

VERIFICATION OF PRODUCTS SOLD AS GAHARU

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Introduction

Gaharu wood, also known as agarwood, eaglewood or aloeswood in the trade, comes from the *Aquilaria* tree: a member of the Thymelaeaceae family. It is highly valued for the production of beads, incense, perfumery and for religious purposes in Asia, especially in the Middle East (Chakrabarty et al. 1994). The stem and branches are the main parts where gaharu is formed, often from matured and damaged *Aquilaria* trees (Nobuchi & Mohd Hamami 2008). Non-diseased wood of *Aquilaria* is called karas in Malaysia (Lim & Chung 2002). According to Ismail & Mohd Zin (2010), other trees that can also produce gaharu are from the genera of *Aetoxylon*, *Gyrinops* and *Gonystylus* which are also member of the Thymelaeaceae family. Among the genera, gaharu from *Aquilaria* is the most commonly sold in the Malaysian market since *Aquilaria* trees are widely distributed, and it is believed that these trees produce the best quality gaharu. The trees of *Aquilaria*, *Aetoxylon* and *Gonystylus* are found in Malaysia (Soerianegara & Sambas 1994), whereas the trees of *Gyrinops* are found in Papua New Guinea, Indonesia and India. *Aetoxylon* and *Gonystylus* can also be found in Papua New Guinea and Indonesia (Irnayuli et al. 2011).

Gaharu woods of karas (*Aquilaria* spp.) (Figure 1A & B) and ramin (*Gonystylus* spp.) (Figure 2A & B) are used for the manufacture of beads and other ornamentals items. Other timbers that are used to make bead and ornamental items and sold as gaharu products include medang (species of *Luraceae*) (Figure 3A & B), kayu malam (*Diospyros* spp.) (Figure 4A) and mertas (*Ctenolophon parvifolius*) (Figure 4B). Medang, kayu malam and mertas are not known to produce gaharu, except that medang sometimes produces fragrant wood and mertas produces oil, and kayu malam looks like gaharu probably due to its dark streaky or black-coloured core. Figures 1 to 4 are some of the specimens received by the Wood Anatomy Laboratory, FRIM for verification. Wood identification is one of the ways to verify whether gaharu products are actually made from the timber of *Aquilaria*.



Figure 1 Products of gaharu from karas

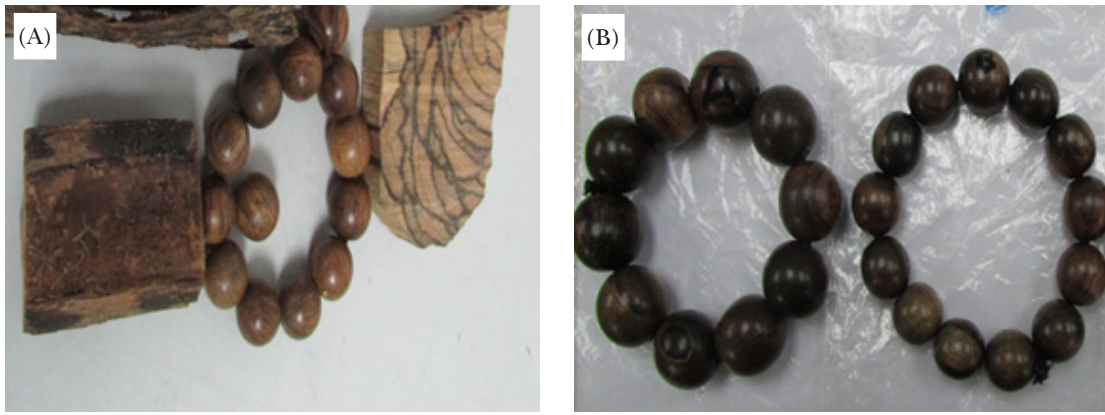


Figure 2 Products claimed to be gaharu from ramin



Figure 3 Claimed as gaharu but identified as medang woods

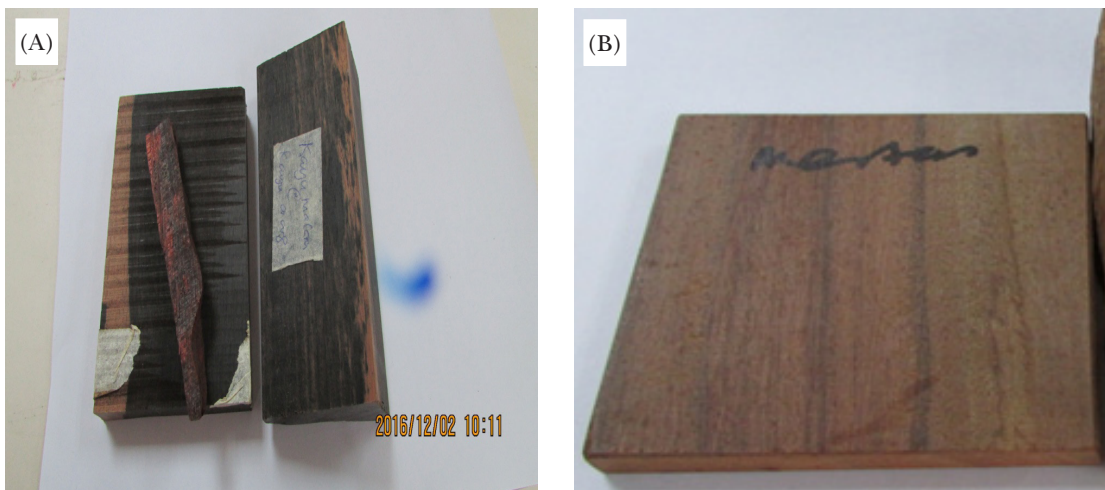


Figure 4 (A) claimed as gaharu but identified as kayu malam and (B) claimed as gaharu but identified as mertas

The authenticity of gaharu

The authenticity as well as the quality are the determining factors that dictate the price of gaharu products. For the government, the revenue from the taxation of gaharu products can be uncertain when a batch of wood is claimed to be of the lesser quality to avoid high tax. To the untrained personnel the deception can easily be executed by unscrupulous traders since the

visual characteristics between the real and the fake gaharu are difficult to differentiate. To fully understand the difference between the real and fake gaharu it is best to explain the anatomical features of woods that are sold as gaharu wood. Wood anatomists use these features to verify the authenticity of each 'gaharu' specimen. In the following pages the anatomical characteristics of woods that are sold as gaharu are described. The descriptions on the identification of karas, ramin, kayu malam, mertas and medang are based on Lim et al. (2016).

Wood Identification

Karas (*Aquilaria* spp., Thymelaeaceae)

General structure of wood (Figure 5): Growth rings are absent. Vessels are fine and moderately few, mostly in radial groups of 3 or 4, sometimes more. Clusters are occasionally present, but tyloses and deposit are absent. Wood parenchyma is scarce except when surrounding the islands of included phloem, not visible even with a lens. Rays are very fine, just visible with a hand lens, not conspicuous on the radial surface. Ripple marks and intercellular canals are absent. Islands type of included phloem are present - lens shape with the wider part in tangential position and occur throughout the cross section. Gaharu from karas is considered the most authentic and fetches the highest price.



Figure 5 Wood structure of karas

Ramin (*Gonystylus* spp., Thymelaeaceae)

General structure of wood (Figure 6): Growth rings are absent. Vessels are with simple perforation, small to medium-sized, few or moderately few, solitary and in radial groups of two, seldom more, occasionally in clusters. Sometimes solitary vessels are predominating and sometimes radial groups are predominating; vessels have tendency to arrange in tangential lines. Tyloses and deposits are absent. Wood parenchyma is mainly in the form of paratracheal parenchyma, as aliform and occasionally confluent. Rays are fine and visible to the naked eye, but not conspicuous on the radial surface. Ripple marks and intercellular canals are absent. Ramin does produce resinous product almost similar to gaharu or can be called also as pseudo-gaharu (Burkill 1935, Soerianegara & Sambas 1994), but it is believed to be lower in quality and fetches low price.

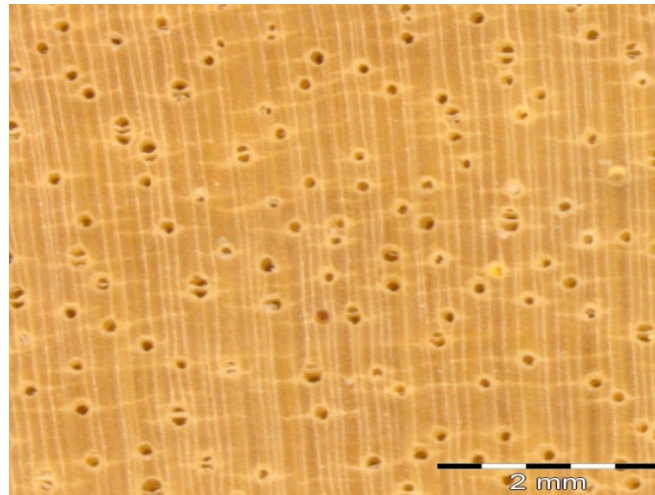


Figure 6 Wood structure of ramin

Kayu malam (*Diospyros* spp., Ebenaceae)

General structure of wood (Figure 7): Growth rings are absent. Vessels are very small to small in some species but medium-sized in others, moderately numerous to numerous, mostly in radial pairs or multiples of 3 to 4, sometimes more. Tyloses and deposits are absent. Wood parenchyma is abundant, mainly as narrow and regularly spaced apotracheal parenchyma band. Paratracheal parenchyma is as narrow layer to vessels. Rays are very fine and not visible to the naked eye, and not conspicuous on radial surface. Ripple marks and intercellular canals are absent. Kayu malam possesses dark streaky or black-coloured core, and it does not produce any resinous product. But due to the similarity in colour, it has been sold as gaharu in the trade.

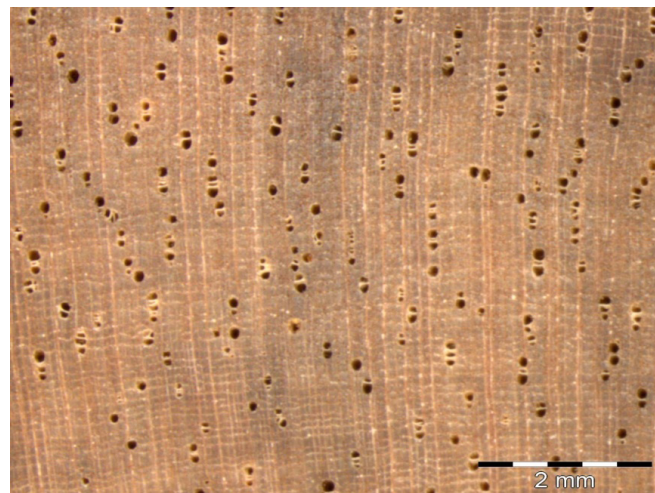


Figure 7 Wood Structure of kayu malam

Mertas (*Ctenolophon parvifolius*, Ctenolophonaceae)

General structure of wood (Figure 8): Growth rings are absent. Vessels are small to medium-sized and numerous. Scalariform perforation plates are present but difficult to discern with a hand lens due to the size of the vessels, exclusively solitary, occasionally filled with cream-coloured deposits. Tyloses are sometimes present. Wood parenchyma of both the apotracheal and paratracheal types are present. Apotracheal parenchyma exists as short tangential strands from ray to ray whereas the paratracheal parenchyma is in the form of narrow aliform. Rays are fine and hardly visible to the naked eye and not conspicuous on the radial surface. Ripple marks and intercellular canals are absent. Mertas possesses oily substance (Lemmens et al. 2012), and therefore it has been sold as gaharu to the public.

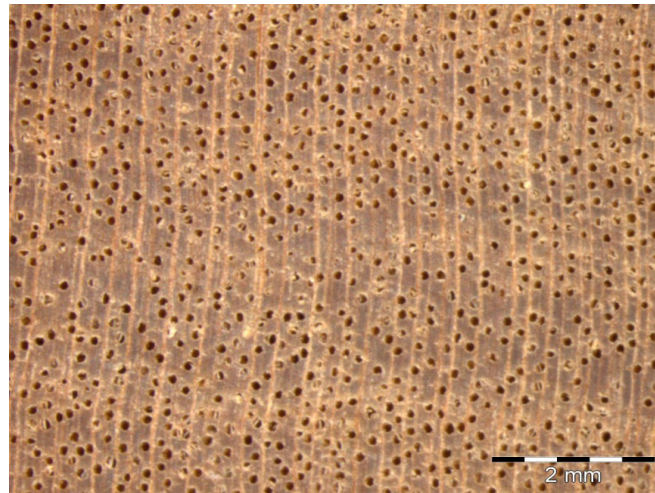


Figure 8 Wood structure of mertas

Medang (Species of Lauraceae)

General structure of wood (Figure 9): Growth rings are absent in most species except some which are marked by the presence of terminal parenchyma bands. Vessels are medium in size, moderately numerous and evenly distributed without any apparent arrangement, some with scalariform perforation plates. Tyloses are usually present and abundant, but deposit is absent. Wood parenchyma is mainly as paratracheal parenchyma in most species, as incomplete borders or ill-developed aliform or confluent, some species with irregularly-spaced terminal parenchyma bands. Rays are fine or medium-sized, not readily visible to the naked eye due to the lack of contrast between the ray and the fibrous background. Ripple marks and intercellular canals are absent. Medang does not produce resinous product, but it consists of special fragrant such that it is being sold as gaharu.

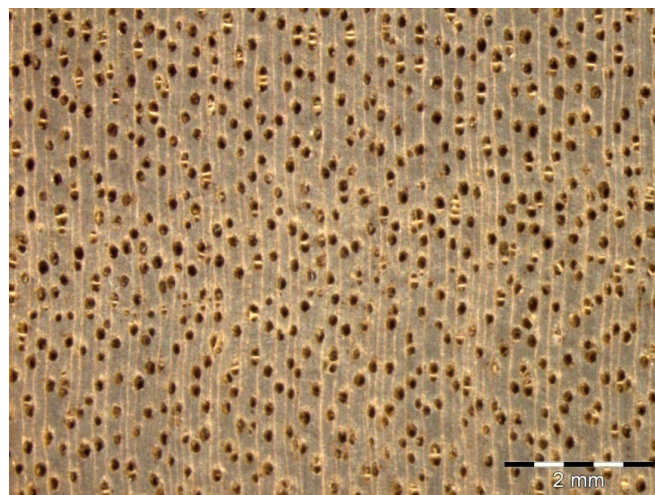


Figure 9 Wood structure of medang

Summary

In Malaysia gaharu in the most authentic form should come from *Aquilaria* tree only. For other timbers like ramin which also produces resinous product almost similar to gaharu it should be called as pseudo-gaharu. Also, timbers like kayu malam, mertas and medang are the non-authentic gaharu woods alleged to be authentic by irresponsible gaharu merchants. Therefore, to ascertain that a product is an authentic gaharu, the wood should be identified by a trained personnel. In Malaysia, this service is rendered by the Wood Anatomist at the Wood Anatomy Laboratory, Forest Research Institute Malaysia (FRIM), Kepong Malaysia.

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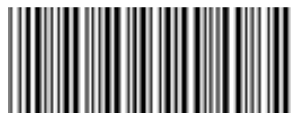
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