



## Isolation and characterization of *Pyricularia oryzae* isolated from lowland rice in Sarawak, Malaysian Borneo

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### ABSTRACT

**Aims:** Rice blast disease caused by *Pyricularia oryzae* is one of the major biotic diseases of rice in Sarawak, Malaysian Borneo. This study aims to isolate and characterize rice blast fungus obtained from infected leaf collected from four different divisions in Sarawak, viz, Miri, Serian, Sri Aman, and Kuching.

**Methodology and results:** Twelve succeeded isolates were pre-identified as *P. oryzae* by morphological characteristics of spores, followed by verification through (internal transcribed spacer) ITS sequencing. The isolates were evaluated for morphological characteristics, growth rate and sporulation rate, which were grown on two types of media, (filtered oatmeal agar) FOMA and (potato dextrose agar) PDA. Morphological characterization showed that the colony surface of the different isolates varied from smooth and fluffy to rough and flattened mycelia; some were with the present of concentric rings, and some with aerial mycelia. The growth rate and sporulation rate of each isolate varied based on types of media used. Most of the isolates grew faster on PDA than on FOMA but produced higher number of spores on FOMA as compared to PDA.

**Conclusion, significance and impact of study:** This preliminary study showed that there were variations observed based on morphological and physiological characterization for the different isolates collected in Sarawak, Malaysian Borneo. This study is the first step towards understanding variation in the population of *P. oryzae* from Sarawak.

**Keywords:** *Pyricularia oryzae*, Sarawak rice, morphological characteristics, growth rate, sporulation rate

### INTRODUCTION

Rice (*Oryza sativa* L.) is a crucial food crop that is widely grown to feed half of the world's population. More than 90% of rice is cultivated and consumed in Asia (Khush, 2005; Talbot and Wilson, 2009; Global Rice Science Partnership, 2013). In Malaysia, the rice production caters approximately 65% of the population demands. As a result, Malaysia still depends on imported rice to meet the total demand. Rice production in Malaysia needs to be increased to reach the status of self-sufficiency and to meet the demand of the rapid growing population (Abdul Rahim *et al.*, 2017). Increasing the rice production is always challenged by rice diseases. One of the diseases is rice blast. Rice blast is recognized as one of the major biotic stresses that could lead up to 10% and 30% significant yield losses each year, globally (Skamnioti and Gurr, 2009; Zhou, 2016;). In Malaysia, rice yield loss due to rice blast can reach up to 50% (Gianessi, 2014; Elixon

*et al.*, 2017).

Rice blast disease is caused by filamentous ascomycete fungus, *Magnaporthe oryzae* (T.T. Hebert) M. E. Barr (anamorph *P. oryzae* Sacc.) (Silva *et al.*, 2009; Talbot and Wilson, 2009). This fungus can infect all stages of rice development and different parts of rice plants; leaves, stems, nodes and panicles (Talbot and Wilson, 2009). The lesion is typically a diamond shape with grayish center and brown margin. Under favorable conditions, the lesions can enlarge rapidly and tend to coalesce, leading to plant death (Wang *et al.*, 2014).

Breeding blast resistant varieties is a promising method in rice blast management (Ashkani *et al.*, 2015). However, the resistance might eventually be overcome by *P. oryzae* due to their genetic diversity and their ability to recombine (Scheuermann *et al.*, 2012). For example, rice blast resistant cultivar MR219 (Hussain *et al.*, 2012) in

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