



UNIVERSITI PUTRA MALAYSIA

**BIOLOGICAL CONTROL OF *Parthenium hysterophorus* USING PLANT
PATHOGEN**

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FACULTY OF AGRICULTURE

**UNIVERSITY PUTRA MALAYSIA
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**BIOLOGICAL CONTROL OF *Parthenium hysterophorus* USING PLANT
PATHOGEN**

By

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A project report submitted to Faculty of Agriculture, Universiti Putra Malaysia In
fulfillment of the requirement of PRT 4999 for the award of the degree of Bachelor of
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Approval Sheet

This project report entitled “EFFECT **BIOLOGICAL CONTROL OF *Parthenium hysterophorus* USING PLANT PATHOGEN**” is prepared by Mohd Ridzuan Bin Hasnan and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of the degree of Bachelor of Horticultural Science.

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Abstract

Parthenium hysterophorus is one of the serious weed that occupy in the agriculture and abandoned area in Asia including Malaysia. This weed caused several environmental hazardous and effect to human and livestock health. This weed potentially cause damage early as in the rosette stage which cause mouth ulcer to livestock after consuming it. Herbicides are frequently used to control this weed. However, the chemical residues may harm to human health, environment pollution, and causing the weed to develop resistance toward the active ingredient. Six plants pathogenic fungus and bacteria were screened for their potential to cause infections against *Parthenium hysterophorus*. Three bacteria isolate namely B1, B2 and B3. Fungus isolate namely A2, A4 and A5 were isolated from the infection *Parthenium* part. Based on the pathogenicity test, all the bacteria and fungus isolate screened cause infection and symptom to detached leaf of *Parthenium hysterophorus* and their ability to cause severe infection depended on the isolate of the pathogen. The level of damaged caused between fungi A2, A4 and A5 was significantly no different between the isolates as it develop averaged lesion size measured 6.2cm, 6.0cm and 6.4cm after six days of incubation. All bacteria isolates produced infection symptom as indicates from the lesion size developed, with the (AUDPC) values of 16.68cm^2 (B1), 12.65cm^2 (B2) and 5.63cm^2 (B3). The rate of symptoms expansion was significantly faster in B1 compared to B2 and B3, with the expansion rate of 1.08 cm/ day compared to 0,90cm/day and 0.48 cm/day for B1 and B3 respectively. From both isolated pathogen, it showed that B1 and A5 are more effective in causing infection symptom to the detach *Parthenium* leaf.

Abstrak

Parthenium hysterophorus merupakan masalah besar yang dihadapi oleh Asia termasuk Malaysia. Rumpai ini tumbuh secara liar di kawasan pertanian dan tanah terbiar. Rumpai berbahaya ini berupaya memberi kesan sampingan kepada ekosistem setempat selain itu masalah kesihatan kepada hidupan termasuk manusia dan haiwan ternakan. *Parthenium* berupaya memberi kesan bermula seawal peringkat rosette di mana boleh menyebabkan ulcer mulut kepada ternakan apabila tersentuh atau termakan. Racun herba merupakan cara yang efektif untuk mengawal rumpai ini, tetapi penggunaannya dapat memberikan kesan negatif kepada alam sekitar dan hidupan. Disamping itu penggunaan racun herba berpotensi menyebabkan kerintangan rumpai ini terhadap racun kimia. Tiga kulat A2, A4, A5 dan tiga bakteria B1, B2, B3 disaring untuk potensi mereka menyebabkan penyakit terhadap *Parthenium hysterophorus*. Berdasarkan ujian "pathogenicity" kesemua kulat dan bakteria yang di saring berupaya menyebabkan penyakit dan symptom kepada daun rumpai. Melalui peringkat kerosakkan yang disababkan oleh kulat A2, A4 dan A5 masing-masing tidak ketara dengan nilai purata saiz jangkitan 6.2sm, 6.0sm and 6.4sm selepas di inkubasi selama enam hari. . Semua bakteria menyebabkan symptom seperti yang ditunjukkan melalui saiz kerosakkan. Melalui teknik (AUDPC) kesemua bakteria memberikan pertumbuhan yang berbeza iaitu 16.68cm^2 (B1), 12.65cm^2 (B2) and 5.63cm^2 (B3). Kadar pertumbuhan simptom bagi B1 adalah tertinggi jika dibandingkan dengan B2 dan B3. Denan kadar pertumbuhan 1.08sm/hari berbanding 0.90sm/hari dan 0.48sm/hari untuk B1, B2 dan B3. Daripada kedua-dua kaedah tersebut, B1 dan A5 dilihat lebih berkesan menyebabkan simptom kepada daun *Parthenium*.

Introduction

Parthenium hysterophorus is one of the top most dangerous weed in the world, which is responsible for its toxic and noxious to biodiversity, agriculture, animals and human health. *Parthenium hysterophorus*. It contributes to huge loss of economy on food crop due to competition. It causes several serious health hazard to human and livestock when exposed to any part of the plant, such as its pollen. *Parthenium* commonly infest abandon and low populated area, mainly growing in vacant sites, dumped areas, roadsides, railway tracks, orchards and construction sites (Singh *et al.* 2004).It is believed to have been introduced into Malaysia from Northern America through contamination of agriculture materials and impact from its destruction to environment the weed have been put under quarantine by Malaysian Agriculture Society under Quarantine Act 1976.

Various weed control strategies mostly chemical and mechanical approaches have been used to control the population but most of them are not very successful to manage it. The present management conducted in Malaysia is by spraying dilute sea salt, (Jabatan Pertanian Perlis 2014). However, the result is not permanent and effective to controlling this weed that has very little environmental resistance. Various methods to control *Parthenium* population have been studied. Unfortunately, conventional methods such as chemical control and cultural control were often very expensive and were not very successful. Biological control is an alternative control which can be successful and effective way to manage the population of *Parthenium*.

Two rust fungi which native to Mexico, *Puccinia abrupta* var. *partheniicola* and *Puccinia xanthii* var. *parthenii-hysterophorae*, were reported to control this weed. From the past studies, there are about 28 species of pathogenic fungi found that naturally occur at *P. hysterophores* which have potential to inhibit the growth and cause damage to the weed. Most of the studies were located in India which has the largest infected area by *Parthenium*. Therefore the objective of this study is to screen for plant pathogens that has potential to be used as biological control agents for *P. hysterophorus*.



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