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A REVIEW ARTICLE ON AN ANDAMAN'S ENDEMIC SPECIES i.e. ANDAMAN REDWOOD (*PTEROCARPUS DALBERGIOIDES* ROXB.) WHICH IS DESCRIBED IN AYURVEDA AS VIJAYSAR

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ABSTRACT

The Andaman and Nicobar Islands, one of the seven union territories of India, are a group of islands at the juncture of the Bay of Bengal and Andaman Sea. The Andaman and Nicobar Islands have a tropical rainforest canopy, made of a mixed flora with elements from Indian, Myanmar, Malaysian and endemic floral strains. Andaman Redwood is endemic to Andaman Islands, and is the state tree of A & N Islands. known as the Andaman padauk, Andaman redwood or East Indian mahogany, is a species of legume having latin name *Pterocarpus dalbergioides* Roxb. ex DC. in the Fabaceae family. It is sometimes called "narra", but this is just a generic term used for any of several *Pterocarpus* species.). The chief use of the timber is for decorative purposes, such as panelling, parqueting, balustrades and cabinet work. Andaman Padauk has been proposed as a Rosewood substitute in musical instrument manufacture but is not yet used very extensively due to its colour. This *Pterocarpus* speciesis known as Vijaysar which is described in Ayurveda as BIJAKA having Indications like in madhumeha, kushtha, shtoulya, vrana, krumi, visarpa. Many modern researches are done to estabalised its antidiabetic activity. The present review article was undertaken to explore the medicinal properties of Andaman redwood (*Pterocarpus dalbergioides* Roxb.) as described in diffedrent Ayurveda text.

INTRODUCTION

The Andaman and Nicobar Islands, one of the seven union territories of India, are a group of islands at the juncture of the Bay of Bengal and Andaman Sea. The territory is 150 km (93 mi) north of Aceh in Indonesia and separated from Thailand and Myanmar (Burma) by the

Andaman Sea. It comprises two island groups, the Andaman Islands and the Nicobar Islands, separated by the 10°N parallel, with the Andamans to the north of this latitude, and the Nicobars to the south (or by 179 km). The Andaman Sea lies to the east and the Bay of Bengal to the west.

Flora of Andaman - The Andaman and Nicobar Islands have a tropical rainforest canopy, made of a mixed flora with elements from Indian, Myanmar, Malaysian and endemic floral strains. So far, about 2,200 varieties of plants have been recorded, out of which 200 are endemic and 1,300 do not occur in mainland India.

The South Andaman forests have a profuse growth of epiphytic vegetation, mostly ferns and orchids. The Middle Andamans harbours mostly moist deciduous forests. North Andamans is characterised by the wet evergreen type, with plenty of woody climbers. The North Nicobar Islands (including Car Nicobar and Battimalv) are marked by the complete absence of evergreen forests, while such forests form the dominant vegetation in the central and southern islands of the Nicobar group. Grasslands occur only in the Nicobars, and while deciduous forests are common in the Andamans, they are almost absent in the Nicobars. The present forest coverage is claimed to be 86.2% of the total land area.

This atypical forest coverage is made up of twelve types, namely:[1]

1. Giant evergreen forest
2. Andamans tropical evergreen forest
3. Southern hilltop tropical evergreen forest
4. Cane brakes
5. Wet bamboo brakes
6. Andamans semi-evergreen forest
7. Andamans moist deciduous forest
8. Andamans secondary moist deciduous forest
9. Littoral forest
10. Mangrove forest
11. Brackish water mixed forest
12. Submontane forest

Andaman Redwood is endemic to Andaman Islands, and is the state tree of A & N Islands.known as the **Andaman padauk**, **Andaman redwood** or **East Indian mahogany**, is a species of legume in the Fabaceae family. It is sometimes called **"narra"**, but this is just a generic term used for any of several *Pterocarpus* species.

Flowering: May-July.Andaman Redwood *(Pterocarpus dalbergioides*) is a large deciduous to semi-deciduous tree with buttresses. Bark is thick, rough, flaky and reddish inside, peeling in irregular scales. Leaves are alternate, pinnately compound, imparipinnate, pulvinate; leaflets 5-9, ovate-lanceshaped, alternate with tapering tip. Flowers are small yellow, borne in panicles at branch-ends and in leaf-axils. Fruit is a flat, round, winged and long stalked pod. Pod does not split open, has a single kidney-shaped seed.[2]

MATERIALS AND METHODS

Taxonomy

Kingdom – Plantae

Phylum – Tracheophyta

Class – Magnoliopsida

Order – Fabales

Family – Fabaceae

Scientific Name – Pterocarpus dalbergiodes Roxb.

Common Name – Andaman Redwood, Padouk, Narra

Pterocarpus dalbergioides is a large tree species endemic to the Andaman islands. The species bears cultural significance as it produces a valuable timber, it can be classed as one of the most decorative Indian timbers and is worth protecting and cultivating. Within some parts of the island the species is dominant and forms pure stands, or 'padouk' forests. The species is commonly present in the deciduous and semi-deciduous forest in almost all the Islands of Andaman. The species geographic range is relatively restricted. Assuming it is found across all the islands of the Andaman the species estimated extent of occurrence (EOO) is 14,679 km2. It is estimated that over the past three generations the population has declined by at least 30% as a result of historical timber harvesting. Logging of the species is now more strictly controlled but the species habitat is becoming fragmented. The overall population size of the species is not known but it is considered to be in decline due to poor seed regeneration, with no saplings or seedlings being found across 106, 0.1 ha sites. The tree is long lived and

thought to need forest disturbance for there to be significant regeneration. The species is assessed as Vulnerable.

Range Description- *Pterocarpus dalbergioides* is endemic to the Andaman Islands. It occurs in both southern and northern parts of the Andamans. There are no point data records for this species but assuming it occurs across all the islands that make up the Andamans south to Little Andaman islands the species has a potential estimated extent of occurrence (EOO) of 14,679 km2.

Use and Trade - This species is harvested for its valuable timber which is mostly exported to the Indian mainland. The species produces a prized redwood which is used for furniture making, joinery, inlay, flooring, tool handles, veneer, boat building and decorative features (Prasad *et al.* 2008). The chief use of the timber is for decorative purposes, such as panelling, parqueting, balustrades and cabinet work. Andaman Padauk has been proposed as a Rosewood substitute in musical instrument manufacture but is not yet used very extensively due to its colour. Compared to the more common African Padauk, which is listed on CITES, Andaman Padauk is considered to have a finer texture (Terence 2010). It was also used for billiard tables, interior work in first-class railway carriages and Pullman cars. The East Indian Railway used this timber for first- and second-class carriages and even an aircraft propeller was made of this timber (Pearson and Brown 1932). It is estimated that overall timber exports for the Andamans are 75,000 m3 (Sekhsaria 2001) but the volume contributed by *P. dalbergioides* is not known. Most harvest is from wild sources and the species is also thought to be subject to illegal logging. The species is also grown as a street tree in Africa and is known to be cultivated on the mainland of India too (Louppe *et al.* 2008).

Major Threat(s) - This species is threatened by illegal logging on the Andaman Islands (Prasad *et al.* 2008, Sekhsaria 2001). This is leading to population decline within the wild. The species also suffers from poor regeneration, reducing its capacity to bounce back after illicit cutting and putting the future viability of the species at risk. The species also has a small native range which puts it at greater risk from depletion. Its native forests are also becoming fragmented, generating further risk to the species (Prasad *et al.* 2008).

Conservation Actions - This species is reported from at least half a dozen *ex situ* collections (BGCI PlantSearch 2017). It was previously assessed as Data Deficient on the IUCN Red List 1998. It is recommended that the remaining species habitat is protected or well managed

to ensure the longevity of the species. Trade of this species is presently highly restricted by different policies of the forest department of the Andaman & Nicobar administration and activities for its multiplication, reintroduction and conservation are occurring under various programmes. There are restrictions even for carrying the samples out of the Islands without prior permission from the Forest Department (S. Deepu pers. comm. 2017). They are also practicing selective felling and plan to restock the species in the wild (J. Alappatt pers. comm. 2017). This requires further investigation for the best germination and propagation practice for the species. Regeneration may require investigation as it is likely the species needs an open canopy to grow (S. Deepu pers. comm. 2017).[3]

Related Species

- **African Padauk** (Pterocarpus soyauxii)
- **Amboyna** (Pterocarpus indicus)
- **Burma Padauk** (Pterocarpus macrocarpus)
- **Muninga** (Pterocarpus angolensis)
- **Narra** (Pterocarpus indicus)
- **Zitan** (Pterocarpus santalinus)

Other Uses: The bark is a source of tannins. The heartwood is variable, mainly a rich crimson hue or shades of red to brown, often with darker red or blackish streaks, it is sometimes pale red or yellowish; the narrow band of sapwood is greyish. The texture is rather coarse; the grain generally interlocked; dull to lustrous; without characteristic odour or taste. The heartwood is rated as very durable and also resistant to termite attack. The wood is moderately hard; it is not difficult to saw and machine but because of interlocked grain does not dress to a smooth finish; it turns well; takes a good polish. It is used for light to heavy construction, joists, rafters, beams and interior finish. It is also used to make high quality furniture, panelling, musical instruments, high-grade cabinet work, interior joinery, billiard tables, decorative flooring, agricultural implements, veneer, etc Because it withstands weathering, wearing and insect attacks, it is used for bridges, piles, posts, railway sleepers and mine timbers[4].

Description of vijaysar from Different Ayurvedic text[5]

बीजकः कुष्ठवीसर्पश्वित्रमेहव्रणक्रिमीन् ।

हन्ति श्लेष्मास्त्रपित्तं च त्वच्यः केश्यो रसायनः ॥ (भा. प्र.)

Vijaysar is described in Ayurveda as BIJAKA, its descriptions are given in Ayurveda text are as follows –

Synonyms – Asana, pitasala, Priyaka.

Classical categorization

Sushrut samhita – salsaradi gana

Vagbhata – Asanadi gana

Ayurvedic properties (Rasa Panchaka)

Rasa – kashaya, tikta

Virya – sheet

Guna – laghu, ruksha

Vipaka – katu

Karma – Kaph pittahar, keshya, rasayana, twachya

Indications- Madhumeha, kushtha, shtoulya, vrana, krumi, visarpa.

Doshkarma – Kaphpittashamak

Sthanik karma (local actions) –sothhar, sandhaniya, kusthaghna, keshya.

Abhyantar (systemic actions) – sthambhan, krumighna

Raktavahasansthan **–** raktasodhan, raktapittashamak

Mutravahasansthan – mutrasangrahaniya, madhumehhar.

Prajanan sansthan – yonidoshhar

Twacha – kusthaghna

Satmikaran – rasayan, sandhaniya.

Therapeutic usage

1) Raktapitta – alkali (kshar) of asana are used.

2) Slipada – paste of heartwood of khadira,asana and sala with cow's urine may be useful.

3) Sthoulya – decoction of heartwood of asana should be taken in the morning with honey.

4) Madhumeha - – decoction of its heartwood is used in madhumeha,its decreases the quantity of urine,also controls blood sugar and reduces complications of hyperglycamemia[6]

Important formulation – Bijakarista

Part used – heart wood, stem,gum

Controversy – Pterocarpus marsupium is known as vijayasara, dymock has given gum of this tree known as kamarkas' and china gond. It is known as a gum kino tree. Kinogum was imported in india but nobody used it, as Dragon's blood (ham khes khajwan) was in used instead of kinogum.[7]

Modern Researches and Study on Vijaysar

Vijaysar and Aloevera both have the potency to be used as anti-diabetic drugs for type 2 DM. Both of them control FPG, 2h PG and complications associated with diabetes mellitus. Vijaysar has some additional property other than glucose lowering effects. Antioxidant effect of Vijaysar prevents the complications due to oxidative stress in diabetes. Non enzymatic glycation of macromolecules (proteins) are responsible for multi organ defects like diabetic nephropathy, retinopathy, neuropathy, etc. Antiglycation property of Vijaysar prevents these complications on chronic administration. Vijaysar may be used in type 1 DM along with insulin as supportive therapy, because it has β- cell regeneration properties as found by many researches in their studies. (-) -Epicatechin has β- cell regeneration properties it is found in bark of Vijaysar. If this molecule can synthesise, it can be used in type 1 DM. Concomitant use of Aloevera and Vijaysar may be useful for lowering FPG. However this combination may antagonise the effects on 2hPG.[8]

P. marsupium modulates the inflammatory cytokine TNF-α in type 2 diabetic rats. Drug at 200 mg/kg dose has more pronounced effect. Rasayana property of *P. marsupium* is related with its potential anti-diabetic activity.[9]

Pterocarpus marsupium Roxb. (Leguminosae) is a plant drug belonging to the group called rasayana in ayurvedic system of medicine.[10] Rasayana drugs are immunomodulators and relieve stress in the body.[11] In ayurveda, aqueous extract of heart-wood of *P. marsupium* is used in treatment of diabetes.[12] Although there are several reports on *P. marsupium* as an anti-diabetic drug,[13 –15]

DISCUSSION

Andaman Redwood (*Pterocarpus marsupium* Roxb.) is endemic to Andaman Islands, and is the state tree of A & N Islands.known as the **Andaman padauk**, **Andaman redwood** or **East Indian mahogany**, is a species of legume in the Fabaceae family. It is sometimes called **"narra"**, but this is just a generic term used for any of several *Pterocarpus* species. This species is harvested for its valuable timber which is mostly exported to the Indian mainland.

The species produces a prized redwood which is used for furniture making, joinery, inlay, flooring, tool handles, veneer, boat building and decorative features,but it is not only used for its timber value its has a great medicinal properties which is described in Ayurveda. This *Pterocarpus* speciesis known as Vijaysar which is described in Ayurveda as BIJAKA having Indications like in madhumeha, kushtha, shtoulya, vrana, krumi, visarpa. Many modern researches are done like Antiglycation property of Vijaysar prevents complications on chronic administration, Rasayana property of *P. marsupium* is related with its potential anti-diabetic activity, Antioxidant effect of Vijaysar prevents the complications due to oxidative stress in diabetes.

CONCLUSION

Andaman Redwood which is one of the speciesis of Pterocarpus,is endemic to Andaman Islands, it is mainly used in Andaman for furniture making, joinery, inlay, flooring, tool handles, veneer, boat building and decorative features etc.but its has a great medicinal properties which described in Ayurveda, This *Pterocarpus* speciesis known as Vijaysar which is described in Ayurveda as BIJAKA.which used in madhumeha, kushtha, shtoulya, vrana, krumi, visarpa. Also from different modern researches it shows it has antidiabetic, Antiglycation, Rasayana properties.

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