UNIVERSITI PUTRA MALAYSIA

BIOHERBICIDAL EFFECTS OF BATAWALI LEAF EXTRACT ON WEED CONTROL, AND RICE GROWTH AND YIELD

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A project report submitted to the Faculty of Agriculture University Putra Malaysia in fulfillment of the requirement of PRT 4999 (Project) for the award of the degree of Bachelor of Agricultural Science.

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CERTIFICATION

This project report entitle 'BIOHERBICIDAL EFFECTS OF BATAWALI LEAF EXTRACT ON WEED CONTROL, AND RICE GROWTH AND YIELD' is prepared by Noor Hafifi Bin Noor Mohamad and submitted to the Faculty of Agriculture in fulfillment of the requirement PRT 4999 (Final Year Project) for the award of degree of Bachelor of Agricultural Science.

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ABSTRACT

Synthetic chemicals have been the only economical way to control weeds for the longest time. Nevertheless, the side effects of using chemical means are undeniably harmful towards humans and nature. This study was done to look for alternative for these harmful chemicals by using natural chemical or allelochemicals, in this case using *T. tuberculata* (Batawali) leaves extract as the applied herbicide on rice production. The effect of *T. tuberculata* leaves extract on weed control, rice growth and yield were studied on four different varieties namely MR219, MR220, MR263, and MR269 under glasshouse condition in Ladang 10, UPM. As expected in the result, weed control by this herbicide was excellent and the side effect on growth and yield were minimum. The only variety that was significantly affected by *T. tuberculata* application was MR219, which the growth of the variety particularly on its height was affected in the beginning but on yield part, no significant effect was recorded. As for the conclusion, the application of this natural herbicide had significant effects on growth and yield mainly on latest and popular varieties such as MR220, MR263 and MR269.

ABSTRAK

Bahan kimia sintetik adalah bahan yang secara ekonomi sesuai untuk mengawal rumpai untuk sekian lama. Walaubagaimanapun, kesan buruk penggunaan bahan ini adalah tidak dapat dinafikan terutama kepada manusia dan alam sekitar. Penyelidikan ini telah dijalankan untuk mencari alternatif kepada bahan kimia berbahaya ini dengan menggunakan bahan kimia semulajadi atau *'allelochemical'*, dalam hal ini menggunakan ekstrak daun *T. tuberculata* (Batawali) sebagai racun herba pada tanaman padi. Kesan ekstrak daun Batawali terhadap kawalan rumpai, pertumbuhan padi dan hasil padi telah dikaji terhadap empat jenis padi iaitu MR219, MR220, MR263 dan MR269 menggunakan keadaan rumah kaca di Ladang 10, UPM. Seperti yang diramalkan di dalam dapatan kajian, pengawalan rumpai adalah cemerlang dan kesan buruk pada pertumbuhan dan hasil padi adalah minimum. Jenis padi yang menunjukkan kesan signifikan terhadap penggunaan racun herba ini adalah MR219 dimana pertumbuhan jenis padi ini terutama pada ketinggian pokok terjejas pada peringkat awal pertumbuhan namun untuk peringkat hasil, tiada perbezaan signifikan direkodkan. Sebagai kesimpulan, penggunaan racun herba semula jadi ini tidak memberi kesan yang signifikan terhadap pertumbuhan dan hasil padi terutama kepada jenis padi yang terbaru dan popular seperti MR220, MR263 dan MR269.

CHAPTER 1

INTRODUCTION

Weed has become among the biggest enemies for crop production and the only economical way to control this continuous problem is using synthetic chemicals which comes at the expense of human health and environment. Rice cultivation as an example has its herbicide usage increased significantly for the last 20 years. Several reasons mentioned were increasing labor cost and the availability and efficacy of herbicides which was economically good and reliable for farmers (Olofsdotter *et al.,* 2002). Weeds are one the major restraint in terms of rice production because weeds reduce crop yields which results in higher herbicide use. Common troublesome weeds are Barnyardgrass (*E. crus-galli)* and weedy rice (*Oryza sativa f. spotanea)* (Hakim *et al.,* 2010)

Various studies have been done to look for the alternatives for these hazardous chemicals, and natural chemicals are one of the highlighted substitutes. Khanh, (2006) opined that the exploitation of plants with allelopathic potential for controlling weed emergence and minimizing the reliance on synthetic chemical may be a possible option. Allelopathic effect is released by all plant as a kind of interaction between plants and the interaction is mostly negative and more to kill or reduce competition (Soltys *et al.,* 2013). Exploitation of this natural phenomena will be a great addition or replacement to our current synthetic chemical control of weeds.

Most of the past researches related to allelopathy were about *O. sativa* because of the problems such as labor shortage for hand-weeding and the flooding method of planting led to high dependency on chemical herbicide for weed control (Belz, 2007). This research will be a continuation for the works done in the past as it is related to *O. sativa* but using different plant species which is *T. tuberculata* or Batawali.

Using raw, dried, and ground Batawali leaves, the leaves were applied as natural herbicide on 4 different type of varieties of local rice developed by MARDI, namely MR219, MR220, MR263, and MR269 for its level of weed control and most importantly, on growth and yield of the mentioned varieties. Leaf part of Batawali was selected ahead of other plant parts because it was proven in previous research that leaves extract are more active than the stem extract and caused the most negative effect on germination and early growth of tested plants (Aslani *et al*., 2013).

The objectives of the research were:

1. To determine the efficacy of Batawali leaf extract application as late post-emergence herbicide on weed control.
2. To observe the growth and yield responses in different local rice varieties to Batawali leaves extract application.

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