

UNIVERSITI TEKNOLOGI MARA

**EVALUATION OF *In Vitro*
ANTIFUNGAL ACTIVITY OF
SELECTED PLANT EXTRACTS AND
ANTAGONISTIC BACTERIA
AGAINST BUTT ROT DISEASE OF
PINEAPPLE**

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ABSTRACT

Butt rot disease caused by *Thielaviopsis paradoxa* is an important disease of pineapple planting material in Malaysia. Plant extracts and antagonistic bacteria are potential biocontrol agents as they are effective and safer than chemical controls. In this study, five groups of antagonistic bacteria were isolated from soil sampled from pineapple plants infected with butt rot disease and non-infected plants and four species of plant extracts, namely *Leucaena leucocephala* (leaf, bark) *Eucalyptus camaldulensis* (leaf), *Alpinia galanga* (rhizome) and *Cinnamomum iners* (bark) were tested against fungal pathogen. *In vitro* antifungal potential of both biocontrol agents were evaluated against *T. paradoxa*. Well diffusion method was used to evaluate antifungal activity of plant extracts, while dual culture method was used to test the antifungal activity of antagonistic bacteria. The result indicated that, among all the tested extracts, three ethanol extracts of *L. leucocephala* bark, *E. camaldulensis* leaf and *A. galangal* rhizome and two chloroform extracts of *L. leucocephala* leaf and *C. iners* bark have showed their antifungal activities with 1.25%, 1.5%, 1.5%, 2.25% and 42.75% radial growth inhibition. Antagonistic bacteria, B1 showed the highest radial growth inhibition with 75%. Results also showed that B2, B3, B4 and B5 bacteria exhibited positive inhibition towards the pathogen with 70.75%, 57.25%, 56.25% and 47.50% radial growth inhibition, respectively. Microscopic observation of antifungal activities by plant extracts and antagonistic bacteria showed that the antifungal activities were via degradation, retardation, malformation, swelling, coagulation and breakage of the hyphae of *T. paradoxa*.

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CHAPTER ONE

INTRODUCTION

1.1 RESEARCH BACKGROUND

Pineapple (*Ananas comosus*) belongs to the family of Bromeliaceae and is one of the industrial crops that has been planted widely in south of Malaysia particularly in Johor. Pineapple fruit is rich in micronutrients and antioxidants such as vitamin C, polyphenols, flavonoids and phytochemicals. It can be consumed either fresh for desserts, jellies and pastries or processed form as a puree, jam and beverages (Chakraborty, Rao and Mishra, 2015). In Malaysia, there are nine commercial cultivars of pineapple which are Sarawak, Maspine, Yankee, Gandul, Moris Gajah, Josapine, N36, MD2 and Moris. In 2015, Malaysia Pineapple Industry Board (MPIB) reported that pineapple crop occupied a planted area of 15, 649.65 hectares where 76.9 % (12,045.65 hectares) is in Peninsular Malaysia, 14.3% (2,235 hectares) in Sarawak and 8.7% (1,369 hectares) in Sabah. In addition, Johor has the largest planted area of pineapple with 9,093 hectares and produced highest yield of pineapple with 202, 183 metric tons. The second highest producer state of pineapple in Peninsular Malaysia is Selangor, with 548 hectares of planted area; the state produces about 21,703 metric tons while Pulau Pinang has 712 hectares of planted area and produced 17,706 metric tons. Sarawak produced about 38,551 metric tons followed by Sabah which produce about 29,147 metric tons. The total cultivation area of pineapple registered by MPIB is 8, 731 ha, where 6,380 ha are from farm sector and 2,351ha from the small sector (Malaysia Pineapple Industrial Board [MPIB], 2015).

Malaysia is known in the production of quality canned pineapple that has golden yellow color of pineapple flesh and one of twenty leading producers of pineapple after Thailand, Brazil, Costa Rica, Philipine, China, Indonesia, India and others. About, 95% productions of canned pineapple are being exported for global market and another 5% for local market. Moreover, about 30% of the fresh pineapple was exported to the global market, and 70% to the local market. Malaysia is (MPIB, 2015).