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A New Record of Leaf Spot Disease on *Aquilaria malaccensis* Lamk in India

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ABSTRACT

Aquilaria malaccensis Lamk. (Locally known as Sasi or agar plant) is a precious floral wealth of North-East India and has been identified as a potential aromatic plant of this region. It is the principal producer of the dark brown agarwood or eaglewood, produced within heartwood as a result of host-fungus interaction. The essential oil from agarwood is valued for preparation of several pharmaceutical and cosmetic products. Due to the abundance of agar trees in North East India, the trade of agar has become a fascinating industry in this region and earned a name of its own in the world market. During the survey in the nursery of Rain Forest Research Institute, Jorhat *Aquilaria malaccensis* seedlings were found to be infected with a leaf spot disease. This study described the symptomatology and etiology of the disease. The pathogenicity studies revealed the cause of the disease as *Corynespora cassiicola* (Bark and Curt). This disease is recorded for the first time in *Aquilaria malaccensis*.

Key words: Rain forest research institute, foliar disease, *Corynespora cassiicola*, new host record

INTRODUCTION

Aquilaria malaccensis Lamk locally known as Sasi is a precious floral wealth of North East India belonging to the family Thymelaeaceae. It is an evergreen tree growing up to 40 m tall and 1.5-2.5 m in diameter, found mostly in mixed forest habitat up to an altitude of 1000 m above sea level. The species occurs mostly in Bangladesh, Bhutan, India, Indonesia, Myanmar, Malaysia, Philippines, Singapore and Thailand (Traffic Southeast Asia, 2004). India is home to two *Aquilaria* species viz., *A. khasiana* and *A. malaccensis*. *A. khasiana* is found mainly in Khasi Hills of Meghalaya while *A. malaccensis* is native to eight North-Eastern states of India. *A. malaccensis* is best known as the principal producer of resin impregnated heart wood that is fragrant and highly valuable. This resinous wood is known by many names viz., agar, agar wood, aloe wood, eagle wood, gaharu and kalamabak and is in high demand for its distinctive fragrance, thus used for incense and perfume across Asia and the Middle East. The essential oil from agar wood is valued for preparation of several pharmaceutical and cosmetic products and its cost is extremely high depending on the oleoresin content of the wood. Traders even quote prices for pure agarwood oil as high as USD 30000 kg⁻¹ (Barden *et al.*, 2000). Due to abundance of agar trees in North East India, the trade of agar-wood has become a fascinating industry in this area. Hojai, a small town in the Central Assam is the important trade centre for big units of agar industries. Around 50,000 people are directly involved in the trade while another 1.5 lac benefit from it indirectly.

The long term success of *A. malaccensis* that generally considered the most promising forest plantation species of South East Asia mainly depends on the seedlings of good vigour and free from diseases. So, far, very few diseases are reported on *A. malaccensis* in nurseries. Survey of literature revealed the occurrence of root rot caused by *Phytophthora parasitica* (Das and Dubey, 2000) and damping off diseases of seedling in nursery by *Pythium aphanidermatum* (Tabin *et al.*, 2009) in *A. malaccensis*.

During the routine survey of nursery seedlings of *A. malaccensis* raised in Rain Forest Research Institute (RFRI) Jorhat Assam, the seedlings were found to be infected by a leaf spot disease. Considering the importance of the plant, the disease was further investigated and reported in this study.

MATERIALS AND METHODS

Rain Forest Research Institute, Jorhat, Assam (located at latitude 26°46'N, longitude 95°17'E and at an altitude 107 m) possess well established nursery of *A. malaccensis*. The investigation was carried out during 2009-2010 and diseased leaf specimens were collected and placed separately into sterilized polythene bags. The leaf sample was brought to the laboratory and isolation was made on Potato Dextrose Agar (PDA) medium. Slides were prepared and examined under microscope. Microscopic observations were recorded and micro photographs were taken.

Identification of the fungus was confirmed following relevant literatures (Subramanian, 1971; Ellis, 1971). Pathogenicity test was conducted on 15 healthy seedlings of *A. malaccensis*. The leaf surfaces were sterilized with 0.1% of NaOCl and inoculated with conidial suspension (1×10^6 conidia mL⁻¹) of the isolated fungus. Inoculated seedlings were kept under humid chamber to facilitate the fungal growth and observation was made regularly for appearance of disease symptoms. Reisolation from diseased leaves was made and culture of the fungus was maintained on PDA in the laboratory of Forest Protection Division of RFRI.

RESULTS AND DISCUSSION

The symptoms first appeared on the seedlings of *Aquilaria malaccensis* as leaf spots in the month of August, 2009 and were noticed till March 2010. The characteristic symptoms initially appeared on the upper surface of leaf as spindle shaped spot with yellow halo and pin head reddish brown dot at the centre. Later on, the spots increased in size up to 2-3 mm (Fig. 1). The diseased spots were found scattered as dark brown to greyish black in colour, angular to oval and irregular shape, produced in large numbers on the surface of the leaves. Initially symptoms were noticed on the younger leaves and later on infections spread to all the leaves of agar seedlings. Immature leaf fall was also noticed in case of severe infection. The disease was found to be prominent in the month of January. Fungal colony was effuse grey to light black in colour on PDA. Microscopic observation of the fungus revealed septate mycelium with 4-11 pseudo septate conidia. The conidia were found to be long, obclavate, straight or slightly curved and measured 35-190 µm long and 8-20 µm wide. Conidiophores were long, flexuous, 4-9 successive cylindrical proliferations and with swollen tips, 100-750 µm long and 3-11 µm thick. Intercalary chlamydospore was also seen (Fig. 2). From the microscopic observation, the fungus isolated from the diseased leaves was identified as *Corynespora cassiicola* (Berk and Curt.). The fungus was earlier reported on *Gmelina arborea* (Singh, 2002) and *Ceiba pentandra* (Mehrotra, 1989). During pathogenicity test, similar disease symptoms also



Fig. 1: Leaf spot of *A. malaccensis*

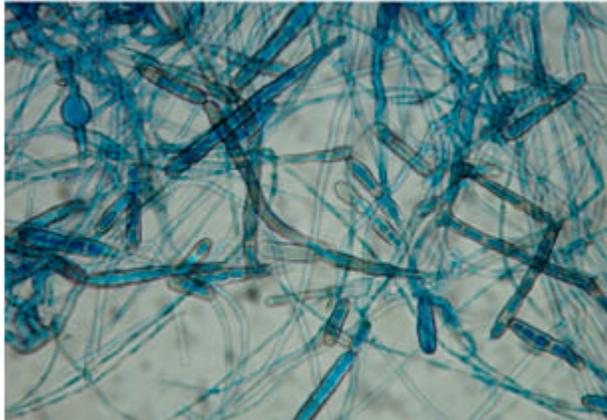


Fig. 2: Conidiophores and conidia of *C. cassicola*

appeared on the inoculated leaves of *A. malaccensis* seedlings after 6-8 days of inoculation. Diseased specimens from artificially inoculated plant also yielded the same fungus that confirmed the pathogenicity of *C. cassicola*. The disease was prevalent only in nursery seedlings but in the young plantations, it was not noticed. This was indication of the plants developing resistance with age.

Though, the disease was not overall severe in the studied area, but under favourable environmental conditions can severely affect the *A. malaccensis* seedlings leading to poor planting stock and ultimately affect the productive potential of the crop. In the month of January, dew formation is found to increase considerably in North East India. The dew carrying the spores appears to play an important role in spread of the disease. This explains why the disease intensity increased considerably in the month of January. Scanning of literature reveals that the pathogen is not reported earlier on *A. malaccensis* and hence forms a new host record. The source of inoculum of the leaf spot disease of *A. malaccensis* might have transmitted from the nearby *G. arborea* seedlings infected with the *Corynespora* leaf spot. In addition to documenting the geographic range of the fungus, or giving warning of a new disease, reporting of *Corynespora* sp. can significantly enhance the understanding of the pathogen biology.

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