Aquilaria malaccensis fruit borer in Peninsular Malaysia

Aquilaria malaccensis Lam. (Thymelaeaceae) has a natural distribution in lowland tropical forests in Peninsular Malaysia, India, Myanmar, Sumatra, Singapore, Borneo and the Philippines. The tree is highly valued for its resin, known as agarwood or popularly known as ‘gaharu’ in the region, which is utilized in various products such as perfumery, incense, decorative carvings and pharmaceutical products. Agarwood is produced when an agarwood-producing tree is wounded or infected with fungi, microorganisms or insect borers, whereby the borers could also act as a vector of diseases. Only 10% of trees in the wild can become infected by the fungi and produce the much-sought-after resin. Indiscriminate felling of agarwood-producing trees, especially A. malaccensis, in the forests has gone beyond control in certain countries. The harvested quantity of agarwood is, however, very low, with less than 0.2 kg per tree for a high-grade resin.

A. malaccensis is currently listed as vulnerable according to the IUCN Red List due to overexploitation. Conservation of A. malaccensis is important to ensure the sustainability of resources, and this requires an understanding of its reproductory biology, which is lacking. Therefore, a series of phenological studies were conducted on wild A. malaccensis trees in the forested areas at Penang Island and Perak, Malaysia beginning 2011. The fruits and seeds were also collected from each study site by placing 10–20 square-framed nettings measuring 1 m x 1 m each under the tree prior to the fruiting season for abortion and germination studies. Damaged fruits were scrutinized for the presence of insect pests.

In Penang, one of the aborted and damaged fruits from a total of 1144 had a mature larva living inside and was seen feeding on the fleshy capsule (Figure 1), whereas in Perak a larva was found inside an aborted fruit randomly picked from the ground. A hole measuring about 3 mm in diameter was seen penetrating through the capsule into the fleshy part (Figure 2). The larvae were extracted and...
the dorsal and lateral surface of its abdomen (Figure 3a). It also had fine setae protruding from the sides of its abdomen. The larvae pupated 3–6 days later underneath the fold of the tissue paper. The adult moth emerged after 14 days in pupation (Figure 3b). The pupa from the larva sample collected in Penang, however, failed to emerge. The moth was identified as *Pitama hermesalis* Walker (Lepidoptera: Crambidae) according to Robinson et al.\(^5\) with a wingspan of 30 mm (Figure 3c). To our knowledge, there are no previous records of the moth species found infesting the fruits of wild *A. malaccensis* tree.

The fruits of *A. malaccensis* could be an alternative host to *P. hermesalis* as its larva is usually observed feeding on the leaves of wild and planted *A. malaccensis* in Peninsular Malaysia. The larva has a preference to live and feed between the folds of two leaves that were attached together using silk web. The green area on the leaves was scraped-off causing it to become translucent (S. P. Ong, pers. obs.). Elsewhere in Indonesia, *P. hermesalis* has also been reported feeding on the leaves of *Aquilaria* sp. trees\(^7\).

Although the larva may not be feeding on the seed, the damage was enough to cause the fruit to abort prematurely (Figure 4), thus leading to underdeveloped seed. More studies are needed to assess the damage rate caused by *P. hermesalis*, although early observations show that fruit feeders such as macaques and squirrels have a greater impact.


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