IDENTIFICATION AND CHARACTERIZATION OF FUNGAL PATHOGEN *CERATOCYSTIS* SP. ON *ACACIA MANGIUM* IN ULU KUKUT, SABAH.

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ABSTRACT

A preliminary survey conducted at the *Acacia mangium* plantation in Ulu Kukut, Kota Belud district, Sabah, Malaysia, showed an alarming mortality rate from the wilt pathogen. Trees infected with this disease will show symptoms such as severe wilting, sapwood discoloration or black lesion, and fruity-sweet odour from the fermentation exudate produced by the yeast or bacteria at the wound lesion. This research aimed to identify the causal fungal isolates from infected *A. mangium* trees through morphological characterization and DNA sequence comparisons for the ITS and β-tubulin regions. The fungal isolates had morphological characteristics similar to the wilt pathogen *Ceratocystis* sp., such as a globose base with a long neck ended tip with ostiolar hyphae. Using the molecular markers, the isolates were identified as *C. manginecans* and *C. fimbriata*. The identification of causal agent of wilt disease may contribute to the development of effective disease management strategies in Acacia-based plantations.
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1.0 INTRODUCTION

Acacia species are well-known for being major fast-growing plantation species that are used not only for timber production but also for tropical greening (Sahri *et al.,* 1993; Yamamoto *et al.,* 2003). Acacia species are not only fast-growing, but they also have good wood efficiency, can reach heights of up to 30 m (Krisnawati *e al.,* 2011), and appear to be very resilient when exposed to conditions such as poor soil (Wahab *et al,* 2011).

The first significant incidence of *Ceratocystis* wilt disease in Malaysia was reported in Tawau, Sabah, where approximately 40% of acacias have infection symptoms.

Vascular wilt fungi invade the host through the xylem until they disrupt the host metabolism and xylem vessels (Talboys, 1972). It also penetrates the parenchyma, cambium, and bark tissues, resulting in cankers (Lehtijarvi *et al.,* 2018).

The first sign of *Ceratocystis* pathogen infection in tree bark is a black lesion or sapwood discoloration, followed by canker and sunken or cracked areas above the canker area. Aside from that, there is also fermentation exudate or foam from yeast or bacteria present at the wound lesion. According to Tarigan *et al.,* (2011) and Brawner *et al.,* (2015), the tree leaves will begin to yellow, followed by extreme wilting and death due to nutritional deficiency

2.0 METHODS AND MATERIALS

2.1 MORPHOLOGICAL CHARACTERIZATION

Figure 1. Morphological characterization of fungal isolates

2.2 IDENTIFICATION THROUGH MOLECULAR MARKERS

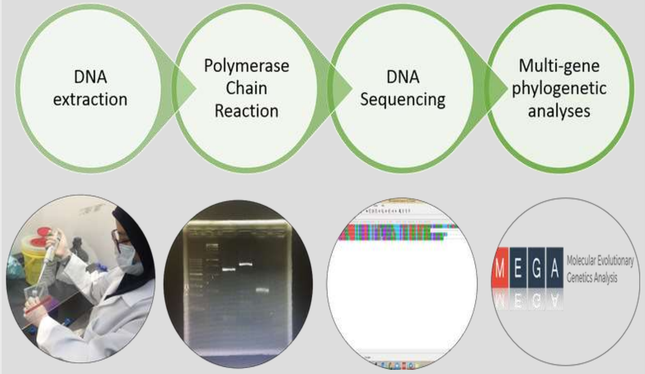

Figure 2. Molecular identification of fungal isolates.

3.0 RESULTS

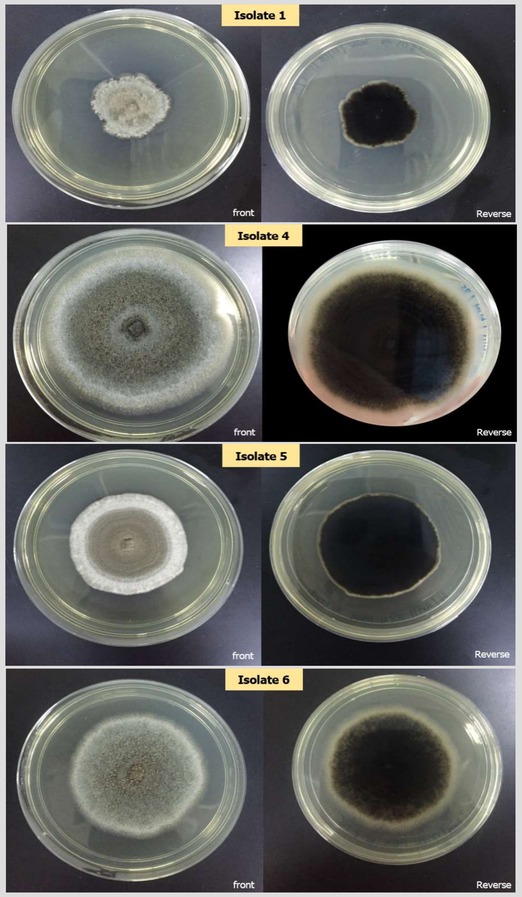

Figure 3. Macroscopic features of *Ceratocystis* isolates.

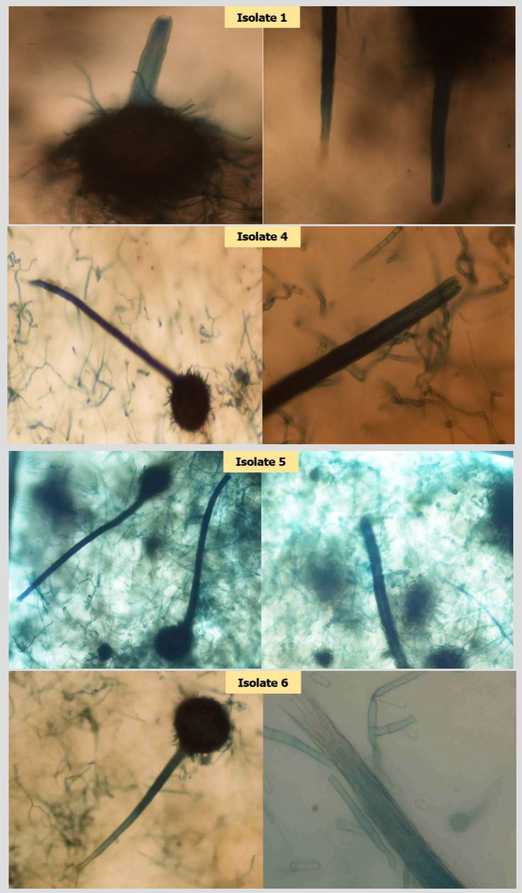

Figure 4. Microscopic features of *Ceratocystis* isolates.

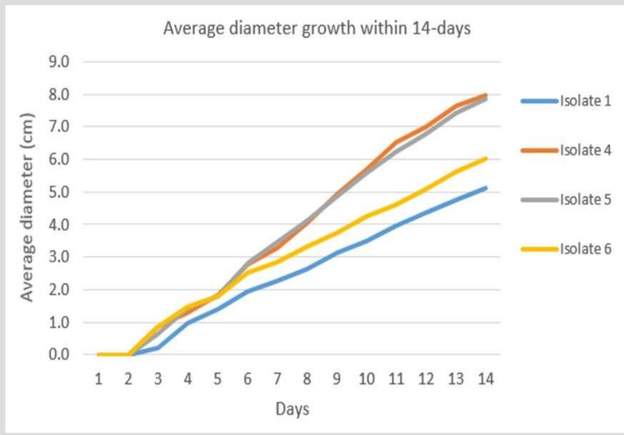

Figure 5. The average diameter (cm) growth of *Ceratocystis* isolates in 14 days.

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3.0 RESULT

Figure 6. Phylogenetic tree constructed based on ITS gene region comparison between isolates (1,4,5 and 6) with C. manginecans, and C. fimbriata as reference fungal strains and Aspergillus niger as outgroup.

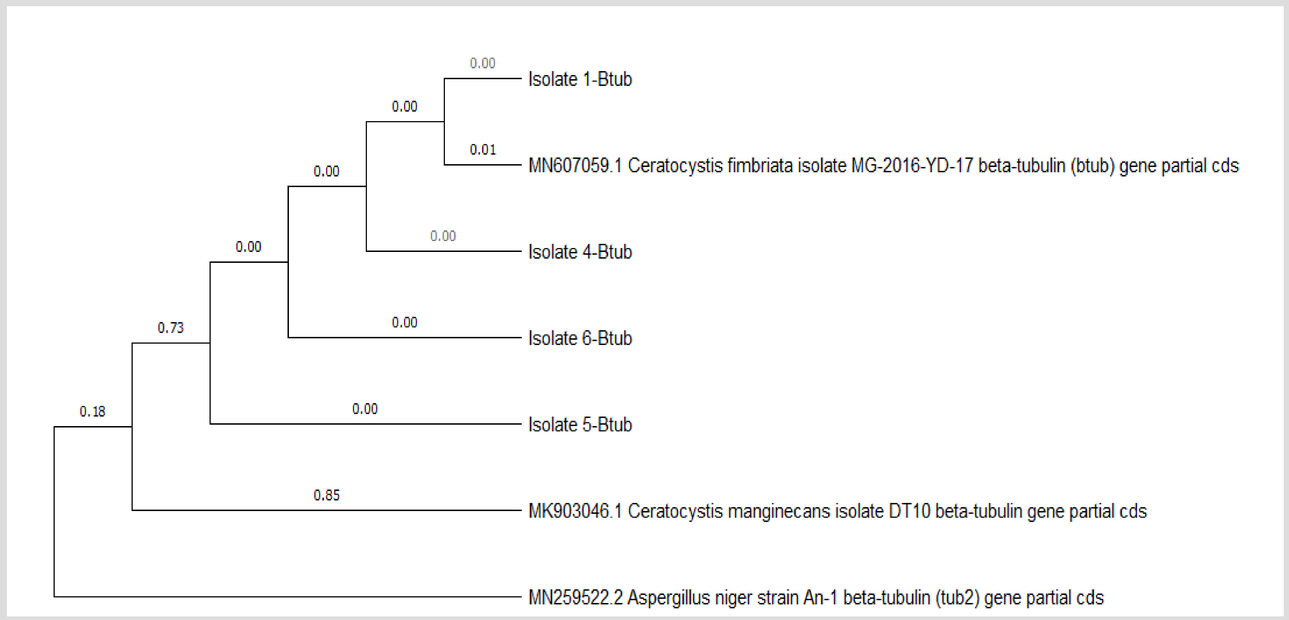

Figure 7. Phylogenetic tree constructed based on Bt gene region comparison between isolates (1,4,5 and 6) with *C. manginecans,* and *C. fimbriata* as reference fungal strains and *Aspergillus niger* as outgroup.

CONCLUSIONS

Molecular identification for all isolates are still not conclusive and will be resolve by pcr and sequencing with third primer MS204.ceratoB (Fourie *et al.,* 2015) to confirm the findings.

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