

Pharmacognostical and Phytochemical Evaluation of *Sterculia Foetida* L. Stem Bark

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ABSTRACT

Various Pharmacognostical and phytochemical parameters such as microscopy, physicochemical and behavior of powder drug on treatment with different chemical reagents were studied on the stem bark *Sterculia foetida* L. belongs to family Sterculiaceae. The successive extraction of plant bark was undertaken by using various solvents of increasing polarity and the extracts thus obtained were subjected for phytochemical analysis. The phytochemical investigation revealed the presence of alkaloids, tannins, saponins, steroids etc. These preliminary data may be helpful in developing the standardization parameters of *Sterculia foetida* L. stem bark.

Keywords :- Pharmacognosy, Phytochemistry, *Sterculia foetida*, Bark

I. INTRODUCTION

Sterculia foetida L. is a tropical plant belongs to the family Sterculiaceae which is also called as 'Java-Olive', 'Bastard poon tree', 'Hazel sterculia', 'Skunk tree', 'Poon tree' and 'Sam-rong' in Thai. In India it is known as 'Janglibadam' (Hindi, Bengali), 'Gorapu-badam' (Tamil), 'Pinari' (Malayalam), 'Bhatalapenari' (Kannada), Nagin (Konkani), Burmese letpan-shaw (Sanskrit). It is a large, straight, deciduous tree growing to 40 m in height and 3 m in girth, with the branches arranged in whorls and spreading horizontally. The bark is smooth and grey. Leaves crowded at the ends of branchlets, digitate, with 7-9 leaflets; leaflets elliptical or elliptic-lanceolate, acuminate, 10-17 cm long, shortly petiolate with unpleasant smell; petiole 12.5-23 cm long. Flowers in many panicles, subterminal, 10-15 cm long; rather large, green or dull purple; unisexual, with male and female flowers on separate trees; calyx dull, orange colored, deeply 5-partite; lobes 1-1.3 cm long. Follicles scarlet, 7.6-9 x 5 cm, very stout, ultimately woody; seeds 10-15, slate colored, ellipsoid, oblong, 1.5-1.8 cm with rudimentary yellow aril.

It is found in tropical zone in Europe, Africa, and Asia and native to Australia, India, Bangladesh, Pakistan, Sri Lanka, Myanmar, Indonesia, Kenya, Malaysia, Thailand, Philippines, Somalia, Tanzania and it's a semiautonomous part Zanzibar, Uganda, Yemen,

Republic of Djibouti, Eritrea, Ethiopia in African continent and Ghana, Puerto Rico are the region where it grows exotically [1]. In India, it is found usually in the western and southern parts of India. According to Germplasm Resources Information Network, Department of Agriculture United States thirty-three species are found in this family and basic distinguishing factor are seeds and leaves [2, 3]. Leaves are used as herbal medicine as aperients, diuretic, anti-epileptic and as insect repellent. A gum that resembles 'gum tragacanth' is obtained from the trunk and branches and is used for bookbinding and similar purposes. Oil from the seed is extracted on a local scale to be used in medicine internally in itches and other skin diseases and is applied externally as a paste [4, 5]. Seed oil also exhibits activities like antifungal [6], insecticide, antibiotic, and antiviral, hormonal, carcinogenic or anti-tumor. The seeds reported to contain fixed oil, proteins, saponins, carbohydrates, phytosteroids, gums and mucilaginous substances [7]. *Sterculia Foetida* oil has been found to contain 71.8% of sterculic acid and minor proportions of oleic, linoleic, and saturated acids [8].

II. METHODS AND MATERIAL

A) Plant Material Collection

The stem bark of *Sterculia Foetida* L. was collected by self in the month of July Latitude N19° 90', 26.8" Longitude E075° 31' 30.2" Altitude 582.5m, from Dr.

Babasaheb Ambedkar Marathwada University, Aurangabad. Bark was pulverized in the mechanical grinder to a fine powder to carry out different Pharmacognostical and phytochemical evaluation and was stored in a well closed airtight vessel for further analysis.

B) Behavior of bark powder towards some chemical reagents.

The powder of *Sterculia Foetida* L. bark was treated with different chemical reagents. The mixture of the powdered drug and chemicals were allowed to warm and cold down for two hours. Changed color of powdered drug was noted (Table no.2).

C) Physico-chemical Evaluations.

Physico-chemical parameters such as water soluble ash, water insoluble ash, acid insoluble ash, acid soluble ash, total ash, loss of weight on drying 105⁰ was determined. Considering the diversity of chemical nature and properties of contents of drugs, different solvents benzene, petroleum ether, chloroform, methanol, water, alcohol, chloroform water of extractive values were determined as per reported methods [9, 10, 11], (Table 3).

D) Phytochemical screening

Qualitative examination of inorganic matters and determination of heavy metals was done as per reported methods. The dried powdered bark was subjected to preliminary phytochemical screening for qualitative detection of phytoconstituents. The dried powdered bark (100g) was extracted successively hexane, petroleum ether, benzene, benzene, chloroform, acetone, methanol, water in Soxhlet Extractor by continuous hot percolation. Each time before extracting with the next solvent of higher polarity the powdered material was dried in hot air oven below 50⁰C for 10 minutes. Each extract was concentrated in vacuum on a Rote Evaporator and finally dried in hot air oven. The dried extracts were dissolved in respective solvents, with it was extracted, and were subjected to various qualitative phytochemical tests for the identification of chemical constituents present in the plant material [12], (Table 4 & 5)

III. RESULTS AND DISCUSSION

Organoleptic Evaluation: -

The organoleptic characters such as touch, color, taste, odor are discussed in (Table 1)

Macroscopic Evaluation:-

In Pharmacognosy the term “bark” is used to describe all the tissue found external to the cambium in the branch, stem or root. Barks consists following tissues: - Rhytidoma (dead tissues), cork, Phellogen (meristematic), Phelloderm, cortex and secondary phloem.

Shape and size: - Curved or channeled very hard, varies in length, 70-90cm in width and 10-13 in thickness.

Outer Surface: -Very rough, longitudinally irregularly ridged, furrowed, blackish to ash in color.

Inner surface: - Rough, fibrous, shows rows of longitudinal running piths on the smoothly cut surface, whitish yellow in color.

Fracture: - Hard, outer is granular, inner is splintery.

Taste: - Bitter

Odor: - Slightly sternulatory

Behavior of Bark Powder towards some Chemical Reagents

The observations are reported in the table no. 2.

Physico-Chemical Evaluation

The physicochemical studies and successive extractive values of stem of *Sterculia Foetida* L. are summarized in table no. 3 and 4.

Phytochemical Screening

Inorganic substances (Ca, Fe, Mn, P, S, and K) were present. The results demonstrated presence of saponin, flavonoids, tannins, alkaloids mainly in the stem bark of *Sterculia foetida* L. The presences of various phytoconstituents in various extracts are summarized in Table 5.

IV. CONCLUSION

Pharmacognocny enfolds the knowledge of history, distribution, cultivation, collection, processing for market and preservation, the study of organoleptic, physical, chemical and the uses of crude drugs. The objective of pharmacognocny is to contribute towards establishment of rational relationship between the chemical moieties of naturally occurring drugs and their biological and therapeutic effects, which ultimately helps in the standardization of the plant bark drugs.

The physical evalution furnished different ash values, extractive values in different values. Water soluble ash, total ash, and acid soluble ash, acid insoluble ash values were also determined. The phytochemical investigation revealed the presence of tannins, alkaloids, saponin, and sterols compounds mainly in the stem bark of *Sterculia foetida* L. Thus a variety of standardization parameters viz. morphology, physic-chemical, phytochemical were studied and data was generated for the assessment of quality of plant material, and also to check the adulteration and substitution etc. which may be helpful for future reference.

The present investigation can be concluded that the pharmacognostic study of stem bark of *Sterculia foetida* L. have furnished a set of qualitative and quantitative parameters that can serve as an important source of information which may substantiate the existing pharmacogostic data to ascertain the identify and to determine and track the quality and purity of the plant material in future studies.

Table 1. Organoleptic characteristic of stem Bark

Parameters	Observations
Touch	Dryness
Color	Blackish Brown
Taste	Bitter
Odor	Slightly Sternutatory

Table 2. Reactions of stem bark powder with different chemicals

Sr. No.	Chemical Reagents	Observation
1	Conc. Sulphuric acid	Dark brown
2	Conc. Hydrochloric	Light black

	acid	
3	Conc. Nitric acid	Bluish yellow
4	Picric acid	Chocolate color
5	Glacial Acetic acid	Light yellow
6	Iodine solution	Light brown
7	Sodium hydroxide	Cream color
8	Potassium hydroxide	Whitish yellow
9	Ferric chloride	Dark black
10	Powder as such	Light black

Table 3. Physico-Chemical Properties Stem bark

Sr. No.	Quantitative Standards	%w/w
1	Total ash	8.23
2	Acid soluble ash	5.87
3	Acid insoluble ash	0.48
4	Water soluble ash	5.93
5	Water insoluble ash	1.94
6	Loss of weight on drying 105°C	49.8
7	Alcohol soluble extractive value	7.10
8	Water soluble extractive value	6.30

Table 4. Successive Extractive Values of the stem Bark

Sr. no.	Solvent	Weight of Drug	Average Extractive Value (%w/w)
1	Methanol	10gm	6.3
2	Alcohol	10gm	11.7
3	Benzene	10gm	6.2
4	Petroleum	10gm	1.25
5	Chloroform	10gm	2.10
6	Acetone	10gm	3.95

Table 5. Observation of Quantitative analysis of organic

Sr. no.	Test of organic mater	Petroleum ether	Benzene	Chloroform	Acetone	Methanol	water
1	Tannin	+	+	-	+	+	+
2	Alkaloid	-	+	+	+	+	+
3	Saponin	+	-	+	+	-	+
4	Sterols	-	+	+	-	+	+
5	Flavonoids	-	-	-	+	-	+

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