



***Aphanamixis polystachya* (wall.) Parker - An Important Ethnomedicinal Plant**

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ABSTRACT

Herbal drugs constitute a major share of all the officially recognized systems of health in India. More than 70% of India's 1.1 billion populations still use these non-allopathic systems of medicine. The usage of herbs to treat a variety of different ailments is universal, and exists in every human culture on Earth different Ethno medicinally important plant are available in our surrounding which having lots of medicinal importance. In this paper we are focusing on importance of *Aphanamixis polystachya*(wall.)Parker. Family- *Meliaceae* syn *Amoora rohituka Aphanamixis polystachya* (wall.) parker. Ethnobotanical it is reported as a good remedy for liver disease, enlarged spleen, tumour, and abdominal complaints. It is distributed tropical areas, *Aphanamixis polystachya*(wall.)Parker manly cultivated by seedling and propagation. In this paper we are also discussing about morphological character of Leaves, Flowers, Habit, Diagnostic characters. chemically also it's very enriched plant the number of Chemical constituents like sterol, saponins, flavanone and anthraquinone glycosides, limonoids, triterpenes, an alkaloid, a chromone and three flavonoid glycosides, aphanamixinin, aphanamixin, aphanamixolin, aphanamixolide, aphananin, aphanamixol, amoorinin, prieurianin, amooranin. Scientifically this plant is reported for good antimicrobial activity, cytotoxicity activity, antitumor activity, analgesic activity, *In vitro* thrombolytic study, antiulcer activity, hepatoprotective activity and CNS depressant activity.

Keywords: *Aphanamixis polystachya* (wall.), antimicrobial activity, antitumor activity, analgesic activity, hepatoprotective activity.

INTRODUCTION

Biodiversity of natural resources has served not only for the primary human needs but also for health care, since time immemorial. The Indian subcontinent, with the history of one of the oldest civilization, harbors many traditional health care systems. Their development was supported by the diverse biodiversity in flora and fauna due to variations in geographical landscaping. Ayurveda, whose history goes back to 5000 B.C., is one of the ancient health care systems. The Ayurveda was developed through daily life experiences with the mutual relationship between mankind and nature. The ancient text of Ayurveda reports more than 2000 plant species for their therapeutic potentials. Besides Ayurveda, other traditional and folklore systems of health care were developed in the different time periods in Indian subcontinent, where more than 7500 plant species were used. According to a WHO estimate, about 80% of the world population relies on traditional systems of medicines for primary health care, where plants form the dominant component over other natural resources. Renewed interest of developing as well as developed countries in the natural resources has opened new horizons for the exploration of natural sources with the perspectives of safety and efficacy. The development of these traditional systems of medicines with the perspectives of safety, efficacy and quality will help not only to preserve this traditional heritage but also to rationalize the use of natural products in the health care. Until recent past, the nature was considered as a compendium for templates of new chemical entities (NCEs). The plant species mentioned in the ancient texts

of these Ayurveda and other Indian systems of medicines may be explored with the modern scientific approaches for better leads in the health care¹.

STUDY OF APHANAMIXIS POLYSTACHYA

Characteristics of Meliaceae Family

The Meliaceae or the Mahogany family is a flowering plant family of mostly trees and shrubs (and a few herbaceous plants, mangroves) in the order spindles. They are characterized by alternate, usually pinnate leaves without stipules, and by syncarpous, apparently bisexual (but actually mostly cryptically (unisexual) flowers borne in panicles, cymes, spikes, or clusters. Most species are evergreen, but some are deciduous, either in the dry season or in winter. The family includes about 50 genera and 550 species, with a pan tropical distribution, one genus (*Toona*) extends north into temperate China and south into southeast Australia, and another (*Melia*) nearly as far north².

MORPHOLOGICAL STUDY

Leaves

Leaves spaced along branches, spiral (leaves occurring singly at a node and arranged spirally up the branch let), compound (a leaf made up from two or more leaflets), petiole present, not winged, attached to base of leaf blade, swollen (at base and inhabited by ants), leaves pinnate (unbranched with more than three leaflets), petiole not swollen, rachis present, absent, absent, leaves with a terminal leaflet (the number of leaflets odd - imparipinnate), broadest below middle, (7.5-) 9.5-



25.0 cm, (4.0-) 5.5-8.0 (-9.0) cm, leaflets opposite, asymmetric, terminal developing leaflet buds straight, venation pinnate, secondary veins open, prominent, intramarginal veins absent, leaves lower surface green, upper surface green, indumentums (hairs) absent, absent, domatia absent, stipules absent³.

Flowers

Inflorescence axillaries (sweetly aromatic), flowers on an unbranched axis, cones absent, flowers unisexual or bisexual, unisexual with male and female flowers on different plants, stalked (shortly), flowers with many planes of symmetry, 3.0-5.0 (-7.0) mm long, diameter small (up to 10 mm diam.) (4-9 mm diam.), perianth present, with distinct sepals and petals whorls, inner perianth pale yellow or cream-colored (sometimes tinged with red), 3, some or partly joined, stamens 3-8, present, joined (to form a staminal tube), at base joined to the perianth; ovary superior, carpels joined (when more than one), locules 3 (-4), styles solitary³.

Seeds

A few, black with orange-red aril, globose. Seed either winged and then usually attached to a large woody columella, or unwinged and then usually with a fleshy arillode or sarcotesta, rarely with a corky or woody sarcotesta, usually exendospermous, occasionally endospermous. Embryo with Plano-convex or flat, collateral, superposed or rarely oblique cotyledons, radical usually superior, less frequently biaxial, included, extending to surface or long-exserted³.

Diagnostic characters: Leaves paripinnate and imparipinnate, crowded at the apex of the branches, leaflets opposite, base acute and asymmetrical. Flowers polygamous. Fruit a capsule, seeds with orange-red aril².

Habit: Evergreen tree up to 8 m. tall, about 15 cm. in DBH, branches ascending or horizontal to main trunk².

Trunk & bark: Trunk longitudinal fissured, bark up to 1 cm. thick, blackish-grey, inner bark brown².

Branches and branchlets or twigs: Branches pubescent, the first twigs yellow, tomentose then glabrescent, terminal buds densely covered with yellow hairs².

Exudates: Exudates absent².

CULTIVATION ASPECTS

Germination

Amoora can be propagated by seed, which can be collected from underneath the tree or from the branches. Seed germination ranges from 80-90% in 20-22 days after sowing. The seed loses its viability quickly in 2-3 months².

Establishment of seedling and propagation

Seeds are to be collected and sown in seedbeds or polybags. Planting of seedlings in the field are preferred after the plants reach 75 cm tall. Weeding is done for

equal time interval. The propagation is done through nursery raised seedling or by sowing the seeds directly².

Distribution

West Sepik, East Sepik, Madang, Morobe, Western Highlands, Eastern Highlands, Southern Highlands, Western, Gulf, Central, Northern, Milne Bay, New Britain, New Ireland & Manus., from Asia and Oceania. China, Bhutan, India Sri Lanka, Indochina, Burma, Thailand, Indonesia, and Malaysia. Within India, Goa, Nagpur. China, Malaysia, Vietnam and Laos.²

Habitat and ecology

In evergreen or open degraded forests from 400 to 600 m. altitude, along the river².

Ethnobotanical uses

root bark in abdominal complaints like enlargement of gland, liver and spleen disorder and corpulence. seed have refrigerant, laxative, antihelmintic activities used against the diseases of blood and scale back muscular pain. oil of seed is used to treat rheumatism and conjointly has pesticides character. bark and seed of plant are useful for ulcer. Various part of the plant have been reported to possess analgesic, Antimicrobial, antioxidant, antitumor CNS depressant, hepatoprotective, laxative, membrane stabilizing activities.

CHEMICAL CONSTITUENTS

aphanamixinin, aphanamixin, aphanamixolin, aphanamixolide, aphananin, aphanamixol, amoorinin, prieurianin, amooranin, β -sitosterol, stigmasterol, dammer-(20:21)-ene-(24:25)-epoxy-3 β -O- α -L-rhamnopyranosyl-(1 \rightarrow 4)-b-D-xylopyranoside, 1,5-dihydroxy-6,7,8-trimethoxy-2-methyl-3-O- β -D-xylopyranoside, naringenin 7,4'-dimethylether-5-O- α -L-rhamnopyranoside, poriferastrol-3-rhamnoside, betulin-3b-O- β -D-xylopyranoside, 8-C-methyl-5,7,3',4'-tetrahydroxyflavone-3-O- β -D-xylopyranoside, fatty acids, tannins. Fruit shell contains triterpenes aphanamixin.

Bark contains tetra nortriterpene, aphanamixinin. leaves contain diterpene, alcohol, aphanamixol and β -sitosterol. Seed yield a limonoid, rohitukin, polystachin and other an alkaloid, a glycoside and a saponin. a chromone and three flavonoid glycosides have been reported from the root².

RECENT SCIENTIFICALLY PROVED PHARMACOLOGY OF A PHANAMIXIS POLYSTACHYA

1. Cell growth inhibition *In vivo* cell growth inhibition was carried out by the method as described by Sur and Ganguly (1994)⁴.
2. Analgesic activity by Hot plate method and Acetic acid-induced writhing test, Tail immersion test⁵.
3. CNS depressant activity Hole crosses test and Open field test⁵.

4. Antimicrobial screening The Kirby-Bauer disc diffusion method was used to evaluate the antibacterial potential⁶.
5. Cytotoxic activities by brine shrimp lethality bioassay⁶.
6. Total phenolic in the fruit extracts was measured as a way of determining antioxidant activity according to Folin-Ciocalteu method⁶.
7. *In Vitro* and *in vivo* antioxidant activity by Determination of DPPH radical scavenging Activity Nitric oxide scavenging assay.⁶
8. *In vitro* thrombolytic study.⁶
9. Treatment of mice with stem bark extract of *Aphanamixis polystachya* reduces radiation-induced chromosome damage⁷.
10. *In vitro* Membrane Stabilizing Activity⁸.
11. Study of Anthelmintic activities of bark extract of *Aphanamixis polystachya*⁹.
12. Evaluation of *Aphanamixis polystachya* as a Source of Repellents, Antifeedants, Toxicants and Protectants in Storage against *Tribolium castaneum* (Herb)¹⁰.
13. Effect of the crude extracts of *amoora rohituka* stem bark on gastrointestinal transit in mice¹¹.
14. Phytochemical analysis and bioactivities of *Aphanamixis polystachya*(Wall)Parker Leaves¹².
15. Antimicrobial screening of *aphanamixis polystachya*¹³.

STATES OF APHANAMIXIS POLYSTACHYA ON CONSIDERATION OF PHYTOCHEMISTRY

1. A new saponin from seeds of *amoora rohituka*¹⁴.
2. Aphanalides A-H, ring A-seco limonoids from the fruits of *Aphanamixis Polystachya*¹⁵.
3. Aphapolynins A and B, two new limonoids from the fruits of *Aphanamixis polystachya*¹⁶.
4. Aphananin, a triterpene from *aphanamixis polystachya*¹⁷.
5. Guaiane sesquiterpenes from *Amoora rohituka*¹⁸.

DISCUSSION AND CONCLUSION

Aphanamixis polystachya(wall.) Parker is a well known plant used in the Indian system of medicine, besides folklore medicine also claims its use in cancer, ulcer, liver disease, cough, enlarged spleen, jaundice, and Research carried out using different *in vivo* and *in vitro* techniques of biological evaluation support most of these claims. Recent studies have focused mainly on its antiulcer, antimicrobial, hepatoprotective, analgesic, CNS depressant, antimutagenic, antiproliferative and antioxidant activities. Literature survey reveals that despite the enormous work done on this plant some of the pharmacological activities are still not proven scientifically some of the compounds present in *Aphanamixis polystachya* (wall.) Parker aphanamixinin,

aphanamixin, aphanamixolin, aphanamixolide, aphananin, aphanamixol, amoorinin, prierianin, amooranin, β -sitosterol, stigmasterol are pharmacologically well known and provide additional supporting evidence for possible mechanism of action. This review was an attempt to compile an up-to-date and comprehensive review of *Aphanamixis polystachya* that covered its distribution, description, cultivation aspects traditional, morphological study, and medicinal uses, phytochemistry and pharmacology.

REFERENCES

1. Mukherjee KP, Wahile A, Integrated approaches towards drug development from Ayurveda and other Indian system of medicines, Journal of Ethnopharmacology, 103, 2006, 25-35.
2. Fabricant DS, Farnsworth NR, The value of plants used in traditional medicine for drug discovery Environment Health Perspect, 109, 2001, 69-75.
3. Mabberley DJ & Sing AM, Indian Forester Flora Malesiana, 62, 1995, 188-193.
4. Rowshanul HM, Mohaimenul IM and Rezaul KM, Antitumor activity of *Amoora rohituka* Roxb Stem against Ehrlich as cites carcinoma in mice, Biharean Biologist, 5(2), 2011, 109-112.
5. Mokarram M, Biva IJ, Jahangir R and Mynol IV, Central nervous system depressant and analgesic Activity of *Aphanamixis polystachya* (Wall.)Parker leaf Extract in mice, African Journal of Pharmacy and Pharmacology, 3(5), 2009, 282-286.
6. Sarker AA, Chowdhury AF, Khatun F, Amaluddin AMT, Pathan AH, Phytochemical screening and in vitro evaluation of pharmacological activities of *aphanamixis polystachya*(wall) parker fruit extracts, Tropical Journal of Pharmaceutical Research, 12 (1), 2013, 111-116.
7. Jagetia CG and Venkatesha AV, Treatment of mice with stem bark extract of *aphanamixis polystachya* reduces radiation-induced chromosome damage, International journal of radiation biology, 82(3), 2006, 197-209.
8. Sikder IDM, Amin AL, Kuddus DM, Kaiser DMR, Abul KS, and Mohammad AR, in vitro membrane stabilizing activity total phenolic content free radical scavenging and cytotoxic properties of *aphanamixis polystachya* (wall.), Bangladesh pharmaceutical journal, 13(2), 2010, 55-59.
9. Khantanveer R, Karmakar P, Das A, Banik R, Sattar MM, evaluation of cytotoxic and anthelmintic activities of bark extract of *Aphanamixis polystachya*(wall.),international research journal of Pharmacy, 4(4), 2013, 2230-8407.
10. Talukder AF, Howse EP, evaluation of *Aphanamixis polystachya* as a source of repellents, antifeedants, toxicants and protectants in storage against *tribolium castaneum* (herbst), Journal of stored product and research, 31, 1995, 55-61.
11. Chowdhury R, Rashid BR, effect of the crude extracts of *Amoora rohituka* stem bark on Gastrointestinal transit in mice, Indian journal of pharmacology, 35, 2003, 304-307.
12. Sarker AA, pathan AH, ferdous A, hossan BS and islam DMR, phytochemical analysis and bioactivities of



- aphanamixis polystachya(wall)parker leaves from bangladesh, journal of biological science,13,2013,393-399.
13. Saklani S, Mishra AP, Satih B, Sati E, Pharmacognostic phytochemical and antimicrobial screening of Aphanamixis polystachya, an endangered medicinal tree, international journal of pharmacy and pharmaceutical sciences, 4, 2012,235.
 14. Bhatt KS, Saxena KV, and Nigama SS, new saponin from seeds of Amoora rohituka, journal of phytochemistry, 20(7),1981,1749-1750.
 15. Wang JS, Zhang Y, Wang BX, Kong ling-yi, Aphanalides a-h, ring a-seco limonois from the fruits of Aphanamixis polystachya, journal tetrahedron, 68(21),2012,3963-3971.
 16. Zhang y, Wang S, Wang, xiao-bing, wei DD, guang JL, lu jun,yang HM, kong LY aphapolynins a and b, two new limonoids from the fruits of aphanamixis polystachya, journal tetrahedron letters, 52,2011,2590–2593.
 17. kundu AB, Ray ST and Chatteree A, Aphananin, a triterpene from aphanamixis polystachya, journal of phytochemistry, 24(9), 1985, 2123-2125.
 18. Chowdhury R, Hasan CM, Rashid MA, Guaiane Sesquiterpenes from Amoora rohituka, Journal of Phytochemistry, 62, 2013, 1213–1216.
 19. Chatterjee A, Kundu AB, Chakraborty T, Chandrasekhar N. S, Extractives of Aphanamixis polystachya Wall Structures and stereochemistry of aphanamixin and aphanamixinin, Tetrahedron, 26 (8),1970,1859-1867.
 20. Alluri VK, Rao CV, Rao VN, Reddy KN and Golakoti T, In vitro and in vivo antioxidant activity of Aphanamixis polystachya bark, American Journal of Infectious Diseases,5 (2), 2009, 60-67.
 21. Arora DS, Chandra P, Assay of antioxidant potential of twoAspergillus isolates by different methods under various physio-chemical conditions, Brazil Journal of Microbiology, 41(3), 2010, 765-777.
 22. Chowdhury NS, Alam MB, Haque ASMT, Zahan R, Mazumder MEH, Haque ME, In vitro free radical scavenging and thrombolytic activities of Bangladeshi aquatic plant Aponogeton undulates Roxb, Global Journal of Pharmacology, 5(1),2011,27-32.
 23. Ainsworth EA, Gillespie KM, Estimation of total phenolic content and other oxidation substrates in plant tissues using Folin-Ciocalteu reagent. Nat Product, 2(4), 2007,875-877.
 24. Peteros NP, Uy MM, Antioxidant and cytotoxic activities and phytochemical screening of four Philippine medicinal plants, Journal of Medicinal Plants Res,4(5),2010,407-414.

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