

**BAUHINIA VAHLII: PLANT TO BE EXPLORED**

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ABSTRACT

Bauhinia vahlii, was first validly published in weight but not actually in weight as he did not distinguish the genera of this species. Finally in this review, *vahlii*, confirmed as one of the different species. Forest product polycyclic of India march 2000 adopted the plant to propagate it by micropropagation as the plant has number of traditional and pharmacological activity. Very little work has been studied in this plant giving researchers to explore the same. But study of chemical compounds isolated may lead to advancement of medicinal chemistry and treatments of ailments and diseases.

Keywords: Mahul patta, Forest product polycyclic, Micropropagation, Pre-Clinical Studies, Economical uses.

INTRODUCTION

The name *Bauhinia vahlii* Wight and Arn was first validly published in Wight, though unaccompanied by any description or diagnosis because they cited "*Bauhinia racemosa* Vahl." which indirectly referred to the previously and effectively published description by Vahl. Thus *Bauhinia vahlii* was not actually published in Wight and Arn. For the first time as generally recorded in majority of the published literature. The reason is that Wight and Arnott had realized in fact that Vahl misapplied the binomial *Bauhinia racemosa* Lam. to a specimen that should have been described as a new species. Thus they provided a new name commemorating Vahl. In the protologue of *Bauhinia vahlii*, Wight cited the n° 628, i.e. Wight's herbarium specimens to whom the n° 628 is attached but validated the name solely by referring to *Bauhinia racemosa* Vahl and thus only the Schumacher specimen from "India Orientali" and the plate given in Vahl (1794) qualified as original materials. The herbarium sheet bears 3 name viz *Bauhinia sericea*, *Phanera vahlii* (Wight and Arn) Benth and *Bauhinia vahlii* Wight and Arn, Wight and Arn the locality has been given as India orient, further and explanatory note was given by A. Fox Maule (AFM) in 1984 reveals that in Vahl's manuscript the epithet *sericea* was replaced by *racemosa*. Vahl specimen was not fully matched with the Indian material because calyx was 5 lobed instead of being 2 and 3 lobed. The ovary was broadly elliptic instead of narrowly elliptic. Wight and Arnott mention only the calyx shape that is ovate splitting to the base, but did not mention about the shape of the ovary, while the nature of splitting of the calyx and the shape of the ovary of this species given by Rexburg's who was fully agreed with Banyopadhyay.¹

Origin and Geographical Distribution

Bauhinia vahlii is a giant climber and one of the most abundant Indian *Bauhinia* species. The species is distributed in the Sub-Himalayan region up to 3,000 meters above sea level and in Assam, Central India, Bihar, Eastern and Western Ghats. Collection of leaves is done in Madhya Pradesh, Orissa and Andhra Pradesh.²⁻⁴

Vernacular name

Bauhinia vahlii is a giant climber. It has several names in different languages example³.

Language - Name

Sanskrit - Asmantaka, Malanjhana
Assamese - Nak kati lewa
Bengali - Chehur lata Shimool
Hindi - Malu, Jallaur, Jallur, Mahul
Kannada - Chambolli
Marathi - Chambuli
Napali - Bhorla
Malayanam - Mottanvalli
Tamil - Mandarai, Adda, Kattumandarai,
Telugu - Madapu, Adattige
Oriya - Siyali

Classifications

Synonyms of *Bauhinia vahlii* are *Bauhinia recemosa* and *Phanera vahlii*. The taxonomic position of *Bauhinia vahlii* is as follows:

Kingdom: Plantae
Phylum : Division
Class : Angiospermae
Order : Fabales
Family : Leguminosaceae
Genus : *Bauhinia*
Species : *vahlii*

Botanical Description**Leaves**

This is a huge climber, branches densely hairy, tendrils circinate, usually opposite the leaves. Leaves alternate, petiolate, petiole 7.5 - 9 cm long, cordate at the base, lobed at the apex, orbicular in shape, 10 - 46 cm long and almost as broad, sparsely hairy on the upper and densely hairy on the lower surface. Inflorescence terminal, subcorymbose, densely hairy raceme; bracteoles persistent; Leaves are variable in size, often up to 18 inch in diameter, as broad as long deeply cordate, 11-15 nerved, cleft through about 1 / 3 of the length, sub-coriaceous, dark green and glabrescent above more or less downy beneath; lobes obtuse, rounded petiole 3 - 6 in. long, stout.^{3,4}

Flowers

Flowers white turning buff with age. Hypanthium is 5 - 8 mm long, calyx 3-5 lobed and 10 - 12.5 mm long splitting into 2-3

parts, densely villous. Petals 5 in number, 1.7 - 4.3 cm long, shortly clawed, spathulate, hairy externally. Fertile stamens 3 in number, 2-7 staminodes may be present. Ovary is densely tomentose, style hairy. Flowers are white, on long slender pedicles, in terminal corymbose or corymbose racemes.³

Fruit

Fruit is a flat woody pod with fine rusty hairs, 20-30 cm long. Pod woody, 22.5 - 30 cm long, 5 - 7.5 cm broad, dehiscent, rusty velvety and 6-12 seeded. Seed are flat, dark brown, polished and 2.5 cm in diameter.⁴

Stem

Plants grow up to 10 - 30 m long, woody stem can get as thick bark as 20 cm. The spreading stout branches are covered with rusty fine hair. Branchlets densely pubescent and terminating in a pair of revolute tendrils, young branches, tendrils, petioles, underside of leaves especially along the nerves and inflorescence clothed with dense ferruginous tomentum.³⁻⁴

The Ecological Impact of *Bahunia vahlii*

Climat

Bahunia vahlii found in the Himalayan from Kashmir, India to skim up to altitude of 1500 m; it is consider to be formidable enemy of trees.

Soil

Bahunia vahlii are not particular as type of soil they grow well in both alkaline rocky soil and acid send but it is important that the soil be well drained.

Cultivation

The study of harvesting practices of (*Bahunia vahlii*) Siali Leaves and studies its impact on plant density and regeneration in the natural forest of three districts of Orissa state. They concluded depletion in the growing stock of leaves in the study area. The density of Siali plant was observed very less in koraput, while slightly more in Malkangiri district. Similarly very few seedlings was recorded in Rayagada followed by koraput and Malkangiri district. The plant damage during collection was observed maximum in Rayagada district under various classes i.e. completely damaged highly damaged and mildly damaged followed by not damaged plantson the other hand in Malkangiri district most of the plants were found not damaged during leaf collection. The superior quality of silai leaves was found in Rayagada district with good length and width with no disease infection, while poor quality of leaves was found in koraput and Malkangiri district having having more diseases infection on the leaves.⁵

Scale of Commercial Production

In the survey area of Paderu forest division of Andhra Pradesh, India abundant (*Bahunia vahlii*) mohual leaves can be harvested almost throughout the year. The FDs in this area used to sell Mohual leaves without value addition at Rs. 5 for a bundle of 100 leaves. The forest department has since intervened and imparted training to the FDs to make leaf plates with the help of compressor machine with a value of about Rs. 50,000. The incremental cost benefit of this technological intervention is calculated in Table 1. The analysis in Table 1 indicates that if an average a person can make one unit/bundle per day he / she will earn Rs. 60 (incremental benefit Rs. 30 + labour charges Rs. 30). The

same task can be also performed by a SHG group consisting of four members and one machine. This would provide sufficient work per day for all four members, enabling the group to earn Rs 240 per day. However, assuming in a year there would be maximum of 200 working days then the total incremental benefit would be (Rs. 30 x 4 x 200) Rs. 24,000 p.a. assuming the venture lasts for 10 years, the pay-back period of the venture would be 2 years and 4 months. The NPV of the project at a 10 % discount rate is Rs. 97470/- and at a 15 % discount rate is Rs. 70450/- and IRR is 46 %, both of which are very positive financial returns on the initial investment. If four people contribute Rs. 12,500 each and take up the venture they will receive Rs. 6000 per annum for ten years in addition to each member getting employment for 200 days each year. All above inferences are made assuming that there would be market available for the total output of 800 units (200 units x 4 persons) p.a., but it is recognized that this might not be realistic. In many cases the main problem facing rural enterprises is availability of a market for finished products. Therefore, the developmental governmental agencies and NGOs, should not only impart training to add value to the local resources and interventional investment through microfinance but also to provide the market linkages for the sale of products. Its fibers are used in thatching, binding bidi leaves, making fences and roofing and are collected from Bihar and Orissa.⁶

Micro Propagation and Plant Regeneration

Micro Propagation of *Bauhinia vahlii*

In the first experiment cotyledonary nodes, from *in vitro* germinated seedling, were cultured on various basic media (murashige and skoog medium, woody plant medium, B5 and 1/2 murashige and skoog medium) containing 1.0 μ M thidiazuron. Shoot proliferation and multiplication was best when cultured on Murashige and Skoosg medium. The second experiment is responded to benzyl amino purine, kinetin, zeatin and thidiazuron. Murashige and Skoog medium with 1.0 μ M thidiazuron proved most effective for both shoot proliferation and shoot multiplication.⁷

Regeneration *Bauhinia vahlii*

The regenerate *in vitro* of a mature leguminous liana (*Bauhinia vahlii* Wight and Arnott). In their study Browning was the major obstacle in the establishment of cultures. Explants collected during the growing season (April-June) showed maximum browning; however browning was minimal during the dormant phase. This problem was circumvented by soaking the sterilized explants in a solution of antioxidant (50 mg ascorbic acid, 75 mg citric acid). The explants were thereafter transferred to culture room conditions after an initial incubation in the dark at 4°C for 48 h. Shoot proliferation (58 %), shoot number (4.5) and shoot length (35 mm) was best in Murashige and Skoog (MS) medium supplemented with 2.5 mM, kinetin + 100 mg adenine sulfate. Seasonal fluctuations significantly affected the proliferation potential of the explants. March-April was found to be the best season for shoot initiation. Microshoots were rooted on a half-strength, growth regulator free, agar-gelled Murashige and Skoog medium after a dip in half-strength MS liquid medium containing 1-naphthaleneacetic acid + indole-3-butyric acid (10 mM). Rooted plantlets were potted and acclimatized under culture room conditions for 4 weeks before transfer to a polyhouse. Again regeneration was performed. They were present combined effect of cytokinins on multiple shoot production from cotyledonary node

explants of *Bauhinia vahlii*. An improved regeneration protocol was developed for *Bauhinia vahlii*. A combination of thidiazuron and kinetin increased the number of shoots significantly up to four successive subculture cycles. Over 83 % shoots rooted on one-fourth strength Murashige and Skoog (MS) medium supplemented with 1.0 mM -naphthalene acetic acid (NAA). Fifty percent of plantlets successfully acclimatized in 90 g (w/v) soilrite, sand, soil in the shed house. Preconditioning at different sucrose concentrations prior to acclimatization showed no effect on percent survival but improved plant quality.⁸⁻⁹

Pharmacological Studies

Anti-inflammatory

The petroleum ether, chloroform and ethanol extract of the dried whole plant material of *Bauhinia vahlii* was found having anti-inflammatory effect induced by paw edema at the dose of 353 mg / kg comparable to standard Ibuprofen (100 mg / kg).¹⁰

Anti Diabetic

The ethanolic and chloroform extract of *Bahunia vahlii* at a dose level 353 mg / kg, showed significant reduction in blood sugar level from 2 to 24 h in progressive manner comparable to standard glibenclamide (5 mg / kg).¹⁰

Antimicrobial

The antimicrobial potency of the stem bark of *Bahunia vahlii* have been studied using the petroleum ether, benzene, chloroform and ethanol extract against gram-positive bacteria (two strains), gram-negative bacteria (two strains) by disc diffusion method. The ethanol extract at a concentration of 30 to 60 µg / disc and chloroform extract at a concentration 60 µg / disc showed significant activity against *Candida krusei*, *Candida albicans*, *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*, and *Bacillus subtilis*. The above said extracts of *Bahunia vahlii* have moderate action but chloroform and ethanol extracts have significant activity against *Candida krusei*, *Candida albicans*, *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureu*, and *Bacillus subtilis*. The hexane, ethyl acetate and methanol extracts of *Bahunia vahlii* roots were tested for their antimicrobial activity against gram-positive bacteria (four strains), gram-negative bacteria (three strains) and three fungi strains using micro dilution methods, for the determination of minimal inhibition concentration (MIC) and the minimal microbicidal concentration (MMC). The MIC values of hexane extracts of *Bahunia vahlii* roots were more than 250 µg / ml. The MIC values of ethyl acetate and methanol extracts of *Bahunia vahlii* roots varied from 15.63 to 62.5 µg / mL and 62.5 to 250 µg / ml, respectively. MMC values obtained are two times greater than the corresponding MIC values. The activities of ethyl acetate extracts are attributed to the presence of flavonoids and that of methanol extracts are attributed to the presence of tannins.¹¹⁻¹²

Antioxidant

Extracts were screened for antioxidant and free radical scavenging activities using various chemical and in vitro model systems. In all the models, except DPPH radical scavenging activity, the extract from raw seeds manifested the strongest antioxidant activity than that from processed seeds. In β- carotene/linoleic acid emulsion system and superoxide scavenging activity, the raw seed extract is registered for more activity when compared to the standards

(butylated hydroxyanisole and α-tocopherol). Whereas, the extract from dry heated seed exhibited higher DPPH scavenging activity (IC₅₀: 70.77 µg / mL) than the raw seeds (IC₅₀: 74.4 µg / mL). This study has to some extent validated the antioxidant potential of the seeds of *Bahunia vahlii*.¹³

Ethno Pharmacological Uses

The roots are used for the pulmonary tuberculosis and root juice used in dysentery and root decoction used in fever. In some places root of *Bahunia vahlii* is used as toothbrush to cure the pyorrhea and root extract for treatment of virus induced disease with specific activity toward herpes simplex. Leaves used in the treatment of abrasions and fruit used for anti fertile in women and used as aphrodisiac. Bark is useful for skin disease, diarrhea and pod taken orally as anti-diarrhea, anti-dysentery and seed used in the treatment of pimple and blister. Ethanolic extract is used as mild diuretic in rats and these extract devoid of analgesic effect. Seeds are considered aphrodisiac and tonic. A paste of the seed is applied to boils and given to children suffering from indigestion. *Bahunia vahlii* used in a hoof diseases; boils carbuncle post claving care.¹⁴⁻²⁸

Classical Uses

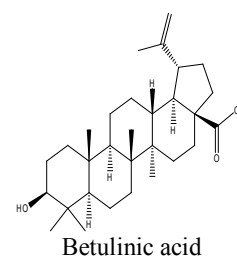
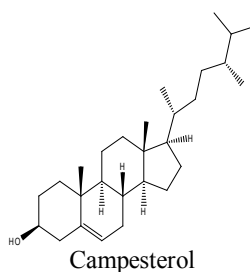
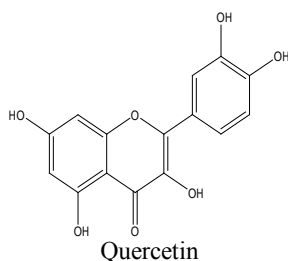
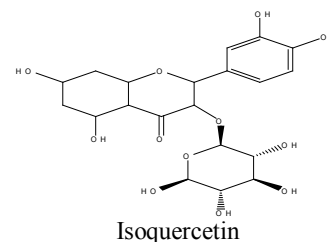
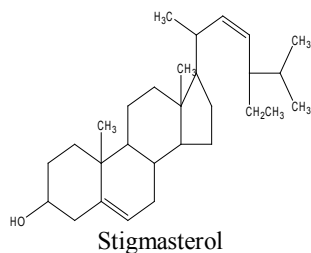
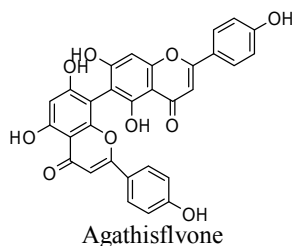
Siali leaf (*Bahunia vahlii*) is an important Non-Timber Forest [NTFP] Product of central and southern Orissa, India. The leaf is mostly used locally by the grocery shops, petty hotels etc as plates and packing material. In the local market it is more precious than the sal leaf. In the rural areas of Ganjam, Gajapati and Phulbani the plates made of Siali leaf is largely being used during the community feasts. The leaf has a fairly good market in Vizag, Srikakulum and Vizianagaram districts of Andhra Pradesh, India. After the NTFP policy of March 2000, its management has been transferred to Gram Panchayats. The importance of the leaf in the socio-economic life of poor tribal is evident from the following narration. The ripe, fried and roasted seeds are eaten by the tribal people. In India people use leaves including leaves of the banana plant, mohual (*Bauhinia vahli*), to eat meals on rather than using plates. Serving meals on leaves is regarded as pure and a good practice during occasions such as marriage parties, birthday parties, death ceremonies, free meals offered during religious festivals and community feasts. Breakfast hotels also use leaves to serve food to customers. Mohual (the national name) or Adda (the local name) leaves are harvested from the creeper, *Bauhinia vahlii*, which produces relatively small leaves which cannot be used as meal plates without adding value in the Form of fastening three to four individual leaves together with wooden nails. In recent years the value addition process has begun to use a machine which has two thick iron plates which compress the leaves to make meals plates. The compressor machine can also be used for making leaf bowls to put curry and liquid food items in such as soup, dal, and ice cream. In the survey area of Paderu forest division of Andhra Pradesh, India abundant mohual leaves can be harvested almost throughout the year. Fiber obtained from stem bark used to makes ropees. *Bauhinia vahlii* is used making of dishes by sewing leaves and long mats. And this plant is also use as soap in bathing.²⁹⁻³³

Phytochemicals Studies

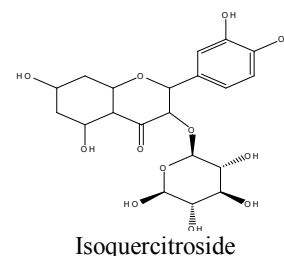
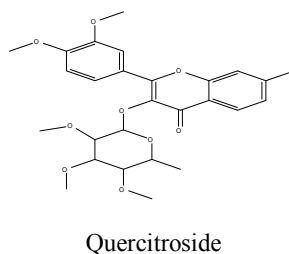
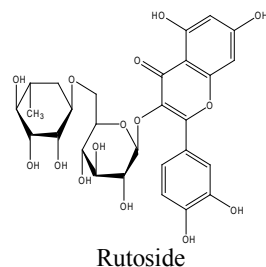
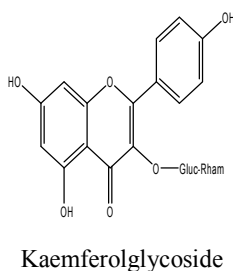
Primary metabolites of *Bahunia vahlii* - The seeds of this legume are a rich source of crude protein (24.59 %), crude lipid (23.26 %), crude fibre (6.21 %), carbohydrates (41.72 %), minerals, and essential amino acids. The extract of raw

seeds contained higher levels of total phenolic (30.8 g / 100 g) and tannins (19.6 g / 100 g) compared to dry heated and soaking, followed by autoclaving seed extracts. Secondary metabolites of *Bahunia vahlii*: The acetone extracts of

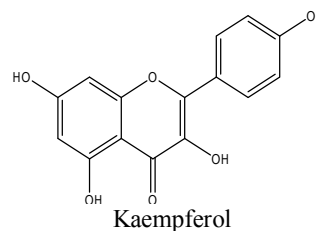
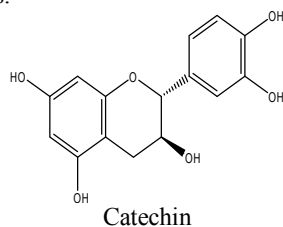
Bahunia vahlii leaves contain agathisflavone, Betulinic acid, campesterol, quercetin, isoquercitrin, β -sitosterol, stigmasterol, Kaempferol and quercetin 3-glycoside were isolated.³⁴



The Quercetin glycoside was the dominating flavonoids of *Bahunia vahlii*. Individual flavanol glycosides Quercitrin, Isoquercitrin, Rutin, Kaempferol glycoside and a taxifolin rhamnoside were isolated from the flower of *Bahunia vahlii*.³⁵



Isolated phenolic constituents from the pods of *Bahunia vahlii*, Dried pods, without seeds, yielded 4 new constituents, viz. methyl 4-O-methylgallate, methylgallate, (+)-mopanol and (+)-catechin and catechin and mopanol together with kaempferol from the flowers.³⁶



CONCLUSION

The present article reviewed research paper since 1977 to till today for pharmacological activity of *Bahunia vahlii*. But it was found out that this plant is not so much explored. So the study of this plant may give an opportunity to scientist to explore the plant. In addition the pharmacological activity studied only in crude extract. Still no work is done on chemical compounds isolated. So in future this work can be extended to explore the plant by its chemical treasure.

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