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Cover: *Minervarya cepfi* & *Nyctibatrachus petraeus*—mix media. © P Kritika

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REVIEW

Exploring the agarwood trade in India and its promising horizon

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Abstract: Agarwood, often referred as "liquid gold," is a valuable aromatic resinous substance with longstanding significance in cultural and religious practices, being utilized in perfumes, incense, medicines, and funeral pyres in some communities. Agarwood is one of the major cash crops in northeastern India, and plays a vital role in the livelihood of local people. The commonest cultivated agarwood source is *Aquilaria malaccensis* Lam., and we found that large quantities of *Aquilaria malaccensis*, and small quantities of *Aquilaria crasna* and *Aquilaria filaria* were also imported and re-exported after value addition. Agarwood is listed in Appendix II of the CITES, hence its international trade is regulated by the CITES Management Authority. However, few instances of proper export with a CITES permit are observed despite there being an export quota since 2021. At the same time, the ongoing monopoly in the Agarwood industry and informal trade is adversely impacting Agarwood cultivation and trade in India. A lack of knowledge of government policies, marketing, CITES regulations, and procedures for obtaining CITES permits is contributing to market inefficiency. India has a significant gap between Agarwood production capacity and actual exports. This presents a strong opportunity to shift from a re-export hub to a primary exporter. This article aims to inform stakeholders at all levels about the production and consumption of Agarwood in India, trade factors associated with its derivatives in the global market, and trade issues arising from restrictions, government policies and regulations in India.

Keywords: *Aquilaria malaccensis,* artificial inoculation, CITES, country of origin (CoO), export, illegal logging, import, legal procurement certificate (LPC), non-detrimental findings (NDFs), livelihoods, policy, re-export, smuggling.

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INTRODUCTION

Agarwood, also known as 'Gaharu' or 'Oud', is an aromatic resinous product obtained from the heartwood of infected trees of the genus *Aquilaria* Lam. and *Gyrinops* Gaertn. (Thymalaeceae). Agarwood, often referred to as 'liquid gold', is cherished for its fragrance and is utilized in perfumes, incense, and medicines. It has also gained importance in cultural and religious practices, and is utilized by different communities in funeral rites (Chakrabarty et al. 1994; Yaacob 1999). The major commercial product derived from Agarwood are resinous wood chips and agarwood essential oil (Images 1E,F). The resinous chips are primarily burned as incense owing to their distinctive fragrances, whereas agarwood oil is widely used as a high-value ingredient in perfumes, air fresheners, cosmetics, aromatherapy products, and pharmaceutical formulations (Chakrabarty et al. 1994). Besides these products, other plant parts also possess commercial value. The dried leaves of Agarwood (*Aquilaria malaccensis*) are processed into herbal tea, while the bark is used for making ropes and the wood serves as fuel for fumigation (TRAFFIC 2005). In addition, 'Boya', an oil extracted from non-resinous wood, is commonly used in the manufacture of smokeless flavoured tobacco products.

Globally, approximately 13 agarwood-producing species belonging to the family Thymelaeaceae are known to yield commercially valuable resin and its derivatives (Lee & Mohamed 2016; Tan et al. 2019). Among these, *A. malaccensis* and *A. crassna* are the two most economically important species cultivated for the commercial purposes (Rasool & Mohamed 2016). In India, the most widely cultivated species is *Aquilaria malaccensis* Lam. (Image 1A), which ranges throughout Bangladesh, Borneo, Bhutan, India, Indonesia, Malaysia, Myanmar, Philippines, Singapore, and Thailand. In India, *A. malaccensis* is distributed throughout the northeastern states, with major cultivation in Assam and Tripura, followed by Manipur, Nagaland, Meghalaya, Mizoram, and Arunachal Pradesh. Apart from the north-east, it is also cultivated in Karnataka, Kerala, West Bengal and Telangana. In addition to *A. malaccensis*, an endemic species *A. khasiana* Hallier f. is found in the Khasi Hills of Meghalaya in India (Barden et al. 2000; Wilson & Kitto 2012; RFRI 2021).

The agarwood industry in India has historically been dominated by a few trading families, particularly in Assam. Before the partition of the Indian subcontinent, traders from Dakshinbagh in Sylhet (now in Bangladesh) played a major role in the agarwood trade by leasing designated forest areas, locally known as 'Assam Agar Mahals', for agarwood extraction and processing (Chakrabarty et al. 1994). In the post-independence era, commercial distillation units were established as cottage/micro industries in upper Assam, especially in Hojai, Naharani, Kakajan, Namti, and Charaidew regions. Over time, the industry expanded across the northeastern states and more recently into southern India. Excessive and largely unregulated harvesting of wild agarwood trees during the 20th Century severely depleted natural populations across northeastern India. Wild populations in Assam and Tripura were considered nearly extirpated due to indiscriminate felling (Chakrabarty et al. 1994). Extensive harvesting between 1950 and 1980 resulted in a significant decline of natural populations in Arunachal Pradesh. This trend of depletion extended to Manipur and Nagaland, where wild populations are now critically diminished. Presently, the wild population of agarwood are confined mostly to some protected areas and very few to remote non-forest areas. As a consequence, *A. malaccensis* was listed in Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) in 1995. CITES, an international agreement among countries to regulate or ban the international trade of species under threat, had legally banned the export of agarwood from India until November 2021 due to insufficient documentation of the wild and cultivated stocks of agarwood. The absence of an export quota until November 2021 and other trade restrictions affected the livelihood of people associated with the agarwood trade and led to illegal practices. However, the import of agarwood, value addition and re-export was continued by a few select business people.

According to CITES, the international trade of specimens of species included in Appendix II, is allowed only if the scientific authority of the state advises that the export will not be detrimental to the survival of the species. Based on the non-detriment findings (NDFs) and advice of the scientific authority, the export of the species is either banned or allowed through quota. The export quota is fixed by the scientific authority and approved by the management authority of the respective parties. In India, the first NDF assessment of *A. malaccensis* was done by the Rain Forest Research Institute (RFRI), Jorhat in 2021. In 2023, the Botanical Survey of India (BSI), Kolkata conducted the second NDF and updated the export quota. However, despite high export potential, only a few export instances have happened in India through the proper channel by obtaining CITES export permit. Whereas, imports and re-exports continued as usual. Considering this, we

Image 1. A—*Aquilaria malaccensis* cultivation in Mon District, Nagaland | B—Naturally infected tree | C—Artificially induction by nailing | D—Resinous wood | E—Agarwood chip | F—Agarwood oil. © BSI NDF team.

have collected information on the scope of agarwood cultivation in India, government policies, regulatory mechanism and procedures for international trade.

Potential for Agarwood Cultivation and Agroforestry

The growing international demand for agarwood, coupled with the rapid depletion of natural populations due to overexploitation, has necessitated the large-scale cultivation of *A. malaccensis* as a sustainable alternative to harvesting from wild sources (Rasool & Mohamed 2016). *A. malaccensis* is a fast-growing and adaptable tree species that can attain a diameter at breast height (DBH) of approximately 25–40 cm within 5–7 years under favourable environmental conditions. The species can be cultivated across a wide range of soil types, including marginal lands; however, optimum growth is achieved in well-drained, fertile soils receiving adequate rainfall and moisture. In northeastern India, one-year-old seedlings are generally transplanted during the monsoon season to maximize establishment and survival. Agarwood-based agroforestry systems include home gardens, plantations as cash crops, block plantations, and boundary plantations (Sarkar 2019). The introduction of agarwood trees to home gardens in upper Assam has resulted in high economic returns (Saikia & Khan 2012). Integrating the plantation of agar trees with other crops provides enormous additional income to farmers. Intercropping of agarwood with various native and non-native species like Tea *Camellia sinensis* (L.) Kuntze, Patchouli *Pogostemon cablin* (Blanco) Benth., Sarpagandha *Rauvolfia serpentina* (L.) Benth. ex Kurz, Physic Nut *Jatropha curcas* L., Pepper *Piper longum* L., Pineapple *Ananas comosus* (L.) Merr., Turmeric *Curcuma longa* L., and Arecanut *Areca catechu* L. has also been practiced in India (Chaudhari 1993). Tea cultivation combined with agarwood trees is a very common agroforestry model of cash crop plantation which is widely popular, especially in northeastern parts of India (Saikia & Khan 2012). According to Shinde et al. (2019), agarwood trees are quite suitable to be planted as boundary trees on the banks of ponds, canals, roads, and even on hilly slopes to reduce soil erosion and prevent landslides.

Formation of Agarwood

The crucial stage in the agarwood production is formation of resinous substance (Image 1D). The quality of the agarwood depends mainly on the formation of resin inside the tree. The agar is formed in the tree due to fungus-host interaction, which generally occurs after boring (Image 1B) by the larvae of stem borer *Neurozerra conferta* Walker and fungi species, like *Fusarium* sp., *Rhizophora* sp., *Aspergillus* sp., and *Mucor* sp., are responsible for the interaction. Generally, trees above the age of seven years are vulnerable to infection by fungus, but sometimes infected plants less than one year old are also observed. Agarwood formation is often linked with physical wounding or damage of the trees caused by thunder strikes, animal grazing, predator, and disease infestations (Rasool & Mohamed 2016; Wu et al. 2017). Thus, the inner part of the trees is exposed to pathogenic microbes, which activate the defense mechanism of *Aquilaria* to initiate resin production (Tan & al. 2019). The resin deposited around the wounds over the years, where the accumulation of the volatile compounds eventually forms agarwood (Subasinghe & Hettiarachchi 2013).

Agar production can also be induced artificially by several techniques, which may be broadly classified into physical, chemical, and biological methods or in combinations. Physical injuries are done with hammers or nails (Image 1C) and inoculation with fungal strains. Different types of artificial infection methods like DTII (Direct trunk injection of inoculum), TIIC (Trunk injection of inoculum through cannula), and PIBR (Pasting of inoculum through bark removal) provided by several private companies, are also observed in other parts of the country where natural infection is less or absent. However, the quality and price of chips and oil from agarwood obtained by the artificial infection method are much lesser than the natural ones.

Agarwood Production in India

India is one of the major cultivators of agarwood in the world. The recent NDF study estimated that more than 13 crores of agarwood plants are under cultivation in India (Bhattacharjee et al. 2024). Assam State leads with more than 11 crores of plants, followed by Tripura, Manipur, and Nagaland. Karnataka is one of the major states in southern India that holds more than 20 lakhs of plants. Naturally infected/ artificially inoculated trees that are more than seven years of age are harvested for good-quality agarwood chips and oil. Out of 13 crores of plants, 2.5 crores are estimated to be infected. Among these, around 25 lakhs of trees are in harvestable condition. Agar chips are obtained by nibbling the infected wood manually. Agar oil is of two types, i.e., 'Malor' and 'Boya'. Malor is the oil obtained from the distillation of infected wood is of high quality. Boya is the low-grade oil obtained from the infected wood residues/non-infected woods. A single harvestable tree can produce up to 3 kg of agarwood chips and 10–40 g of agarwood oil (including Boya), depending on the quality

of wood. Based on currently available harvestable trees, India can export up to 1,51,080 kg of agarwood chips and powder/sawdust (non-exhausted) and 7,050 kg of agarwood oil, which is much higher than the existing export quota (Bhattacharjee et al. 2024).

International Trade of Agarwood

Two major global market zones for agarwood consumption are eastern Asia (including markets of Taiwan, Japan, and the Republic of Korea) and western Asia or Middle East (which includes the countries of the Arabian Peninsula). Although there is no known agarwood-producing plant west of India, it has been traded for more than 2,000 years, being sourced from India and further east.

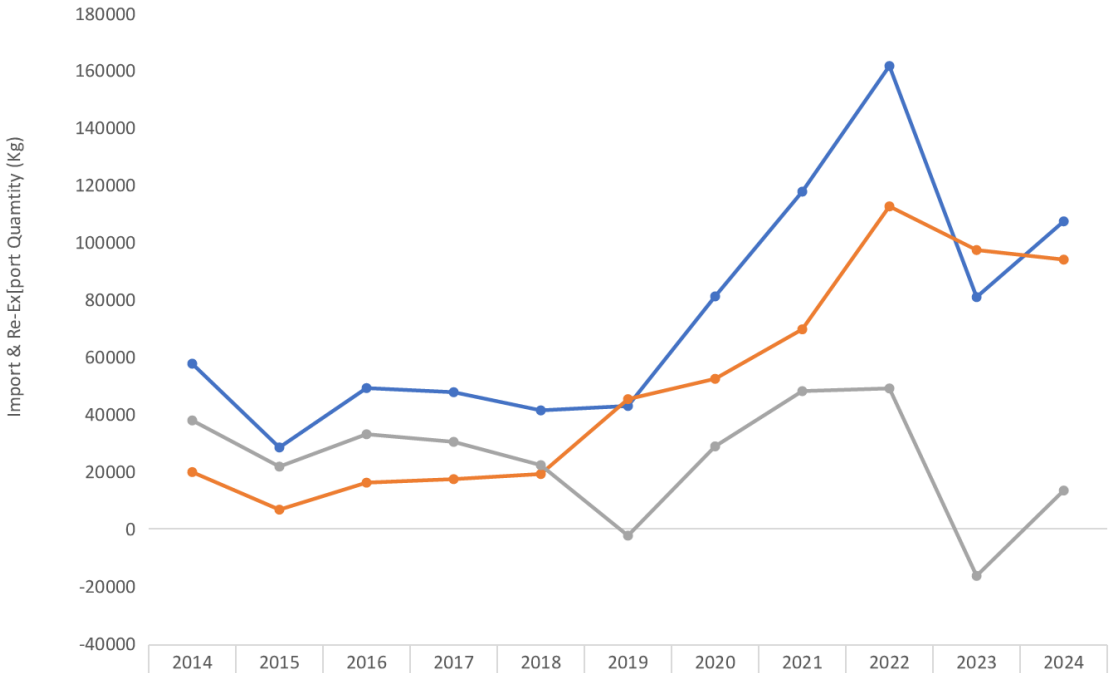
According to the CITES trade database (2019–2023), the United Arab Emirates and Saudi Arabia are the major importing and re-exporting countries of agarwood products worldwide. These countries imported an estimated 1,800 tons of agarwood derivatives during this period. Apart from these countries, Thailand, Singapore, Kuwait and many other countries have also imported more than 200 tonnes of agarwood products. Indonesia, Singapore, and Thailand are major exporters of agarwood derivatives and export around 400 tonnes of agarwood. As per the study by Persistence Market Research, from 2018 to 2022, the global agarwood chips market grew at a compound annual growth rate (CAGR) of 7.7%, reaching a valuation of USD 44,050.7 million in 2023. In the global market, a litre of pure oud oil can fetch up to USD 80,000. Global agarwood trade is predicted to be USD 64 billion by the end of 2029, from an estimated USD 32 billion in 2018 (Kumar et al. 2023). By the end of 2033, the global market for agarwood chips is projected to grow at a 7.1% CAGR, with a total value of USD 87,467.6 million (https://www.persistencemarketresearch.com).

According to the CITES trade database, from 2019 to 2023, India re-exported over 240 tonnes of agarwood derivatives. Major destination countries include the United Arab Emirates, Kuwait, Oman, Qatar, Saudi Arabia, Singapore, and Thailand. At the same time, India imported more than 220 tonnes of agarwood and derivatives from Australia, Saudi Arabia, Qatar, Lao People's Democratic Republic, United Arab Emirates, Malaysia, Thailand, Singapore, Indonesia, Bhutan, Switzerland, France, and Vietnam; out of which, one-third of the agarwood was imported solely from Indonesia and Singapore (TRAFFIC 2023). Agarwood imports and re-export data pertaining to India for the last decade (2014–2024) recorded in the CITES trade database is provided in Image 2. In the global market, India has been currently identified as a re-export hub. The market mechanisms in India needs to be strictly regulated in consonance with the legislation and policy framework to strengthen its position as a primary exporter commensurate with its production potential.

Illegal Logging and Smuggling Issues

India has long agarwood trade relationships (during 1974–91) with Saudi Arabia, Kenya, Bahrain, United Kingdom, Qatar, Dubai, Kuwait, United Arab Emirates, Oman, Singapore, the United States of America, Netherlands, and German F. Republic. More than 1,500 tonnes of agarwood (including chips and dust) were exported from India during this period (Chakrabarty et al. 1994). However, after enlisting *A. malaccensis* in CITES Appendix II in 1995, the export of agarwood and its derivatives was restricted. The absence of an export quota for a long period and other trade-related restrictions in India lead to increase in informal trade/export. More than 1.25 tonnes of chips and 6 l of oil/derivatives were reportedly seized in six states of India from 2017 to 2021 (TRAFFIC 2023). Assam, Delhi, Kerala, Maharashtra, Telangana, and West Bengal reported incidents of agarwood smuggling destined to Bahrain, Saudi Arabia, Kuwait, Thailand, and the United Arab Emirates (TRAFFIC 2023). As per WCCB data base, different forms of agarwood derivatives and products were seized at Delhi, Kolkata and Mumbai airports (Image 3).

Though India has an export quota since November 2021, informal trade is continuing due to complex process of fulfilling official formalities for legal trade and export. The villagers/growers of major harvesting states planted agarwood on private lands, sometimes on leased lands, for their livelihood. However, due to several legal restrictions imposed during the last few decades on harvesting and trading of agarwood and complicacy in obtaining CITES export permits, the growers/ farmers could not trade/export agarwood legally which compelled them to sell their trees and derivatives to informal traders. The formal process of agarwood export with a CITES permit involves about 16 steps starting from obtaining a legal procurement certificate (LPC)/ certificate of cultivation (CoC) from the DFO to getting clearance from DGFT (Director General of Foreign Trade) through the MoEF&CC (Ministry of Environment, Forest and Climate Change). Therefore, the majority of the growers and traders are still inclined towards informal trade which is much more convenient for them due to the well-established, decades-long informal system of trade chain. The informal trade is



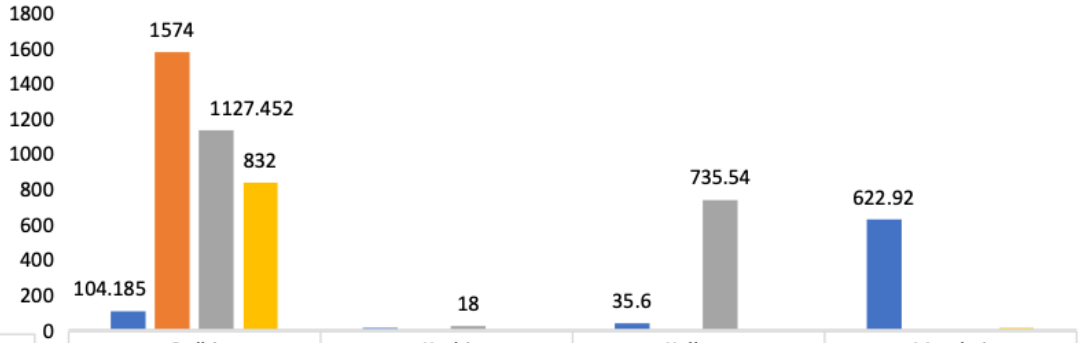
	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Import of Agarwood (Kg)	57628.01	28388.65	49113.1	47676.4	41328.58	42862.96	81118.18	117674.6	161530.4	80865.85	107305.6
Re-Export of Agarwood (Kg)	19800.36	6682.4	16105.85	17332.41	19115.49	45253	52348.16	69621	112536.0	97296.86	93948.46
Difference	37827.65	21706.25	33007.25	30343.99	22213.09	-2390.04	28770.01	48053.6	48994.41	-16431.01	13357.16

Image 2. The import and re-export of Agarwood during 2014-2024 in India based on export country report (Source: CITES Trade Database).

facilitated through importing low-quality agarwood derivatives, logs etc. and replacing these with high-quality derivatives from India in the name of re-export. Pure agar oil is often mixed with some other perfumes, or some volatile solvent to bypass the legal restriction for export. Sometimes, the low-quality agarwood chips are painted and polished to enhance as high-quality chips. Also, the broken or smaller chips are sometimes fixed with glue to sell at a higher price. The agarwood is sometimes exported illegally through postal/ courier services (Bhattacharjee et al. 2024).

Role of Government Policies and Regulations

The Government of India (GoI) and state governments have framed legislations to facilitate formal trade. Agarwood harvesting and transportation within and across states are regulated under the Indian Forest Act (1927) and the Transit Rules. The collection of agarwood plants from any protected area, artificial propagation, stock declaration and international trade of agarwood is regulated by The Wildlife (Protection) Act, 1972 (WPA) and CITES. The agarwood is listed under chapter – III A of the WPA, which contains the primary provisions and regulatory controls such as, licensing and permits that govern cultivation and international trade of this specified plant. As agarwood is protected under Schedule IV of WPA and Appendix - II of CITES, the international trade is regulated through the provisions of section 49 H, 49 I and 49 K of WPA and Wildlife (Protection) International Trade of Specimens Rules, 2023. The state forest departments oversee the collection of cultivated agarwood plants from non-forest regions. Once a plantation reaches the age of five, it must be registered with the Plantation Registering Authority to be eligible for rewards under the state government's promotion policy. Trees from plantations and non-forest areas have to be felled with authorization. The transportation of agarwood will only be allowed by railways in compliance of the directives of the Supreme Court of India and/ or any orders, notifications, or guidelines issued from time to time by the MoEF&CC, GoI. The Ministry of Commerce, GoI, formulated the Export & Import (EXIM) Policy, which forbade the export of agarwood from 1992 to 1997. The DGFT, GoI, published the Negative List of Plant Species for Export, which included *A. malaccensis*. Consequently, it was forbidden to export any part of the species that were harvested from the wild, including extracts, and derivatives of *A. malaccensis*. Later, according to EXIM Policy (2009–2014) published by the DGFT, the export of agarwood and its derivatives



Confiscated forms	Delhi	Kochi	Kolkata	Mumbai
Chips/ Powder/ Dust (kg)	104.185	1.425	35.6	622.92
Chyawanprash (kg)	1574	0	0	0
Herbal products (kg)	1127.452	18	735.54	0
Oil (l)	832	0	0	1.5

Image 3. Details of agarwood derivatives seized at major cargos and airports in India in the form of different products/ as raw items during 2007–2023 (Source: WCCB).

is restricted and is subjected to the provisions of CITES due to its listing in Appendix II of CITES in 1995. The DGFT vide notification No. 52/2024-25, New Delhi, dated 20.ii.2025 has earmarked annual limits for export of agarwood chips and powder obtained from artificially propagated sources (Cultivated outside forest areas) for three financial years from 01.iv.2024 till 31.iii.2027. The application for obtaining authorization to export agarwood sourced from artificially propagated plantations include 1. Attested copy of Certificate of Origin (COO) issued by a authorized forest officer, 2. A coloured photograph of the stock certified by the designated forest officer, 3. An undertaking from the exporter that agarwood derivatives proposed to be exported have been harvested from plantation complying CITES conditions and they shall be exported only upon submission of a valid CITES export permit at the time of export. The state-wise annual export limits for agarwood chips and powder obtained from artificially propagated sources increased from 25,000 kg in 2021 to 1,51,080 kg in 2025 subject to export policy. The state-wise annual export limit for agarwood obtained from artificially propagated sources has been tabulated in Table 1.

Assam and Tripura forest departments have recently taken several initiatives to promote agarwood cultivation and trade to support the economy of farmers and people associated with agarwood industry. *A. malaccensis* is listed in Schedule III of the Assam Trees Outside Forest (Sustainable Management) Rules, 2022. It is exempted from obtaining prior permission for felling, conversion and transportation of outturn from non-forest areas when they are meant for consumption within the state. However, permission is required to establish a chain of custody if the out-turn is transported outside the state. According to the Assam Wood-Based Industries (Promotion and Development) Rules, 2022, no agarwood processing and agar-oil extracting unit can be established or operational without a valid registration. The law provided that all the existing unit holders should get registered under these rules with the divisional forest officer (DFO) concerned within three months of the notification of these rules (12 January 2023). The Forest Department of Assam took initiative to legalise existing agarwood industries through a license under these rules and facilitated through the WBI portal (https://wbi.assam.gov.in). The Assam Agarwood Promotion Policy 2020 aims at promoting agarwood-based industries by providing subsidies and incentives to the distillation units, perfumery, chipping, packaging units, artificial inoculation units (both government and private) and also for creating market facilities. The Forest Department of Assam distributed around 4.54 million saplings of *A. malaccensis* freely in different parts of Assam on 17 September 2023 under the campaign 'Amrit Brikshya Andolan' (Amrit Briskshya Andolan 2024).

Similarly, the Government of Tripura implemented the 'Tripura Agarwood Policy 2021' to ensure the sustainability of the agarwood by taking into account all the aspects of cultivation, harvesting, processing, value additions, transit and trade. It also aims at promoting agarwood trade by easing procedures of procurement, processing and selling of various products, within the

Table 1. State-wise annual export limit for Agarwood (*Acquilaria malaccensis*) from artificially propagated sources.

	State	Agarwood chips/powder/sawdust (non-exhausted) (Kg)	Agar Oil (Kg)
1	Assam	1,19,400	5,560
2	Tripura	22,500	1,047
3	Manipur	4,000	200
4	Nagaland	3,400	180
5	Karnataka	1,200	35
6	Meghalaya	200	09
7	Kerala	80	04
8	Others *	300	15
	Total	1,51,800	7,050

* The state-wise limits for all other states is collectively included in "Others" because the harvest in these states is comparatively very less (Source: DGFT Notification 52/2024-25, dated 20.ii.2025)

country and export subject to the provisions of CITES. All eligible new industrial units for the distillation of agar oil, perfumery, and packaging are provided with capital investment incentives as applicable by relevant provisions under the Tripura Industrial Promotion Scheme and Northeast Industrial & Investment Promotion Policy (NEIPP) of the GoI. Through "Ghar Ghar Agar – Har Ghar Agar" campaign, Tripura Forest Department is promoting private plantations to ensure monetary benefits to thousands of potential agarwood growers of the state by creating awareness on economic potential of agar plantations, intercropping for interim returns, artificial inoculation and registration of each tree grown on private land. The Tripura Wood-Based Industries (Establishment and Regulation) Rules, 2006, encourage registration of the existing and new agarwood processing units. The Non-Timber-Forest-Produce (NTFP) Centre of Excellence is facilitating research on inoculation and planting materials and has collaborated with the Fragrance and Flavour Development Centre to launch the 'Tri Agar' brand. In 2023, the M/S Mamon Enterprise of North Tripura exported 2.5 kg agar oil to M/S Fragrance Force General Trading LLC, Dubai with a valid CITES export permit and approval of MoEF&CC (SU Division) F.no. 5-24/2023-SU dated 4th October 2023. In November 2023, the Ministry of Development of Northeastern Region (DoNER), GoI has constituted the Inter-Ministerial Task Force for promoting trade in agarwood.

India has a robust legislative and policy framework governing agarwood cultivation and trade, however, its implementation at the field level remains inadequate. Challenges associated with registration of plantation, authorization of harvesting, maintenance and submission of stock registers, maintenance of a transparent chain-of-custody from growers to traders for exports, issuance of LPC and COO continue to hinder the acquisition of CITES permits for indigenous cultivated agarwood.

How to Obtain a Valid CITES Permit?

To obtain a CITES permit for the export of agarwood in India, one needs to follow a specific process overseen by the State Forest Department, State Tax Department, DGFT, MoEF&CC, CITES Management Authority, WCCB (Wildlife Crime Control Bureau) and Indian Customs. The exporter must get a valid export license from DGFT by submitting necessary documents, including quota validation and proof of legal acquisition. The legal acquisition is ensured by obtaining legal felling and transit permits from the authorized officer of the forest department, as per the state legislation. The duly completed CITES permit application form is submitted to the designated office of the regional deputy director (RDD) of WCCB, MoEFCC, along with all supporting documents. The authorities will then inspect and verify the details provided. Once approved, the Export/Re-Export CITES permit is issued with a unique identification number in accordance with international standards laid down by the CITES Secretariat. The export permit is valid for specific period, exporter, destination, port of export, nature and quantity of agarwood derivative. The exporter shall ensure strict compliance with all permit conditions and maintain proper records. Along with the shipping bill, the consignment of agarwood derivative shall invariably be accompanied by a CITES export/re-export permit issued by the CITES MA. The authorized officer from WCCB will endorse the CITES export permit in the Customs area before the consignment is loaded in cargo for export. Therefore, starting the application process early and consulting experts can help navigate it efficiently. A framework for obtaining CITES export permits was suggested by the WCCB (Image 4). A flowchart depicting each step of the agarwood trade from planting to export is presented in Image 5.

Future Prospects and Opportunities for the Agarwood Industry

The agarwood industry faces numerous challenges, from the artificial inoculation process till export of agarwood derivatives. One of the major challenges, the artificial inoculation process is influenced by factors such as the age of trees, inoculation methods, and environmental conditions that contribute to the alteration of resin quality and composition. This

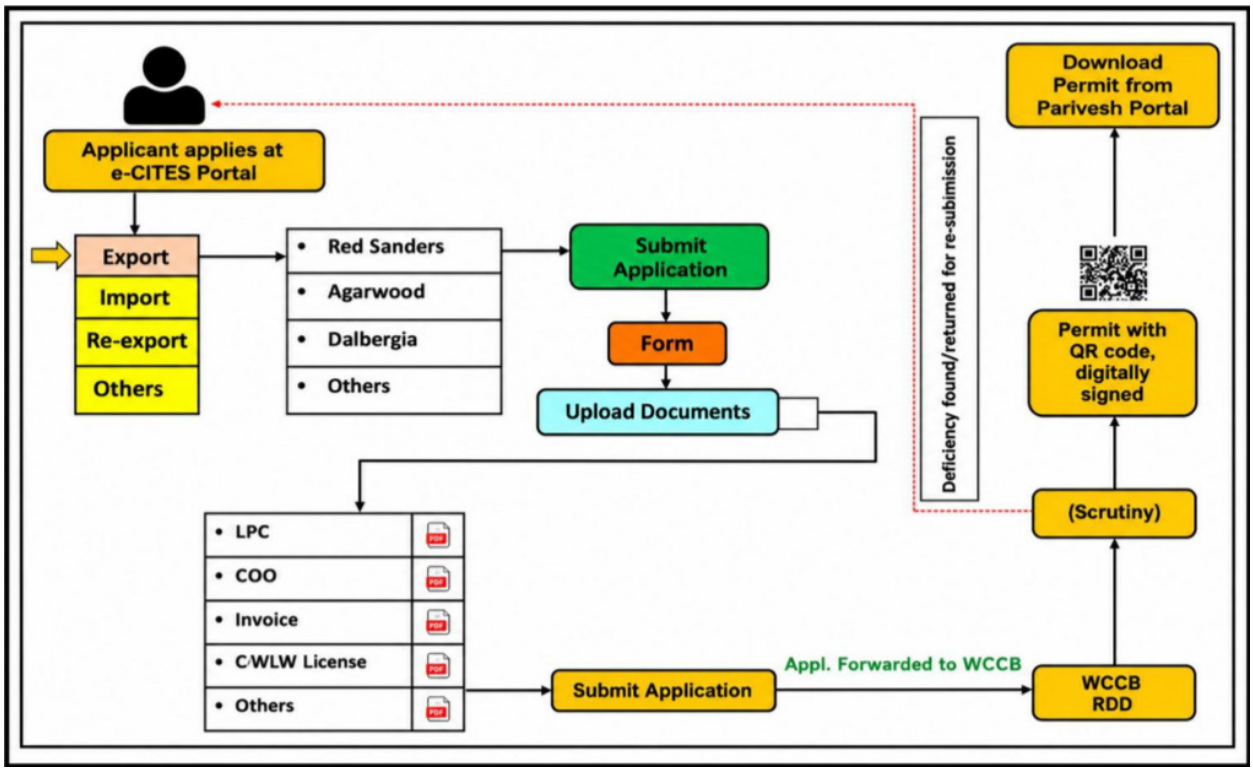


Image 4. Flowchart of the procedure to get CITES export permit through WCCB.

inconsistency poses difficulties in meeting market demands and maintaining product standards (Azren et al. 2019). Improper inoculation techniques or ineffective post-inoculation care may lead to irreversible harm, including harmful infections, stunted growth, or even tree mortality (Herath & Jinendra 2023). Therefore, studies are needed to optimize the inoculum dose and inoculation techniques to increase the chances of infection and standard of agarwood.

The training institutions and skill development centers need to provide training on plantation techniques, artificial inoculation, as well as online marketing. National-level research organizations and private institutions are to be funded for agar-related projects. In October 2023, the chief minister of Assam laid the foundation stone of the Assam Agar International Trade Centre (ITC) in Golaghat, which is the first of its kind in the entire country. The Centre would have facilities for agar plantation, research and training, an industrial shed, exhibition space, a laboratory with tissue culture facility and B2B facilities. The ITC aims to promote the business growth of agarwood entrepreneurs. Such models are worth emulating by all other major agarwood-growing states in India.

Agarwood plantations have potential to improve economic conditions and livelihood of the cultivators, especially in rural areas. Owing to pollarding and coppicing ability, many researchers have recommended agarwood trees as an important component in agroforestry systems (Sarkar 2019).

The intervention of state governments is required to further formalize the informal agarwood trade to create a fair and efficient trade atmosphere. The State Forest Development Corporations (SFDCs) need to come forward to establish a buying and selling mechanism to ensure participation of all agarwood farmers and break the monopoly in agarwood export from India.

As per CITES trade database, global demand for agar products is steadily increasing. For example, the import of agarwood chips to the UAE rose from 56 tonnes in 2004 to 162 tonnes in 2007 (TRAFFIC 2010). Malaysia and Indonesia are two major sources as per the country-of-origin for agarwood imported to the UAE. However, agarwood cargoes get there from three major countries, viz., Singapore, India, and Malaysia. Agarwood from Indonesia largely arrive as re-export from Singapore. Therefore, GoI needs to encourage market research on trade data in the CITES and Customs database in order to understand the global market scenario and cope up with global supply strategy. Lack of data consistency between data held with CITES MA and the Customs in India also needs to be harmonized. Based on analysis of seizure

Image 5. Flowchart - steps involved in export of agarwood through CITES export permit.

data, India needs to communicate frequently with destination countries and take measures to discourage the smuggling of Agarwood derivatives and formalize the international trade.

Among trading communities, CITES is perceived as a trade barrier and business impediment. As India is the global forerunner in SDG (Sustainable Development Goals) compliance, the CITES MA India and authorities in range States should be encouraged to take up awareness campaigns to educate all stakeholders. There is already an established mechanism for the export of Red-Sanders *Pterocarpus santalinus*, which is also listed in Appendix II of CITES. The range state authorities in India should observe and adopt similar mechanisms and procedures for agarwood also and encourage global traders to participate through e-auctions.

CONCLUSION

The study provides an overview of the production, consumption, transport, international trade, other challenges associated with agarwood, as well as the regulatory policies in India. The GoI and state governments have taken measures to comply with CITES requirements to ensure the sustainability, traceability, and legality of agarwood derivatives in international trade. The primary reason for the informal trade is the limited bargaining power of agarwood growers and limited awareness of the requirements for obtaining a valid CITES export permit. The continued monopoly in the agarwood export trade is also affecting small-scale farmers' ability to market their agarwood derivatives. India has a robust legislative and policy framework governing agarwood cultivation and trade, with inadequate implementation at the field level. India has a vast scope to scale up export quantity to commensurate with its production capacity. Therefore, the study will be useful for understanding government policies and CITES regulations related to agarwood and for identifying ways to obtain a CITES export permit. The Management Authorities/ State Forest Departments are suggested to conduct awareness programmes and campaigns to educate the growers, traders and exporters about the process of obtaining a CITES export permit and its economic benefits. By encouraging agarwood growers and strengthening the agarwood industry, the local people associated with this industry get benefited, thereby significantly contribute to India's foreign currency earnings.

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