

**LAPORAN PENYELIDIKAN DANA
KECEMERLANGAN PENDIDIKAN UiTM**

**BIOCONTROL OF PLANT PATHOGEN
PHELLINUS NOXIUS BY SELECTED
ACTINOMYCETES, BACTERIA AND FUNGI**

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Surat Kami 600-RMI/ST/DANA 5/3/Dst (>^ /2011)
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3. Bagi pihak Universiti kami mengucapkan tahniah kcpada Y. Brs. Profesor/tuan/puan kerana kejayaan ini dan seterusnya diharapkan berjaya menyiapkan projek ini dengan cemerlang.
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1.1 Report Summary

The *Phellinus noxius* which are the plant pathogen caused brown root rot disease and harmful to the plantation industry. In Malaysia, disease was found in teak plantations in Selangor, Perak, Kedah and Melaka. A study was conducted to evaluate the antagonistic activities of selected fungal and bacterial species which included *P. aeruginosa*, *B. subtilis*, *Trichoderma* spp. TT1 *actinomycete*, TT2 *actinomycete* and TT3 *actinomycete* towards the plant pathogens. All the antagonists were found to have antagonistic activities against the fungal pathogens when evaluated by the dual culture assay on potato dextrose agar (PDA) and ISP-2 at 30°C. The *Trichoderma* spp. is the best antagonist due to the highest percentage inhibition ranging from 14.28% to 100%. There are 3 mechanisms of antagonisms has been done such as competitive inhibition, mycoparasitism or antibiosis. For competitive inhibition, *Trichoderma* spp. showed the fastest growth which indicated it to be very competitive to the pathogens for the substrates, nutrients and space. Meanwhile mycoparasitic interactions were investigated by using light microscopy and scanning electron microscopy. Under the microscopic observations showed that the hyphae of *Phellinus noxius* shrink, swell and become stunt. Activity of chitinolytic enzymes was detected when the antagonists formed clearing zone chitin yeast extract agar and only TT1 and TT3 *actinomycete* strains was produced a positive results with the significant clear zone (> 0.5cm of diameter). Activity of cellulolytic enzymes was detected when the antagonists formed halos on CMC plate assay and the highest secretion was showed by TT2 *actinomycete* with the halo diameter was 1.40cm. Under the antibiosis using cell-free culture filtrate by agar well diffusion bioassay, all antagonists effectively against plant pathogen except TT1 *actinomycete* was not effective against *Phellinus noxius* due to the absence of inhibition zone. During the antibiosis using solvent extracts methanol extract gave a positive result. The methanol extract of *P. aeruginosa* produced the widest zone of inhibition among other antagonists.

1.2 Introduction

Phellinus noxius is a pathogenic fungi which infects the teak trees and causing brown root rot disease. In Singapore, this pathogen was first described by Corner in 1932 as *Fomes noxius* (Corner, 1932). This pathogen been reclassified as *Phellinus noxius* in the year 1965 by Cunningham (Cunningham, 1965). This pathogen also been reported has a wide host range on more than 200 plant species including woody plants and some herbaceous plants. Moreover *Phellinus noxius* is active and widespread in the tropical countries such as Southest Asia, Africa, Oceania, Central America and Carribean (Pegler etal., 1968).

This pathogen also causes destruction of the tropical forest plantation in Peninsular Malaysia. The disease caused by *Phellinus noxius* which are also known as Brown Root Rot (BRR) disease was observed in teak plantations in Sabak Bernam, Selangor and Kuala Kangsar in Perak as well as in Sik, Kedah and Lendu, Malacca (Maziah and Lee, 1999). Plant such as *Acacia mangium* and *Hevea brasiliensis* has been detected by this pathogen.

Phellinus noxius also caused significant economic losses in rubber, cocoa, tea and fruit tree plantations. Besides that, it caused major losses in timber and hardwood plantations, agro forests and landscapes (Ko, W.K and R.K. Kunimoto, 1996). The fungus pathogen forms an infection centre and spreads from tree to tree by root contact. It can exist on decaying roots in the soil for more than 10 years and the frees are rapidly killed by these pathogens.

According to Ellis et al.,(1990), *Phellinus noxius* is a member of the family Hymenochaetaceae, order Aphyllophorales, and phylum Basidiomycota of the kingdom Fungi. These *Phellinus noxius* obtained nutrients from dying or dead plant tissue. This pathogen requires living hosts for their nutrient supply. The mycelium of *Phellinus noxius* gained nutrients from the enzymes that break down the cell walls of the plant into simple sugars and this mechanism allows it to move deeper into the wood. This pathogen cannot break up lignin and the wood retains its brown color because of that it is called