



UNIVERSITI PUTRA MALAYSIA

**ASSESSMENT OF POTENTIAL RESISTANCE TO IMIDAZOLINONE
HERBICIDE IN THREE RICE WEED SPECIES**

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IN THREE RICE WEED SPECIES**

By

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CERTIFICATION

This project paper entitled ‘Assessment of potential resistance to imidazolinone herbicide in 3 rice weed species’ is submitted by Nur Azrina Binti Razak in partial fulfilment of the requirement of PRT 4999B (Project) for the award of the degree of Bachelor of Agricultural Science.

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LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
L	Liter
g	Gram
ai	Active ingredients
Spp	Species
mm	milimitre
°C	Degree celcius
h	hour

ABSTRAK

Satu kajian telah dijalankan untuk mengkaji potensi rintangan tiga rumpai padi iaitu *Cyperus iria*, *Echinochloa crus-galli* dan *Oryza sativa* var *sylvatica* kepada racun herba imidazolinone. Kajian ini dijalankan menggunakan Rekabentuk Rawak Lengkap dengan tiga replikasi. Parameter yang di ambil ialah kandungan klorofil, peratusan hidup, berat basah akar dan berat kering akar. Data bagi peratusan hidup, berat basah akar dan berat kering akar di ambil 21 hari selepas rawatan di jalankan. Kesemua data dianalisis menggunakan Analisis Variasi (ANOVA) menggunakan Sistem Analis Statistik (SAS) untuk menguji perbezaan antara rawatan dan perbezaan min di tentukan dengan kaedah LSD (Less Significant Difference). Peratusan hidup (%) di analisis secara probit menggunakan perisian Statistical Package SPSS untuk menentukan LD₅₀ (jumlah imidazolinone yang diperlukan untuk 50% kematian). Data menunjukkan *Cyperus iria* mempunyai peratusan hidup yang tertinggi iaitu sebanyak 53%, apabila disemur dengan imidazolinone, diikuti dengan *Echinochloa crus-galli*, (10%), manakala *Oryza sativa* var *sylvatica* dapat dikawal sepenuhnya oleh imidazolinone. LD₅₀ bagi *Cyperus iria* juga tinggi berbanding spesies lain iaitu 3.178 g ai L⁻¹. Ini menunjukkan antara ketiga-tiga rumpai padi tersebut, *Cyperus iria* mempunyai risiko rintang terhadap racun imidazolinone.

ABSTRACT

This experiment was conducted to examine the potential resistance of three rice weeds species, namely *Cyperus iria*, *Echinochloa crus-galli* and *Oryza sativa var sylvatica* to imidazolinone herbicide. Different doses of imidazolinone herbicide (0, 0.275 g ai L⁻¹, 0.55 g ai L⁻¹, 1.10 g ai L⁻¹ and 2.20 g ai L⁻¹) were used as the treatment. The experiment was conducted in Randomized Completely Block Design (RCBD) with three replications. The parameters measured were amount of chlorophyll content, percentage of survival, fresh weight of roots and dry weight of roots. Data percentage of survival, root fresh weight and root dry weight were taken for 21 days after the treatments. Data were analysed by Analysis of Variance (ANOVA) using Statistical Analysis System (SAS) to test significance and the means were separated to Least Significant Difference (LSD). Plant survival (%) was subjected to a probit analysis by using the Statistical Software Package of SPSS in order to determine the LD₅₀ (the amount of imidazolinone required for 50% death) value. At the recommended rate of imidazolinone, *Cyperus iria* had the highest percentage of weed survival which was 53%, followed by *Echinochloa crus-galli* (10%), while *Oryza sativa var sylvatica* was completely controlled by imidazolinone. LD₅₀ for *Cyperus iria* also indicated the highest which was 3.178g ai L⁻¹ compared to other weed species. This shows that *Cyperus iria* has the highest risk of potential resistant towards imidazolinone herbicide.

CHAPTER 1

1.0 INTRODUCTION

Weed control in agriculture includes physical and cultural practices such as cultivation, burning, crop rotations and grazing. However, herbicides have been used as the important weed control tools due to agronomic and economic reasons. In Malaysia, herbicides have been used widely as a weed control in agriculture sector (Kuan et al, 1990). However, the repeated use of herbicide may develop herbicide resistance in some weeds in the population (Kuan et al, 1990). This resistance development has become the problem to the farmers.

Resistance is a survival of a section of the population following treatment with herbicide dosage lethal to the normal population. The development of resistance of weed species to herbicide is among of main problem faced by growers in Malaysia especially in rice field production. In Malaysia, Saramollagrass (*Ischaemum rugosum*) was the first weed evolved resistance to Group D/22 herbicides in 1989 and infests rubber and vegetables (Heap, 2000). Twenty weed species have been reported to develop resistance to one or more herbicide modes of action in Malaysia, predominantly in rice fields (Heap 2014).

Clearfield® production system is new variety of paddy which is MR 220CL1 and MR 220CL2 that includes the use of imidazolinone herbicide as the component of the system in that paddy production (MARDI, 2012). This imidazolinone herbicide has been used to control the population of weeds in the Clearfield rice fields. Imidazolinone herbicide, under the trade name OnDuty™ (active ingredient imazapyr and imazapic) is the herbicide used to control weeds in Clearfield® production system of paddy (BASF, 2010). However, recently, in early 2014, farmers in Titi Serong, Perak and Kuala Sanglang, Perlis have reported that imidazolinone herbicide failed to adequately control the weeds population in their Clearfield® rice fields,

As a way to solve the problems, an experiment was conducted to examine 3 major weeds species in rice field in order to ascertain if resistance to imidazolinone herbicide did occur in these 3 weed species. The 3 weed species that were used for this experiment are *Cyperus iria*, *Echinochloa crus-galli* and *Oryza sativa var sylvatica*, which were found to highly infest many rice fields in Kuala Sanglang. Those 3 rice weeds species were sprayed with 5 different doses of imidazolinone herbicide as the treatments of the experiment. The objectives of the experiment were to examine the potential risk of resistant in 3 rice weed species to imidazolinone and to quantify the level of resistance in each weed species to imidazolinone.

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