

## GAHARU INOCULATION TRAINING FOR COMMUNITIES NEAR THE PT. ARUTMIN INDONESIA SENAKIN MINE IN SOUTH KALIMANTAN

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### Abstract

Indonesia is a country rich in forest products. One of which is Gaharu, a treeless forest product with high economic value for the perfume, incense, and pharmaceutical industries. Gaharu in Indonesia comes from gaharu trees that are infected with bacteria so that the result is gaharu. Many aloes grow in Indonesia, one of which is in the settlement around the PT Arutmin Indonesia mine. In this case, the community needs science and technology to optimally utilize the abundant gaharu in their area. The purpose of this service is to provide science and technology as well as additional skills in utilizing gaharu effectively and quickly. The community was very enthusiastic in this service activity by actively participating in activities both from socialization to the practice of making gaharu sapwood inoculation. The manufacture of gaharu sapwood by inoculation is carried out using a drilling machine by wounding the trunk of the gaharu tree and then the wound is given bacteria that can make gaharu produce resin that is useful and of high selling value.

**Keywords:** Devotion, Gaharu, Cultivation, Inoculation, Mining

### INTRODUCTION

Indonesia is a country rich in forest products. One of which is Gaharu, a treeless forest product with high economic value for the perfume, incense, and pharmaceutical industries. Forest resources play a very important role in human life from socio-economic, ecological, and other perspectives. Forest resources are a form of development capital related to the production of forest products, genetic resource activities, and livelihoods. A production forest is a forest area where a variety of trees grow thickly and the fruits of which are accumulated as timber and non-timber forest products.

Gaharu is produced by infected trees that grow in tropical forests and belong to the

genus *Aquilaria*, *Gyrinops* dan *Gonystilus* which all belong to the Thymelaeaceae (Heyne, 1987). The *Aquilaria* genus consists of 15 species, distributed in tropical Asia. Six of them are found and have been widely recognized by the Indonesian people, namely *A. malaccensis*, *A. microcarpa*, *A. hirta*, *A. beccariana*, *A. cumingiana* dan *A. Filarial*. *Aquilaria malaccensis* in Indonesia is found mainly in Bangka, Jambi, Riau, South Sumatera, Kalimantan, Sulawesi, Maluku and Papua. The trees grow in primary and secondary forests, mainly in lowlands and hillsides at altitudes of 200m – 750m (Sitepu, *et al.* 2011).

The Indonesian Gaharu trade has been known since more than 600 years ago, namely in the Dutch East Indies Government and Portuguese trade. A lot of Gaharu from Indonesia is sent to China, Taiwan and Saudi Arabia (Middle East). The high demand from gaharu especially from the *Aquilaria malacensis* species, has caused gaharu poaching to increase and become uncontrollable in Indonesia. The potential production of gaharu in Indonesia comes from the *Aquilaria malacensis*, *A. filarial*, *A. birta*, *A. agalloccba Roxb*, *A. macrophyllum*, *Aetoxylon sympetalum*, *Gonystylus bancanus*, *G. macrophyllus*, *Enkleia malacensis*, *Wikstroemia androsaemofolia*, *W. tenuriamis*, *Gyrinops cumingiana*, *Dalbergia parvifolia*, dan *Excoccaria agalloccb*. From all of the various type that have potential to produce gaharu, only one is known to produce the best quality gaharu and has a high economic value compared to other trees, that is *Aquilaria malacensis*. The lack of gaharu hunters knowledge about good quality gaharu trees has led to the indiscriminate cutting of gaharu trees without being followed by replanting efforts (cultivation), so that the population of gaharu-producing trees is decreasing (Dusai, 2006).

In its development, the production and marketing of gaharu has decreased, while on the other hand the demand for gaharu has increased. With the increasing consumer need for gaharu, since 1995 by CITES in Florida, the gaharu commodity for the host species *Aquilaria malaccensis* has been included in Appendix II, due to its diminishing and even scarce production. Therefore, gaharu cultivation is needed, so that people around the forest do not only hunt/pick gaharu.

Communities around PT Arutmin Indonesia Senakin Mine mostly livelihood from farming, one of which is growing gaharu trees. Gaharu plants are commodities that are usually planted in between other plants in their gardens. Until now, the surrounding community has not cultivated gaharu seedlings specifically to be used as a source of family income. The purpose of this activity is to increase knowledge and skills about gaharu inoculation for the community around the PT Arutmin Indonesia Senakin mine coal in Kelumpang Tengah Sub-district and Kelumpang Utara Sub-district.

## **IMPLEMENTATION METHOD**

Community service activities were carried out at the PT Arutmin Indonesia Senakin Mine office in March 2023. In the vicinity of this mine there are people in the Kelumpang Tengah sub-district and Kelumpang Utara sub-district who are the object of this activity. Gaharu is naturally produced by gaharu trees in response to the entry of bacteria into the injured tissue.

Gaharu sapwood formation techniques can be done traditionally and by induction (inoculation). Traditionally, the technique of making Gaharu sapwood is carried out by people

around the forest, especially on naturally growing agarwood trees. The traditional method can be performed as follows:

1. Piercing or wounding the gaharu tree trunk 1 – 3 cm deep
2. After the stem is wounded, then make a 1 – 2 cm wide cavity
3. Then install a peg made of belian wood in the cavity of the wounded trunk
4. After that, planting lianas that wrap around the trunk of the gaharu tree

Another way that can be done to make gaharu sapwood is by induction or inoculation. The stages of the inoculation method according to Muin & Iskandar (2007) are as follows:

1. Clean and sterilize equipment used to make holes and insert inoculants using 70% alcohol or methylated spirits.
2. Make inoculation holes using a hand drill or machine drill. Start from the bottom ( $\pm$  80 cm from the ground). The hole diameter is between 0.8 cm to 1.0 cm, the depth is adjusted to the diameter of the tree. For trees with a diameter of 10 cm, the depth is about 5 cm.
3. Insert the inoculant into the inoculation hole, in this case you can use liquid inoculant or by diluting solid inoculant with distilled water.
4. Seal the hole using wooden pegs or soft wax. Covering is done so that the inoculation hole does not enter water
5. Make the next hole and so on. The distance between one hole and another is 20 cm – 30 cm in a spiral direction
6. Induction should be done up to the top, or at least up to the limit of the first branch. However, it will be better if the induction is done on the branches, especially for larger diameter trees with branches more than 10 cm in diameter. For inoculation on all trees, ladders or barracks should be used.

## **RESULTS AND DISCUSSION**

Community service activities were carried out around the Senakin mining area of PT Arutmin Indonesia with participants from the community around the mine, especially at Pondok Pesantren Nurul Robi, Tanjung Batu, Kalumpang Tengah District, Kotabaru. This socialization activity uses several methods like lecture, discussion, and tutorial. The lecture method was used to provide understanding to the community about how to make gaharu sapwood using the induction technique or inoculation technique. The material was delivered by Jarkasi as a gaharu cultivator in Hulu Sungai Tengah. In the counseling session, participants were motivated to optimally utilize the gaharu resources around them while maintaining environmental sustainability. Moreover, in this session it was also explained how to take advantage of gaharu by artificially or inoculated so that beside traditional methods, the community also gained additional knowledge about how to utilize gaharu conventionally to increase their economic income.



**Picture 1. Socialization & Counseling Activities**

This counseling activity was followed very enthusiastically by the participants, as seen from the community following and listening to the presentation of the service team and resource persons well and actively. Participants were also actively involved in discussions to develop the utilization of gaharu so that the benefits can be obtained maximally. Knowledge about marketing became a topic that was also discussed during the counseling because good packaging and good marketing, will make the product become sold faster so that the economic rotation of the community becomes faster. The enthusiasm of the community during the counseling made the team feel optimistic that the training and mentoring activities on product innovation would be better. Counseling and discussions were carried out in a relaxed manner and full of the characteristics of the village community who like to joke so that there was no impression of being forced to participate in this activity. The community was also eager to follow this counseling activity from start to finish.

The process of making gaharu sapwood by induction or inoculation by hurting the trunk of the gaharu wood tree and then inserting bacteria. The response to the introduction of bacteria or pathogens into the tree tissue produces a phytoalexin compound that functions as a defense against disease or pathogens. Then the result of the reaction will produce secondary metabolic for the tree in the form of resin compounds that produce fragrance when burned (Sitepu et al., 2011). Gaharu that produces resin naturally in nature is difficult to occur and takes a long time, so to facilitate the production of gaharu, it is done by induction or inoculation.



**Picture 2. The Practice of Making Gaharu Sapwood using Machine Drill**

During the community service activity, the practice of making gaharu sapwood by induction or inoculation was also carried out. The gaharu sapwood making activities by induction can be seen at Picture 2. The gaharu trees as an experimental material for making gaharu sapwood by induction is a trees around Nurul Robi Islamic Boarding School which grows abundantly in the area. Making samples of gaharu sapwood using machine drill with a depth of approximately 10 cm according to the method of Muin & Iskandar (2007). After the drill, the wounded part of tree is given an inoculant to produce gaharu.

## **CONCLUSION**

This community service activity was carried out around the PT Arutmin Indonesia mine with the agenda of gaharu inoculation or induction. The community was very enthusiastic about participating in this community service activity because they could utilize the material and practice to accelerate gaharu production. The technique of making gaharu sapwood using induction has many advantages, including the production of more gaharu because a lot of sapwood can be made in this way and the effectiveness of production is faster.

## **REFERENCES**

- Heyne, K. 1987. *Tumbuhan Berguna Indonesia*, Jilid I dan III. Badan Litbang Kehutanan, Jakarta.
- Muin and Iskandar. 2007. *Teknologi Percepatan Pembentukan Gubal Gaharu pada Pohon Penghasil Gaharu di Kabupaten Kapuas Hulu*. Laporan Hasil Penelitian Pemerintah Kabupaten Kapuas Hulu dan Lembaga Penelitian Universitas Tanjungpura. Pontianak.
- Sitepu, I.R., Santoso, E. and Turjaman, M. 2011. *Identification of Eaglewood (Gaharu) Tree Species Susceptibility*. Technical Report No. 1. Forestry Research and Development Agency, Ministry of Forestry. Bogor. Acces on 15<sup>th</sup> July 2023