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MEDICINAL IMPORTANCE OF ODINA WODIER, ROXB., A BRIEF REVIEW STUDY

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ABSTRACT

Plants serve humans as primary sources for food, shelter and medicines. So understanding the plant uses in treating the diseases is very important for leading a healthier life. Our ancestors have used many plants as medicines and there is a need to provide scientific evidence for the same. *Lannea coromandelica* is one of such important plants well distributedin India. It is commonly called as Odiar, Gumphini in South India. It was extensively used by the tribes all over India to treat various diseases some of them include body pains, tooth ache, stomach ache, ulcers, sexual impotency. Many investigations on the chemistry of the plant have been done. They revealed the plant contains majorly Polyphenols including Flavonoids and Tannins, Terpenoids, Gums, and Polysaccharides. Not much scientific support was given to the folklore claims of the plant and some of its traditional uses have been investigated including Wound Healing activity, Hypotensive activity, Anti-microbial activity and Zoo sporicidal activity. This article is the review of research works done on the plant *L.coromandelica* till to date. As a part of it the local names, morphology, traditional claims, chemistry, pharmacological activities have been discussed.

KEYWORDS: Lannea, Polyphenols, Flavonols, Folklore uses, antioxidant, antimicrobial activity, Wound Healing activity, Medicinal importance.

INTRODUCTION

In the Medicinal history, so far we have come across many plants used by our ancestors astheir primary source for the treatment of diseases. In consideration to their active chemicalprinciples and medicinal properties they were extensively used in the traditional

systemsof Indian medicine like Ayurveda, Siddha, Unani, each of them having their own therapeuticuses. Some of them scientifically proven and some were still to prove. One of suchplants is *Lannea coromandelica* belonging to family Anacardiaceae, claims for its position among the best medicinal plants in the country. This plant so far was extensivelystudied for its chemical constituents and pharmacological activities. The tree gained itsimportance due to remarkable variations in the chemistry and uses. A number of researchersattempted to reveal the claims of the plant and succeeded in proving the same. Stillmany of the traditional uses of this plant are devoid of a recorded scientific proof. Thisarticle features the review of pharmacognostical, pharmacological activities and thetraditional uses of *Lannea coromandelica*. This hopefully supports the previous research and helps the future research on the plant.[1]

The latex from leaf and stem bark is used to treat heel cracks.Juice of leaves is taken orally to prevent white discharge in women.[2]

Plant Biography[3]

Botanical name: *Lannea coromandelica* (Houttuyn) Merril.

Family: Anacardiaceae (Spondiadae).

Synonyms

Dialium coromandelicum Houttuyn, *Lannea grandis* (Dennstedt) Engler, *Calesiam grande* (Dennstedt) Kuntze, *Haberlia grandis* Dennstedt, *L. wodier* (Roxburgh) Adelber, *Odinapinnata* Rotte, *O. wodier* Roxburgh, *Rhus odina* Buchanan-Hamilton.

Common names

It is commonly called as Indian Ash Tree, Moya, Wodier. The plant is distributed all overIndia and linguistic variations lead in various names to the plant. Some of them are givenbelow.

Sanskrit	**Jhingini**
Hindi	Mohin
Telugu	Appriyada, Ajasrngi, Gumphini
Manipuri	Aaman
Marathi	Moi, Shemat, Shimati, Shinti
Oriya	Indramai, Moi
Konkani	Moi
Tamil	Oti
Malayalam	Otiyan-maram

Kannada	Godda, Gumpina, Kuratige, Udimara
Bengali	Jiola
Coorgi	Goddana-mara
Assamese	Jia
Gujarati	Mavedi

Fig. 1: The branch showing leaves of *Lannea coromandelica.*

Distribution and Morphology

The genus Lannea constitutes about 40 species of trees, shrubs, and undershrubs. They are widely distributed in Africa, but only one species, *Lannea coromandelica* (Houtt.) Merr., is located in tropical Asia. This plant is a small deciduous tree which is cultivated mainly for living fence posts. it grows up to 14 m tall, in regions with high sunlight, good drainage and has a bright red blaze. Its bark is light and has branchlets which concentrate at the end of branches. Branchlets are minutely covered with starry hairs. Leaves are alternatively arranged, imparipinnate as shown in (Figure 1). Leaflets are usually 5-7, opposite, ovate, acute tip, entire margin and covered by velvet hair when young. Flowers are unisexual, green

in colour. The male is compound and female is simple raceme. They contain 4 broad ovate Sepals, about 1 mm long. Petals are 4 in number, 2 mm long, oblong, greenish yellow colour with stamens twice the number of petals. They turn into yellow at the time of falling. Usually the tree flowers in months between February and April. Fruits occur as drupes, 3-5 loculed, dull red to pink in colour. The fruiting season is between May to July. The tree when injured exudes a brown gum that turns black on drying. It also has been noted to be glassy white in colour. *L. coromandelica* is strongly irritant.[4]

Folklore claims: As it was said the plant is widely distributed all over Indian forests, its local names vary widely and were mentioned in the table. Merlin franco F et. al. studied 4 communities of khoraput district of Orissa namely kondh, poraja, gadaba and bonda communities. They examined many plants used for various diseases by the people in those communities and reported *L. coromandelica* has local names kanbeli marnu and paalkaara, pithmari, pithmari, pithmari respectively and found that the plant twigs used as toothsticks by all the fourcommunities, bark used for skin diseases by poraja people, tender leaves and roots for stomach ache by poraja and gadaba communities and roots in brew by gadaba people.[5] The plant was known as Gopid by the Gond tribes in Mendha village, Dhanora taluka of Gadchiroli dist. of Maharastra state in Central India. Its fruits are crushed and mixed with water and is used as fish poison.[6] It is Raji Mohi in oriya and Expirements revealed that the bark contained Flavonoids and Terpenoids, but no Alkaloids and Steroids were reported.[7] The stem bark of *Lannea coromandelica* known as Jiga Bark by the Garo tribes in Madhapur forest region of Bangladesh was used to treat seminal weakness and excessive seminal emissions.[8] The Indian ash tree was called locally as Ziza by the tribes Mt. Yinggeling, Hainan Island, China. The decotion and macerated extracts of the leaves and bark of the plant was taken orally to treat injuries and hematochizia.[9] The tree barkknown as Tawitawsuak in Mizoram, India is traditionally used as astringent, in ulcers andsore, leaf is used in swellings, sprains and pain of the body.[10] This plant was locally called as gumphini by the people in Sriharikota island, Nellore, India. Traditionally the leaf juice was orally taken to relieve ulcers and applied in mouth to treat toothache, stem bark is made into a paste and used to treat body pains, wood is used to make agricultural implements. Spiritually it is used to avoid evil spirits.[11] Locals of goa call it as moi and use the bark of the plant for tanning. It was also claimed to be used as antidote in coma caused by narcotics, to treat dyspepsia, general debility, gout, dysentery, sore eyes,leprosy, sprains and bruises.[12] Dumpidi plant bark is being used as a bandage to treat bone fracture by lambada tribes of Nizamabad District,

Andhra Pradesh, India.[13] Lannea was called as Jingini by people of Rajasthan, India. In folklore the gum is soaked in water, rubbed on stone and applied locally, to treat pain. The inner bark of stem is crushed and the juice is squeezed over cuts to stop bleeding and to prevent tetanus.[14] The total importance value index of the plant in Mota Magra Forest of Udaipur, Rajasthan was reported and in comparision to the values of the plant growing in various regions of the forest was listed.[15] Reports suggested the plant is as important as Neem, sacred tree of India. The hardwood of *Lannea coromandelica* is used for making bleachable pulp and to feed the wild silkworms.[16]

Table 1. Traditional uses and Local names of *L. coromandelica.*

Region	Local name	Plant part used	Medicinal uses
Khoraput district of Orissa	Kondh tribe-Kanbeli, marnu	Twigs	Tooth sticks
	Poraja tribe-paalkaara, pithmari	Bark	Skin diseases
	Gadaba tribe-pithmari,	Leaves and roots	Stomach ache
	BONDA tribe-pithmari	Roots	Brew
Gadchiroli district of Maharastra	Gond tribes- gopid	Fruits	Fish poison
Orissa	Raji-mohi	Bark	-
Madhapur forest region of Bangladesh	Garo tribes-Jiga Bark	Bark	Seminal weakness and excessive seminal emissions.
Mt.Yinggeling, Hainan Island, China.	Ziza	Decoction and macerations	Injuries and Hematochizia.
		of leaves and bark	
Mizoram, India	Tawitawsuak	Bark	Astringent, in ulcers and sore, leaf is
			Used in swellings, sprains & Pain of the body.
Sriharikota island, Nellore dist., India	Gumphini	Leaf juice	Ulcers, applied to treat tooth ache
		Stem bark paste	Body pains
		Wood	To make agricultural implements
Goa, india	Moi	Bark	Tanning, as antidote in coma caused by narcotics,
			To treat dyspepsia, general debility, gout,
			Dysentery, sore eyes, leprosy, sprains and bruises.
Nizamabad District, Andhra Pradesh, India	Lambada tribes- dumpidi	Bark	Bandage to treat bone fracture, impotency
Rajasthan, India.	Jingini	Gum- soaked in water, rubbed	Pain
		On stone and applied	

		locally	
		The inner bark of stem- crushed	Stops bleeding and to prevent tetanus.
		and the juice is squeezed over cuts	

Chemical constituents

All the plant parts, gums, stems, leaves, flowers and bark were investigated for the chemical constituents. The plant was reported to contain various compounds like Carbohydrates including Gums, Proteins, Glycosides, Terpenoidsss, Polyphenols. Preliminary phytochemical analysis of the bark revealed the presence of Terpenoids and Flavonoids.[8] Some of the therapeutically important chemical compounds have been given below.

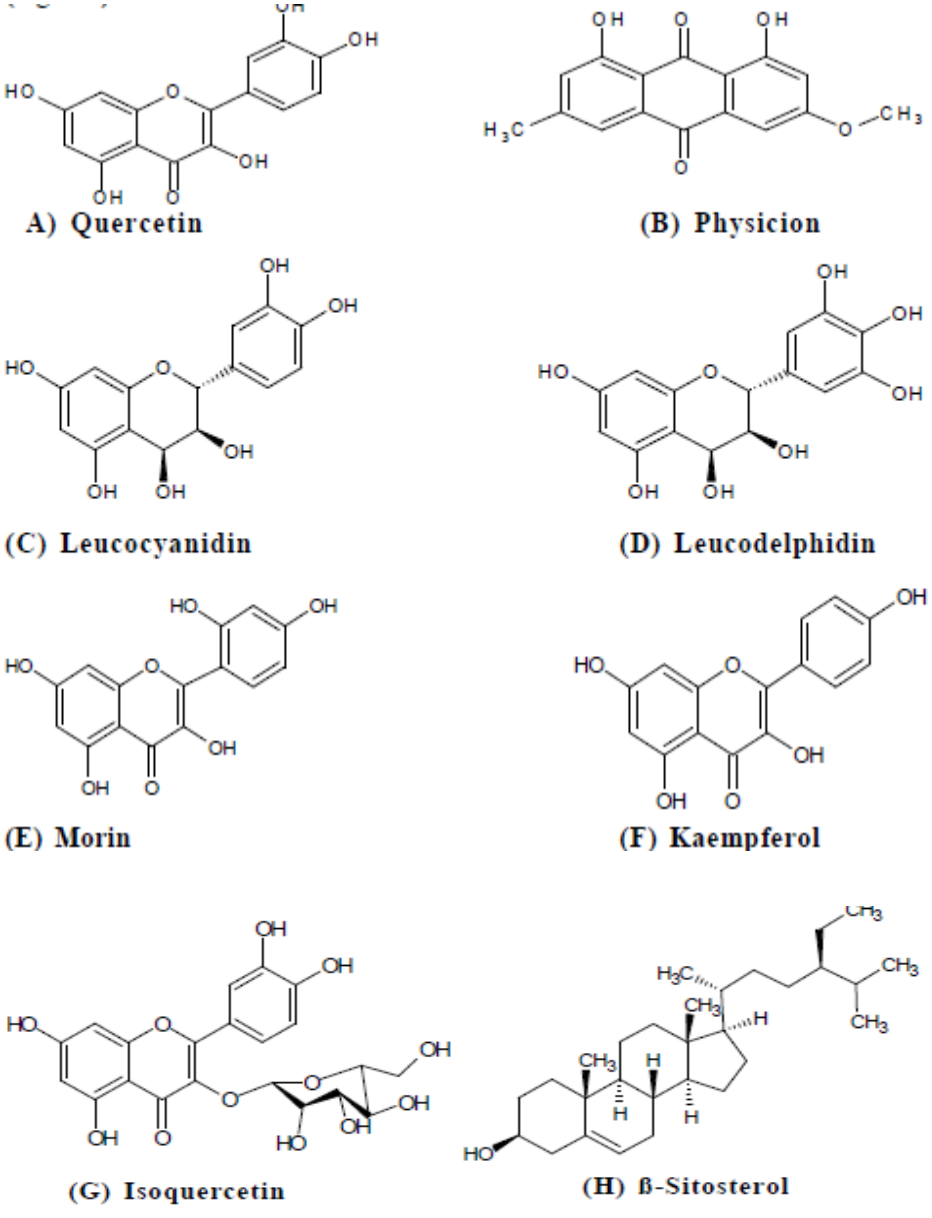

Fig. 2. Structures of some important chemical compounds identified in *L. coromandelica*

The Petroleum Ether extract of stem bark contained ß-Sitosterol and Physcion (B). Physcion anthranol-B was present in the successive hot chloroform extract of the preceeding. The mother liquor contains Physcion. ß-Sitosterol (H) from the ether extract, Leucocyanidin from the acetone extract, Microcrystalline powder from the ethylacetate extract of the heart wood has been reported. Majorly Polyphenols have been identified in the flower including various classes of compounds like Tannins, Flavonoids, Flavonols, Flavanones, Isoflavones and Flavonol glycosides. Tannins like Ellagic acid and a Flavonoid glycoside, Quercitin- 3-arabinoside have been isolated from the ether and ethyl acetate fractioned alcoholic extract of fresh flowers. The crude alcoholic extract of flowers contained Isoquercitin (G).Leaves were proven to contain ß-Sitosterol, Ellagic acid, Quercetin (A), Quercetin-3-arabinoside, Leucocyanidin (C) and Leucodelphinidin (D).[18] The Flavanols present in the plant are its Dihydro derivatives which include (2R, 3S)-(+)- 3,5-dihydroxy-4,7 dimethoxydihydroflavonol, (2R,3S)-(+)-4,5,7-trimethoxydihy droflavonol, (2R,3S)-(+)-4,7-di-O-methyldihydroquercetin, (2R,3S)-(+)-4,7-di Omethyldihydrokaempferol (F) and (2R, 3S)-(+)-4-O-methyldihydroquercetin have been identified in the plant.[17] Morin (E), a flavonoid aglycone was also isolated from the plant and the possible structure was identified as 3,5,7,2',4'-OH-flavone.[19] The chemical composition of gums is mainly arabino-3,6-galactan containing D-galactose (69.5%), L-arabinose (11%), 4-O-methyl uronic acids (17%), L- rhamnose (2.5%) and proteins (1.38%). Specific rotation and specific viscosity of the gum were found to be +27 and 11.7 ml/g respectively.[20] The three aldobiouronic acids constitute 4-O-(a-D-galactopyranosyluronic acid)-D-galactose, 6-O-(ß-D-glucopyranosyluronic acid)-D-galactose, and 6-O-(4-O-methyl-Dglucopyranosyluronicacid)-D-galactose. Controlled acid hydrolysis revealed the Linkage System in the degraded gum which was 3-O-ß-L-arabinofuranosyl-L-arabinose, 3-O-ß Larabinopyranosyl- L-arabinose, 3-a-D-galactopyranosyl-L-arabinose, 3-O-ß-D-galactopyranosyl-D-galactose, and 6-O-ß-D-galactopyranosyl-D-galactose.The methanolysis of the gum resulted in neutral polysaccharide in which the 4-O-methyl derivatives namely 2,3,4-tri-O-methyl-Lrhamnose, 2,3,5- and 2,3,4-tri- and 2,5-di-O-methyl-L-arabinose, 2,3,4,6-tetra-, 2,3,6-, 2,4,6-, and 2,3,4-tri-, and 2,6- and 2,4-di-O-methyl-D-galactose, 2,3,4-tri-O-methyl-D-glucuronic acid and 2,3,4-tri-O-methyl-D-galacturonic acid were identified.[21] In molar terms this methylated polysaccharide from the gum on hydrolysisyields one mole of 2,3,4,6-tetra-O-methyl-D-galactose, four moles of 2,3,6-tri-O-methylo- galactose, three moles of 2,6-di-O- methyl-D-galactose and two moles of 2,3,5-tri-Omethyl arabinose.[22]

LITERATURE

Macroscopical Examination: The macroscopical features observations of the leaf were carried out as per Wallis.[23]

Microscopical Examinations**:** The powder, transverse section and macerate of the leaf were used for this study. Following Trease and Evans.[24]

Quantitative Evaluations**:** The moisture content was determined following *Indian Pharmacopoeia.*[25] The ash value, acid insoluble ash and extractive values (water and alcohol) were determined using methods described by Kokate, Brain and Turner.[26,27]

Qualitative Phytochemical Screening: The crude drug powder of hydro-ethanolicextract of the leaf of *Odina wodier* wassubjected to qualitative analysis for presenceof chemical constituents. The different qualitative chemical tests wereperformed for establishing phytochemicalprofile of extract obtained from soxhletextractions. The follsowing tests wereperformed on the extract to detect variousphytoconstituents present in it.[28.29]

Medicinal Importance of the plant

Antioxidant activity

Valli G. et al. in 2012, explains thePreliminary phytochemical studies of *Odinawoodier leaf* and the In-vitro anti oxidant study of DPPH radical scavenging at different concentration (25-200µg/ml) in methanol and ethyl acetate extract of *Odinawoodier* leaf were measured. The radical scavenging effect was found to increase with increasing concentrations.[30]

Srinivas Rao. Et al. in 2014, explains the different concentrations of ethanolic extract of bark regarding radical scavenging activity with an IC50 value 83.28 ug/ml using DPPH.[31]

Antimicrobial activity and wound healng

Antimicrobial activity of the different extracts of the plant including leaves of *cassia tora linn* was evaluated in 2010 by Gouranga das and Durbadal ojha.[32]

Sathish R et al. in 2010, was evaluated the antimicrobial and wound healing activity on bark of *lannea coromandelica* and it determined by disc diffusion method. it shows the significant wound healing activity on mice.[33]

Antidiabetic and analgesic activity

Islam et al. in 2016, explains the ethanolic extract of bark of lannea coromandelica and reported the antidiabetic activity in mice and it possesses substantial analgesic activity in heat induced models.[34]

Antiarthritic activity

Deepa selvaraj et al. in 2015, shows the preliminary phytochemical studies, in vitro anti oxidant and anti arthritic study, the ethanolic extaract of leaves of lannea coromandelica shows enhanced anti arthritic potency.[35]

Antibacterial and phytochemical studies

Prabhakaran et al in 2010, express the root of lannea coromandelica have better antibacterial action compare to leaves and bark of the plant.[36]

Hypotensive activity

The ethanolic extract of the plant was administered to anasthetised dogs and rats at a dose of 5-100 mg/kg to dogs and 1-25 mg/kg in rats intravenously. It showed a reduction in the arterial blood pressure so can be used as hypotensive agent. It was found no effect in vagotomized and eviscerated dogs, but spinal preparation showed a slight increase in hypotension.[37]

Zoo sporicidal activity

The first natural Polyflavonoid tannins against an oomycete phytopathogen ever reported was found to be isolated from this plant. The stem bark extracts of *Lannea coromandelica*pocess zoosporicidal acitivity against viable spores of *Aphanomyces cochlioides*. The MIC was found to be 0.1 microg/Ml.[38]

CONCLUSION

Plants are natural sources of bioactive compounds to treat various life threatening diseases. *Lannea coromandelica* has showed various phytochemicals which means that it can be used for treating diseases. The review shows the activity of various parts of the plant and its pharmacognostic profile. Extracts and phytoconstituents isolated from this plant have shown to produce different pharmacological response, which includes Antioxidant, Antimicrobial, wound healing, Antidiabetic, Analgesic, Antiarthritic, Antibacterial effects. Considering all the above medicinal importance of *Lannea coromandelica* it can be concluded that further

studies on these plants may helpful for future researchers to develop some newmedicinal drugs.

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