

1. Agarū [Aquilaria agallocha Roxb.]

- Synonym:** *Aquilaria malaccensis* Lam.
Family: *Thymelaeaceae*
Hindi name: *Agar*
English name: *Eagle's wood, Agar wood, Aloe wood*



Plant of *Aquilaria agallocha* Roxb.

Introduction

The word “Agarū” literally means the one which is the heaviest and no other aromatic wood is heavier (garu) than it.

Since thousands of years, Agarū “The wood of God” has been used for multiple purposes throughout the world. Besides its commercial, historical, spiritual, aromatic, medicinal, and social significance, it is considered as a symbol of high status, wealth, and prosperity. Its use has been reported in many old testaments of Ayurveda, and in Chinese, Tibetan, European, and East-Asian texts. In the ancient Hindu epic, the Mahābhārata, Agarū is referenced as a welcome offering. In the Holy Bible, the spiritual significance of Agarū is demonstrated with it being used along with myrrh in the anointing of Jesus Christ following his crucifixion. The spiritual importance of Agarū in Buddhism was similarly demonstrated when it was used among other fragrant products in the cremation of Buddha.

Being highly priced and valuable, Agarū has equaled or exceeded the price of gold; hence, it was often referred to as “black gold” in the past.

Agarū is also cited thrice in the Holy Bible as a fragrant product for intimacy and seduction. In Islamic texts, Agarū appears as a conspicuous fragrance used in the ritual burning of incense, for spiritual purification, and as one of the rewards in paradise. Agarū wood mixed with camphor was the preferred scent of the Prophet Muhammad. In Arabian medicines, its oil is used for aromatherapy.

Due to its distinctive fragrance, Agarū is used abundantly for making incense sticks, perfumes, and soaps. Its wood is also used for making sculptures and carvings. In middle-east countries, beads prepared from its wood are used to keep oneself safe from evil spirit and for bringing good luck (Sampson et al 2018).

Medicinal uses of Agarū have been recorded in many pieces of Indian, Greek, Roman, Chinese, Middle Eastern, and European literature since ancient times by people of diverse culture. It is reported to be used as a folklore medicine in inflammatory diseases, skin diseases, headache, arthritis, vomiting, gout, etc. In traditional Chinese medicine, Agarū is used as a chi-regulating drug and carminative medicine



to relieve gastric problems, coughs, rheumatism, and high fever. It can promote chi-circulation to relieve pain, warm the middle energizer to arrest vomiting, and regulate respiration to relieve asthma (National Pharmacopeia Committee 2015).

Acharya Charak has referred to Agarú as an ushna virya dravya in spite of having tikta rasa (C.S.Su. 26/49). Charak also advocated applying paste of Rasna and Agarú to counteract the effect of cold in agraya dravyas (C.S.Su. 25/40). Sushrut used Agarú as dhupan dravya along with Guggulu, Ral, and Shoma in the treatment of karnasweda and vrana.

Because of its consistent high demand and slow natural growth rate, the plant is facing severe scarcity in nature. This is the reason for it being highly priced in trade and for placing it under the category of critically endangered or vulnerable species. Owing to its rapid declining rate, all the species of *Aquilaria* have been placed in the Appendix II list of the Convention on International Trade in Endangered Species of Wild Fauna and Flora since 2004 (CITES 2004).

Vernacular Names

Arabic: Oud, Oodh, Shajarat-al-oudh

Assamese: Sasi, Sashi, Agarú

Bengali: Agar chandan, Agarkastha

Chinese: Chenxiang

Hong Kong: Aloe wood

Indonesia: Gaharu

Japanese: Jinko

Kannada: Krishna Agarú

Malayalam: Akil

Punjabi: Ooda, Pharsi

Tamil: Agalichandanam

Telugu: Agarú

Thailand: Mai kritsana

Synonyms

Anaryaka: It grows abundantly in the forest region of the Northeast of India.

Krimija: The plant is infested by fungus.

Krimijagdh: The gum resin is produced by fungal infestation.

Loha: The infested heartwood is heavy and black like iron.

Pravar: It means a substance which is best among its class.

Rajarha: Due to its valuable nature and great utility, it is used by royal families.

Sheetshaman: It has cold-allaying property.

Shringaj: The plant grows in hilly region.

Vanshika: The plant is gregarious in nature like the bamboo plant and has a nauseating smell.

Varnaprasadana: The heartwood is used to enhance luster of the skin.

Vishvadhupa: The aromatic wood is used for making incense and perfumes.

Yogaj: The resinous wood is produced by fungal association.

Classical Categorization

Charak Samhita: Sheetprasasmana, Shwasahara, Tikta skanda

Sushrut Samhita: Salasaradi, Eladi, Shleshmasansaman

Ashtang Hridaya: Salasaradi, Eladi

Dhanvantari Nighantu: Chandanadi varga

Madanpal Nighantu: Karpuradi varga

Kaiyadev Nighantu: Oushadi varga

Raj Nighantu: Prabhadradi varga

Bhavaprakash Nighantu: Karpuradi varga

Distribution

Agarú is a native plant of China, India, Indonesia, Malaysia, Philippines, Laos, Thailand, Singapore, Sri Lanka, Tibet, Europe, and Africa.

In India, the plant is found growing naturally in evergreen forests of Eastern Himalayas. It grows at an altitude of 700 to 1400 m. It is found in abundance in Assam, Tripura, Meghalaya, Nagaland, Sikkim, Manipur, Bhutan, Khasi hills, etc. Agarú obtained from Sylhet region is considered the best.

Morphology

A large evergreen tree about 70 to 80 ft in height and 4 to 5 ft in girth with a straight and fluted stem. Initially its wood is soft, light, elastic, whitish yellow in color without any characteristic smell. Later as the fungal infection progresses it becomes heavy and black (Fig. 1.1).

- **Leaves:** Simple, alternate, ovate-lanceolate to lanceolate-oblong in shape, about 8 to 10 cm long



Fig. 1.1 Stem.



Fig. 1.2 Leaves.



Fig. 1.3 (a) Inflorescence and (b) flowers.

and 2 to 3 cm broad, short petioled, silky glossy surface, and entire margin (Fig. 1.2).

- **Flowers:** Inflorescence of many small, greenish yellow-colored flowers on short peduncle umbels occurring on younger branchlets (Fig. 1.3a, b).
- **Fruits:** Capsule, obovoid shape, slightly compressed, yellowish, and tomentose (Fig. 1.4).
- **Seeds:** Brownish black colored, ovoid shape with a long tail (Fig. 1.5).
- **Heartwood:** Dark resinous wood which is formed when the plant becomes infected with a type of fungus (ascomycetous mold). Species of *Aspergillus*, *Fusarium*, and *Penicillium* are reported to be associated with the development of infection. Prior to infection,

the heartwood is odorless, relatively light, and pale colored; however, as the infection progresses, the tree produces a dark aromatic resin in response to the attack, which results in accumulation of a very dense, dark resin in the heartwood. The infected resin-embedded wood is known as Agarwood (Fig. 1.6). Infection is more common on the trunk, roots, and area where branches divide. The formation of Agarwood starts when the tree attains the age of 20 years. On an average, approximately 30 mL oil is extracted from 100 kg of infected Agarwood. Oil extracted from the wood is popularly known as Oud oil. The plant is propagated by seeds.



Fig. 1.4 Fruit.



Fig. 1.5 Seeds.



Fig. 1.6 Heartwood.

Phenology

Flowering time: May to June

Fruiting time: July to August

Key Characters for Identification

- > An evergreen 70 to 80 ft tree with straight and fluted stem
- > Leaves: simple, alternate, ovate-lanceolate, silky glossy surface
- > Flowers: small, greenish yellow in axillary inflorescence
- > Heartwood: dark, resinous, heavy, aromatic, and is infected with fungus

Types

- Dhanvantari Nighantu describes Kaleyaka as a type of Agar
- Sodhala Nighantu describes three types of Agar: Agar, Krishna Agar, and Kakatunda Agar
- Raj Nighantu describes five types of Agar: Krishna Agar, Kasht Agar, Daha Agar, Mangalya Agar, and Agurusaar
- Arthashastra describes three Agar wood products:
 - Jongaka: Black or variegated black in color and having variegated spots
 - Dongaka: Black in color
 - Parasamudraka: Black in color and smells like navamallika (Shamasastri 1915)

Rasapanchaka

Guna	Laghu, Ruksha, Tikshna
Rasa	Katu, Tikta
Vipaka	Katu
Virya	Ushna

Chemical Constituents

Agar's heartwood is rich in essential oil, resins, alkaloids (liriodenine), saponins, steroids, terpenoids, tannins,



flavonoids (aquisiflavoside, aquilarisin, aquilarisin, and aquilarixanthone), and phenolic compounds (Satapathy et al 2009). Agaru wood predominantly contains 2-(2-phenylethyl)-4H-chromen-4-one derivatives and sesquiterpenes.

Chromone derivatives include 7,8-dimethoxy-2-[2-(3'-acetoxyphenyl)ethyl]chromones, 6-methoxy-2-(2-phenylethyl)chromones, 6,7-dimethoxy-2-(2-phenylethyl)chromones, aquilarone A-I, aquiseninone A-D, tetrahydrochromone A-M, and quinanone A-D.

Sesquiterpenes include agarol, aquilochin, α & β agarofuran, norketoagarofuran, agarspirol, 10-epi-g-eudesmol, jinkoeremol, jinkohol, kusunol, dihydrokaranone, oxoagarospirol, qinanol A-F, aquilarabietic acid A-K, aquilarin B, aquilacallane A-B, aquimavitalin, abietane ester, gmelofuran apigenin, and 4',7-dimethyl ether (Wang et al 2018; Srivastava et al 2016).

Agaru oil contains selinene, dihydroselinene, agarol, b-agarofuran, vetispira-2(11), valerianol, dihydrokaranone, and tetradecanoic acid (Naf et al 1992, 1995).

Identity, Purity, and Strength

- Foreign matter: Not more than 1%
- Total ash: Not more than 13%
- Acid-insoluble ash: Not more than 0.5%
- Alcohol-soluble extractive: Not less than 1%
- Water-soluble extractive: Not less than 2%

(Source: The Ayurvedic Pharmacopeia of India 2004).

Karma (Actions)

In various samhitas and nighantus, Agaru is described as tikshna, snigdha, sheetprasasmana, varnaprasadan (blood purifier), tvachya (skin tonic), pitta vardhaka (pitta aggravating), shirovirechan (procedure used for head purification), mangalya (auspicious), sugandhik (aromatic), and rochak (relish) in properties. Nighantus recommended its use in the form of lepa (topical application), udvartana (powder massage), and dhum pana (medicated inhalation therapy). Raj Nighantu has described the properties and action of five types of Agaru, which are as follows:

- Krishna Agaru: Katu, tikta rasa, ushna, sheet when applied externally and pittahara when taken orally, slightly tridoshahara.

- Kastha Agaru: Katu, ushna, ruksha, and kaphashamaka
- Mangalya Agaru: Sheet, yogavahi, aromatic
- Daha Agaru: Katu, ushna, keshvardhak, varnya, with persistent aroma
- Agarusaar: Katu, kashaya, ushna, produces aroma on burning, vatashamaka
- Doshakarma: Vata kapha shamaka, pitta vardhaka
- Dhatukarma: Rasayana, tvachya
- Malakarma: Vata anulomaka

Pharmacological Actions

Its heartwood and oil is reported to have antinociceptive, antimicrobial, analgesic, antiinflammatory, antihyperglycaemic, antipyretic, antioxidant, ulcer-protecting, anticancerous, hepatoprotective, antihistaminic, anxiolytic, and thrombolytic properties (Alam et al 2015).

Indications

Traditionally, Agaru's heartwood and oil is used in the treatment of sheet (chill), karna akshi roga (ear and eye diseases), shwasa (asthma), kustha (skin diseases), dustha vana (chronic ulcers), visha (poison), and shirashool (headache). Charak suggested an external application of Agaru and Rasna to counteract the effect of cold. Sushrut uses Agaru taila for dustha vana shodhana (cleansing of chronic wound), krimi (microbes), and kustha.

It is also used as a mouth freshener, carminative, and an appetizer in digestive ailments, and it relieves itching, improves blood circulation, and gives relief in cough, bronchitis, and asthma. Agaru oil massage is effective in rigors in fever. Its oil is used to treat toothache, colic pain, and pains during pregnancy (Burfield and Kirkham 2005).

Therapeutic Uses

External Use

1. **Sotha** (edema): Chanda (choraka), Agaru paste is applied externally to decrease edema (A.H.Ci. 17/36, C.S.Ci. 12/70).
2. **Dadru, Kustha** (skin diseases): External application of oil prepared by Agarusaar and Sinshipa is used in chronic nonhealing ulcers and skin diseases like dadru, kitibh, and kustha (S.S.Ci. 31/5).



Internal Use

1. **Shwasa and Hikka** (asthma and hic-cough): Agarwood powder mixed with honey twice daily is used as leha to get relief in shwasa and hikka (C.S.Ci. 17/129). Incenses of Agarwood can also be used to get relief in respiratory congestion and asthma.
2. **Kasa** (cough): Taking 1 to 3 g of Agarwood's heartwood powder with honey gives relief in kasa (A.H.Ci. 3/47).
3. **Lavanmeha** (a type of diabetes): Decoction prepared with Patha and Agarwood is used to cure lavanmeha (S.S.Ci. 11/8).
4. **Rasayana** (Rejuvenators): Daily intake of Agarwood powder with milk gives rasayana effect (A.H.U. 39/104-105).

Official Parts Used

Heartwood and oil

Dose

Powder: 1 to 3 g

Oil: 1 to 5 drops

Formulations

Agaruvadi taila, Chandan Agarwood kwath, Anu taila, Madhukasava, Chandanadi taila, Shwasahara kasaya churna, Guduchyadi taila, Khadiradi gutika.

Toxicity/Adverse Effects

There are no reported side effects of Agarwood when used in recommended dose. Agarwood oil being pitta aggravating in nature can cause redness and irritation on local application, while inhalation of excessive fumes or oral intake may result in nausea, dizziness, and burning sensations.

Substitution and Adulteration

Other species of *Aquilaria*, such as *A. crassna*, *A. malaccensis*, and *A. sinensis*, are used as Agarwood's substitutes.

Points to Ponder

Qualities of best Agarwood:

- It should be black in color.
- It should be extremely heavy and aromatic.
- It should be oily in appearance and taste.
- It should sink in water.
- It should burn easily with a bright flame giving off a pleasant smell.

Suggested Readings

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