high, the plant can be easily deteriorated due to fungus. The loss on drying at 105°C in root was found to be 7.66 %. Total ash value of plant material indicated the amount of minerals and earthy materials attached to the plant material. Analytical results showed total ash value content was 13.23%. The negligible amount of acid-insoluble siliceous matter present in the plant was 3.28 %.The alcohol soluble extractive values indicated the presence of polar constituents like phenols, alkaloids, steroids, glycosides, flavanoid. Different extracts of the powdered root were prepared for the study of extractive values. Percentage of extractive values was calculated with reference to the air dried drug. The results are shown in Table 2.

Thin Layer Chromatographic (TLC) techniques were used to separate the chemical compounds present in the herbal drug. Various solvent systems were checked to separate the maximum number of chemical compounds in the drug. TLC of the methanolic extract developed in the mobile phase of Toluene: Acetone (8:2v/v).The TLC of the *Bombax ceiba* Linn was performed and observed under λ 366 and λ 254 nm. The plates were also derivatives with Iodine vapours and Vanillin Sulphuric acid solution. Under λ 366 nm the plate showed 7 spots indicating that the root part contains many components adsorbing at this wavelength. At λ 254 nm, the samples showed 6 spots towards the baseline indicating the highly polar nature of the compounds. After exposing to the iodine vapours, the plate showed few spots in between the base line and solvent front indicating the presence of compounds which can be fixed by the Iodine. After dipping the plate in a Vanillin Sulphuric acid solution, the plate showed different colored compounds indicating the presence of compounds with strong chromophoric groups and multiple bonds.

TLC of the methanol extract developed in the mobile phase of Toluene: Acetone (8:2v/v) and observed under UV 254 nm 3 spots at R_f 0.6, 0.67, and 0.76 (Pale green); under UV 366 nm showed 7 spots at R_f 0.22 (Fluorescent green), 0.35 (Blue green), 0.6 (Blue), 0.67 (Pale green), 0.77 (Fluorescent green), 0.84 (Fluorescent blue) and 0.96 (Fluorescent green), and after derivatization with Vanillin- Sulphuric acid, showed 6 spots at R_f value 0.22, 0.35, 0.6, 0.65, (Grey), 0.77 (Purple) and 0.98 (Dark green).

CONCLUSION

Preliminary phytochemical as well as various aspects of the root sample were studied and described along with physico-chemical parameters, TLC studies in authentification adulteration for quality control of raw drugs. The roots of Bombax ceiba exhibit a set of diagnostic characters, which will help to identify the drug in dried condition. The periodic assessment is essential for quality assurance and safer use of herbal drugs.

REFERENCES

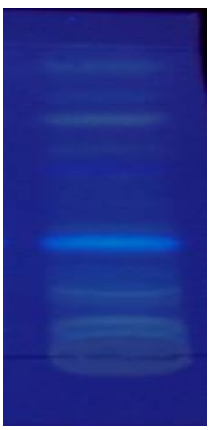
1. Chanda YR. The Wealth of India, Raw Material. New Delhi: CSIR, 1962; 175–183.
2. Vaidyaratnam PS, Indian medicinal plants-A compendium of 500 species, Vol. 3, 1997; 222.
3. ScienceDr.Uwe Muß Rajendra K.C. Georg-August A brief introduction to Semal (Bombax ceiba Linn). For: Dendrology and Science TIF 2007/08.
4. Williamson EM, Major herbs of ayurveda, 2002; 261.
5. Singh MP & Panda H, Medicinal herbs and their formulations, Vol.1, 2005; 176-78.
6. Nadkarni, 1954; chopra et al., 1956; wealth of India, 1988.
7. Kapoor SL, kapoor LD.Medicinal plant wealth of the karimnagar district of Andhra Pradesh. Bull Med Ethnobot Res 1980; 1:120-144.
8. Nautiyal, B.P. and Nautiyal, S.Some medicinally important tree species of U.P Himalaya: relevance in regional development and ecological security. J Sci Res Plant Med.1983; 4(1)14-22.
9. The wealth of India. First Supplement series (Raw materials) Vol.1: A-Ci, NISCAIR, CSIR, New Delhi.2004; 7236-208.
10. Malhotra SK, Moorthy S.Some useful and medicinal plants of chandrapur district (Maharashtra state). Bull Bot Surv India. 1973; 15:13-21.
11. Katewa SS, Arora A. Some plants in folk medicine of Udaipur district(Rajasthan). Ethnobotany.1997; 9:48-51.
12. Chelvan PT.Traditional phytotherapy among the migrant Tamilian settlers in South Gujarat.Biojournal.1998; 10:9-14.
13. Szepesi G. J. Planar Chromatogr.-Mod. TLC 1993;6:187.
14. USP XXV, Validation of Compendial Methods _1225_, The Pharmacopoeia of the United States of America, vol. XXV, United States Pharmacopoeial Convention Inc., Rockville, MD, 2002, pp. 2256– 2259.
15. Commission of the European Communities – Directorate General Industry, CPMP Working Party on Quality of Medicinal Products, III/5626/93- EN, 1993

Table 1. Preliminary phytochemical tests for various solvent extracts of *Bombax ceiba* Linn root

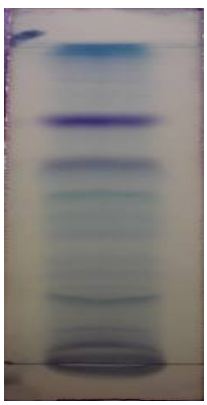
S. No	Natural Product	Methanolic	Ethyl Acetate	Petroleum Ether
1.	Phénol	Positive	Negative	Positive
2.	Flavanoid	Positive	Positive	Negative
3.	Steroid	Positive	Positive	Positive
4.	Tannin	Positive	Negative	Positive
5.	Glycoside	Positive	Positive	Positive
6.	Terpenoid	Positive	Positive	Positive
7.	Saponins	Positive	Positive	Positive
8.	Coumarin	Negative	Negative	Negative
9.	Carbohydrate	Positive	Negative	Negative
10.	Alkaloid	Positive	Positive	Negative

Table 2. Physico-chemical parameters of *Bombax ceiba* Linn Root

S. No.	Parameters	Results
1.	Description	Brownish
2.	Loss on drying at 105°C (% w/w)	7.66
3.	Total Ash (% w/w)	13.23
4.	Acid-insoluble ash (% w/w)	3.28
5.	Water insoluble ash (% w/w)	8.78
6.	Alcohol-soluble extractive value (% w/w)	8.23
7.	Ethyl acetate soluble extractive value (% w/w)	7.19
8.	Chloroform soluble extractive value (% w/w)	2.82
9.	Pet. Ether soluble extractive value (% w/w)	1.82
10.	Hexane soluble extractive value (%w/w)	1.69
11.	Bulk density (gm/ml)	0.122
12.	Tap density (gm/ml)	0.203



At λ 366nm



At λ 254nm

Vanillin Sulphuric acid

Source of support: Nil, Conflict of interest: None Declared