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EVALUATION OF PHYSICOCHEMICAL STANDARDIZATION PARAMETERS OF PTERYGOTA ALATA (ROXB) BARK

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ABSTRACT

Pterygota alata (Roxb.) R. Br., family: Sterculiaceae is a tall evergreen tree, commonly known as Buddha Coconut in English, Tula in Bengali and Kodaittondi in Tamil, found in India and South East Asia. Seeds are edible and the oil obtained from the seed is nutritious. It is used as the substitute of Opium. The present study was carried out to establish physico-chemical parameters along with preliminary phytochemical screening of petroleum ether, chloroform, methanolic and aqueous extracts of *Pterygota alata*. Preliminary phytochemical screening of various extracts revealed the presence of carbohydrate, flavonoids sterols, phenolic & tannins compounds. The physico-chemical parameters such as total, water soluble, acid insoluble and sulphated ash (7.01, 5.65, 0.52 and 1.95%w/w respectively) and loss on drying (8.17 %w/w), extractive values foaming and swelling index were studied. These studies will be helpful in developing standards for quality, purity and sample identification of this plant.

KEYWORD: Standardization, *Pterygota Alata*, Physicochemical and Phytochemical.

INTRODUCTION

Buddha Coconut (*Pterygota alata* (Roxb.) R. Br., family: Sterculiaceae) is a tall evergreen tree, up to 30 m tall. The of the tree is because of the presence of coconut like fruit. Leaves are carried on 3-10 cm long stalks, crowded towards the ends of branches. Leaves are like blade, broadly ovate-heartshaped, 10-25 cm long, 7-15 cm broad, wavy, smooth, pointed or tapering. Flowers are borne in small, few-flowered racemes. Flowers are 1-1.5 cm across, on 2-3 mm long stalks. Flowers have no petals. Five free sepals are present with linear-lance or elliptic in shape, 1.2-1.5 cm long, 3-4 mm broad in size. Each sepal is fleshy, densely ferruginous pubescent outside, and purple in colour with red streaks. Male flowers bear

anthers which are united into 1-2 mm broad head on 4-6 mm long staminal column. In bisexual flowers sessile anthers are arranged in clusters of 4 or 5 in the sinuses formed by the carpels. Carpels are 5 in number; ovary is sessile having recurved 2-3 mm long and pubescent style. Fruit is woody, large in size. About 7-12 cm in diameter, obliquely round. Seeds are about 40 per follicle, oblong, compressed, arranged in 2 rows and winged. In India, Seed are edible and also cause drowsiness so that it can be used as substitute for opium. The tree is harvested for local use as a food and medicine and also as a source of oil and wood. Buddha Coconut is native to India, and also distributed in South East Asia. For the standardization and quality assurance purpose, we make an attempt for the standardization of *Pterygota alata* (Roxb.) R. bark by carrying out its pharmacognostical studies.[1-7]

MATERIALS AND METHODS

Plant Material: The bark of *Pterygota alata* (Roxb.) R. was collected from Forest Research Institute, Dehradun in the month of January 2017 and authenticated by Dr. Rajeev Soni, Botanist and Head, Nirmal Institute of Medicinal and Aromatic Plant Studies, Indore, M.P. The plant material (1kg) was air-dried at room temperature (30-40^{o}C) and then powdered to pass through a sieve of 1mm and further subjected to various studies.

Chemical and Reagent: All the chemical and solvents used for the study were of analytical grade and all methods were taken from official methods.

Physicochemical Parameters: The physicochemical parameters such as percentage of total ash, acid-insoluble, water soluble and sulphated ash, loss on drying, extractive values, foaming index, swelling index, crude fibre and heavy metal were determined according to official methods for quality control of medicinal plant.[8-11]

Preliminary Phytochemical Screening: The preliminary photochemical screening was carried out on extracts obtained after successively extraction with petroleum ether, chloroform, methanol and aqueous solvents. The dried extracts were treated for the presence or absence of phytoconstistuents.[12-14]

RESULTS AND DISSCUSSIONS

Physico-chemical Parameters

The various parameters such as total ash, acid insoluble ash, water soluble ash, sulphated ash, loss on drying were established and shown in Table 1. The extractive values by successive

extraction method and colour change of extracts, in visible and UV light are summerized in Table 2.

Table. 1: Ash values of *Pterygota alata* bark.

Sr. No	Evaluation parameter	Value (% w/w)
1	Total ash	7.01±0.045
2	Water-soluble ash	5.65±0.315
3	Acid-insoluble ash	0.52±0.234
4	Sulphated ash	1.95±0.146
5	Loss on Dying	8.2±0.003

Table. 2: Extractive value (percentage yield) and colour of *Pterygota alata* bark extracts.

Solvents used	Percentage yield	Colour of extract		
		Visible light	254 nm	365 nm
Petroleum ether	8.95±0.04	Light Brown	Greenish brown	Greenish
Chloroform	11.75±0.02	Light brown	Greenish brown	Yellowish black
Methanol	16.91±0.08	Brown Black	Greenish Black	Black
Water	15.05±0.06	Brown Black	Greenish Black	Black

Quantitative studies

The other quantitative studies for foaming index and swelling index were performed. The swelling index of tasted samples was found to be less than 1 and the foaming index of tested samples was found to be less than 100.

Crude and heavy metal analysis

Heavy metals in Pterygota alata bark samples were analyzed. The percentage crude fiber and the presence heavy metal are tabulated in Table 3.

Table. 3: Concentration of heavy metals and percentage of crude fibre in *Pterygota alata* bark.

Heavy metal	Concentration (ppm)
Arsenic	0.1787
Iron	0.1195
Copper	0.0120
Zinc	0.0468
Lead	0.0011
Cadmium	0.0039
Mercury	0.0159
Cobalt	0.0021
Crude fibre (%)	18.3%

Preliminary phytochemical studies: The preliminary phytochemical screening of *Pterygota alata* bark extracts were performed for various phytoconstituents. It revealed the presence of different phytoconstituents, like carbohydrates, glycoside, phenolic & tannins, flavonoid, protein & amino acid and steroids in different extracts. Results are shown in Table 4.

Table. 4: Preliminary phytochemical screening of *Pterygota alata* bark extracts.

Test	Pet. Ether extract	Chloroform extract	Methanol extract	Aqueous extract
Carbohydrate				
Molish'reagent	–	–	+	+
Fehling solution	–	–	+	+
Benedict solution	–	–	+	+
Alkaloid				
Mayer'reagent	–	–	–	–
Dragondroff'reagent	–	–	–	–
Hager' reagant	–	–	–	–
Glycoside				
Killer Killani	–	–	+	–
Sod. nitroprusside	–	–	–	–
Phenolic and Tannin				
$FeCl_3$ Solution	–	+	+	+
Lead acetate solution	–	+	+	+
Sterols				
Salkowski reaction	–	+	+	–
Hesse's reaction	–	+	+	–
Flavonoid				
Ammonia solution	–	+	+	+
Shinoda test	–	+	-	+
Saponin				
Foam test	–	–	–	–
Protein and Amino acid				
Ninhydrin test	–	–	+	+
Millon's reagent	–	–	+	+

+ = Present; – = Absent.

CONCLUSION

From ancient time, plants having specific therapeutic property, desirable action, easy availability with less toxicity. The scientists from past few decades are keen and sincere to evaluate many ethno medicinally used plants. The bark of *Pterygota alata* (Roxb.) R is still traditionally used in treatment of various disorders by many populations. The physicochemical evaluation of this plant gives the idea about identification and standardization of the plant. It is also important in long term study of plant to evaluate the medicinal and therapeutic action of this plant.

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