

Asia Regional Workshop on Agarwood "Management of Wild and Plantation source Agarwood"
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INDIA



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Distribution in India

- ✦ India is home to two *Aquilaria* species, *A. khasiana* and *A. malaccensis*. *A. khasiana* is found mainly in the Khasi Hills of Meghalaya.
- ✦ *A. malaccensis* is native to eight north-eastern States: Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura.
- ✦ The species is typically found growing at altitudes of up to 1000 m, being localized mainly in the foothills and undulating slopes of evergreen and semi-evergreen forests

TRADE OF AGARWOOD IN INDIA

- ✦ India does not permit harvest of Agarwood species from the wild. The trade in Agarwood products is limited to import, processing and re-export.
- ✦ Indonesia and Malaysia are major contributors of import into India
- ✦ Re-export of Agarwood in the form of processed incense chips, oil and dust are permissible with CITES re-export permit.
- ✦ Saudi Arabia and UAE are major destinations for exported products from India

MANAGEMENT OF WILD POPULATION

- ✦ Inventory of wild population by the Working Plan Officers of respective forest departments of state governments
- ✦ Inclusions of proper prescriptions for conservation and regeneration of the species in the wild
- ✦ Coordinated Legal and policy issues for control over trade between all Agarwood producing states of the country
- ✦ NDF Formulation may not be an immediate need for wild population in the country and can be reviewed as information base widens.

MANAGEMENT OF AGARWOOD PLANTATIONS AND NDF

- ✦ **Creation and proper inventory of plantations**
 - ✦ There are estimated 9-10 million *Aquilaria* trees in North East India on private lands.
 - ✦ Government owned cultivated trees are reportedly less.
 - ✦ The trend for cultivation is rising and great interest is generated in the south India also.
- ✦ **Research**
 - + Artificial inoculation
 - ✦ Identifying proper strains of causal fungi and inoculation
 - ✦ Techniques of inoculation (Injury, time of inoculation etc.)
 - + Genetic evaluation of *Aquilaria malaccensis* in North Eastern India and establishment of Gene Bank

What can be achieved through research initiatives?

- ✦ Series of cultivated species having wider and representative genetic base providing seed security for future plantations through out it's range of occurrence under state control
- ✦ Motivating few if not all, private growers to establish preservation plots with R&D support from research institutes and advocating sustainable harvest
- ✦ Artificial inducements to avoid indiscriminate harvest of non agar producing individuals
- ✦ Promoting research collaboration amongst all agar producing countries

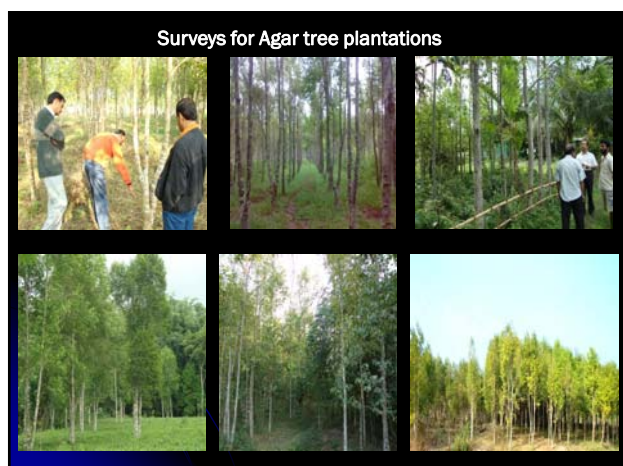


Why Artificial Inducement of Agarwood is Necessary?

- @ In natural forest, only 7-10% of trees infected by fungus.
- @ Raising of agar plantation is a long time investment. Besides, all Sasi tree do not form agarwood.
- @ Few skilled and experienced planters can only identify agarwood bearing trees.
- @ Indiscriminate felling of agar trees are going on, endangering the vary existence of the species in wild.
- @ Thus, key for identification of infected trees and to locate a way to induce early agarwood formation is important to meet the challenges for sustainable commercial use of agarwood.



Continued



Keys for Identification of the Infected Agar Trees



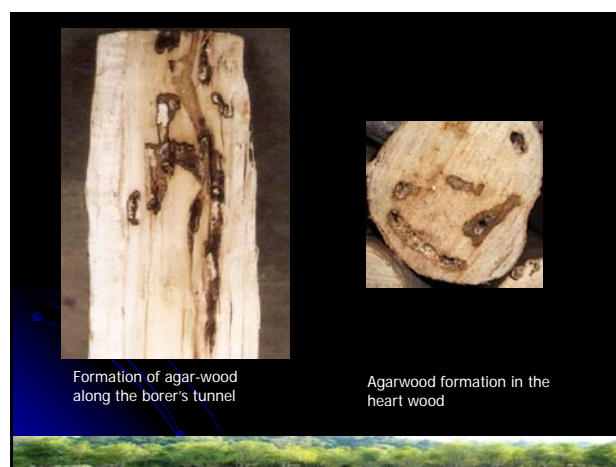
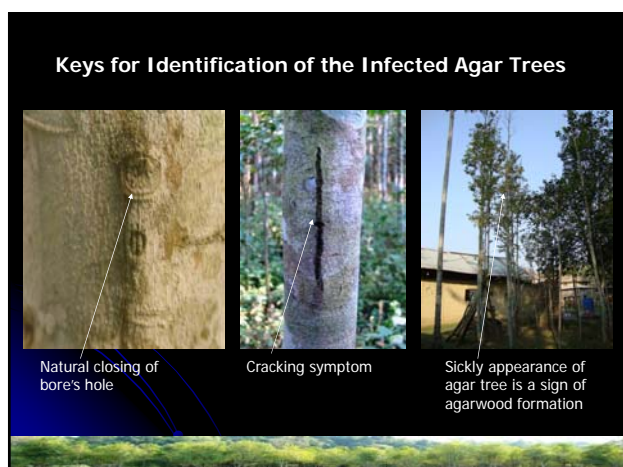
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Oozing out of watery substances from fresh borer hole



Frass at the base of the tree



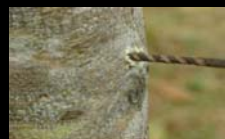
The Study included- the following treatments, replicating thrice and laid down in Randomized Block Design

- T1 – Artificial wounding
- T2 – Wounding + inoculation with dominant fungi isolated from diseased wood
- T3 – Wounding + inoculation with dominant phyllosphere fungi
- T4 – Wounding + inoculation with dominant fungi isolated from borer tunnels
- T5– Control.



After inoculation, observations were made visually for deposition of agar, with the change of colours in inner woody tissue, at an interval of three months.

Artificial inoculation technique to induce agarwood formation in agar tree



Making of holes with the help of drill



cultures of dominant fungi were inserted into the hole



Holes were closed with sterilized cotton



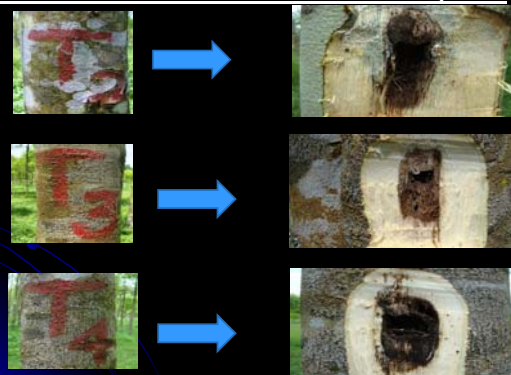
Closing of artificially inoculated hole



Artificial inoculation of fungi were carried out in Tezpur of Assam for inducement of agarwood in agar trees in the month of March, 2011.



Visual observation for deposition of agarwood after 3 months in the month of June ,2011



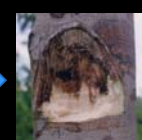
Visual observation for formation of agar wood after inoculation with the dominant fungus after every 3 months (September,2011)



Artificial wounding



Artificial injury to the agar tree



Agarwood formation in artificially injured site

