TAXONOMY & ECOLOGY

Beyond Classical Approaches

Edited by
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DIVERSITY OF WOOD INHABITING FUNGI IN *AQUILARIA* SPECIES

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ABSTRACT

Formation of agarwood (gaharu) in the trunks and roots of *Aquilaria* species is frequently associated with the physiology reactions of the host to infections by pathogens such as the parasitic fungi. In nature, the plant is not only exposed to pathogens, but they are also colonized by the saprophytes and endophytes. The present research was conducted to identify the woods inhabiting fungi that might also involve in the process to generate gaharu in *Aquilaria* species. In order to determine fungi in fresh samples, the newly cut stem tissues of *A. malaccencies* and *A. microcarpa* were used. Fungi in chips of gaharu that were sold in the markets were also determined. All of the samples were placed on water agar to enhance growth of the wood inhabiting fungi. Fungi that grew from the sample were identified base on morphological structures. The results of this observation indicate that diverse of fungi were found inhabiting the *Aquilaria* woods. Species of *Aspergillus, Botryodiplodia, Cladosporium, Fusarium, Gliocladium, Graphium, Penicillium, Phomopsis, Stachybotrys* and *Trichoderma* were amongst the common fungi that have been identified inhabiting woods of *Aquilaria* species. There was no clear indication to associate a specific fungus with the resin formation in the wood of the *Aquilaria* or the grades of gaharu.

Keywords: *Aquilaria malaccensis, Aquilaria microcarpa*, wood fungi, agarwood fungi, gaharu,

INTRODUCTION

Aquilaria is a genus of plant in which some their species can produce agarwood or gaharu (Donovan and Puri, 2004). So far, only eight species of *Aquilaria* are known to produce gaharu. In Malaysia, only five species of *Aquilaria* have been reported occur naturaly in the forest, which include *A. beccariana, A. hirta, A. malaccensis A. microcarpa* and *A. rostrata*. Agarwood is the aromatic dense, dark or brown resin-impregnated heartwood of *Aquilaria,* which is highly valued in many cultures especially for its distinctive fragrance, and thus is used for incense, perfumes and medicines (Ng et al., 1997). In nature, the oleoresin (gaharu) is not found in all trees of the *Aquilaria* species which are known can produce gaharu. In the tree where the gaharu can be found, the resin does not present in the normal tissue but may exist in the damage cells due to wounds or infection. Often, the gaharu occurrs as paches or streaks in *Aquilaria* trunks, branches or roots. Chang *et al.* (2002) suggested that wound could be the primary trigger for the formation of gaharu, but many reports suggested that the formation of gaharu or oleoresin in *Aquilaria* is associated with the patological effect, as one of the defence mechanisms of the plant after infected by pathogen (Jalaludin, 1997; Gong and Guo, 2009). Besides pathogens, endophytes that are inhabiting in the plant tissues might also be responsible to generate gaharu, since they also can behave as pathogen when a condusive environment is acheived.

This paper aims to provide information on the diversity and occurrence of fungi that are inhabiting wood of *Aquilaria* species.

MATERIALS AND METHODS

In this study, woods samples of the *Aquilaria* were divided into two groups. First, normal woods, which did not contain gaharu. Second, woods which were impregnated with gaharu. Normal wood of *Aquilaria*, which did not contain gaharu, is pale yellow or ligh colour and softer than those which contained gaharu. The woods were considered contain gaharu when they had brownish to black resinous material in their cells, either distributed in patches or in almost all part of the wood sample. the woods with gaharu are hard and will produce fragrant when it is burnt.

The wood samples were obtained from differnt sources. Depending on the sources of the samples, some were still fresh at a time of the collections while the others had been separated from the main stem and exposed