UNIVERSITI PUTRA MALAYSIA

INSECTICIDESRESISTANCE OF BROWN PLANTHOPPER (Nilaparvatalugens) FROM INTEGRATED AGRICULTURE DEVELOPMENT AREA (IADA) UTARA, KERIAN PERAK DARUL RIDZUAN

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FP 2014 15

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BY

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

Faculty of Agriculture

University Putra Malaysia

2013/2014

CERTIFICATION FORM

This project report entitled "Insecticide Resistance of Brown Planthopper (Nilaparvatalugens) from Intergrated Agriculture Development Area (IADA) Utara, Kerian. Perak DarulRidzuan" is prepared by Muhammad Afandi bin Khairuddin 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 Agricultural Science.

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2013/2014

ACKNOWLEDGMENT

First and foremost, I wish to express my thankfulness to Almighty Allah S.W.T because of His bless fullness and guidance to me from the beginning of this project until now. Apart of the efforts of me, the success of this project depends mostly on the encouragement and guidelines of many others. I take this opportunity to express my appreciation to the people who have been instrumental in the successful completion of this project report.

I would like to express my deepest appreciation to my project supervisor, Dr.NoridaMazlanfor his invaluable advice, ideas, encouragement, guidance, discussion and suggestion throughout this project to make sure I can finish this project smoothly. Furthermore I would also like to acknowledge with much appreciation the crucial role of laboratory staff especially En Ahmad TamsilShariff, En HishammudinZainuddin, and En JarkasiSarbinifor their guidance and help as well as assisting me during handling this project at laboratory. Their guidance and assist are giving me a good knowledge how to work in laboratory.

A special thanks goes to my beloved family especially my parent, Khairuddin bin MohdKadri and RabeahbtHjZaini for their pray, support and encouragement for me to finish this final year project. Lastly, Last but not the least, many thank go to all my friends especially to NurulAshiqinbt Mat Nawi, Mursidatunbt Ad Jalal and MohdHafizanizam b Shaari for their helping and accompany me during handling this project. Without their support and advice I will not able to finish this project in the given period.

ABSTRACT

Brown planthopper (*Nilaparvatalugens*) is a serious pest in rice field because it causes a directdamage to rice plant and also as a vector several serious viruses. Intensive use of similar insecticide at rice field in Malaysia has result a low mortality of BPH population today. Therefore, a study of insecticide resistance to BPH and what type of level is of great interest because if resistance could be monitored, the population and the disease that came from BPH can easily be controlled. Applying the insecticide to BPH not only can cause of resistance but also could bring another impact such as the mortality of natural enemies, BPH resurgence, effect on human health and polluting the environment. In this case studies, BPH will be collected at rice field at Kerian, Perak by using an aspirator and transfer into mylar cages in glasshouse. Taichung Native 1 of variety rice will be the planted as a food for BPH in insect rearing process where until the instar of BPH will develop into female adult. Two types of insecticide will be used in this study (Imidacloprid and Fipronil) to determine resistant level. Insecticides treatment will be applied topically on the thoracic region of insects. Mortality observation was recorded after 24 hours and 48 hours. The results from bioassays demonstrated that BPH population in 2013 has developed resistance to Imidacloprid and less resistance towards Fipronil with resistance ratio ranging from 2.71-fold and 0.59-fold respectively. By comparing BPH population in 2013 with results from 2012, Fipronil has the highest toxicity level as having the lowest LD_{50}values (1.05 – 67.26 µg/g) which mean it needed only small amount of insecticides to kill half of the population. Meanwhile, Imidacloprid have least toxicity at range (1.05 – 67.26 µg/g) respectively.

ABSTRAK

Benaperang (Nilaparvatalugens) adalahperosaktanamanpadiutamakeranaianyamenyebabkankerosakanlansungterhadaptanamanpadidanjugamerupakanvektor virus yang serius.Penggunaanracunseranggadenganintensif di kawasantanamanpadikinitelahmenyebabkanperatuskematianbenaperangmenurun.Jadi, kajianmengenaitahapkerintanganbenaperangterhadapracunseranggadanpadatahapberapakahkerintangantersebutadalahperludikajidenganlebihmendalamsupayapopulasidankehadiranpenyakitmelaluibenaperangbolehdibendung.Mengaplikasikanracunseranggabukansahajamenyebabkanbenaperangmenjadirintang, tetapiiajugabolehmenyebabkanimpak lain sepertikematianmusuhsemulajadibenaperang, benaperangbertambahbanyak, kesankeataskesihatanmanusiadanpencemaranterhadappersekitaranjugaturutterlibat.

Dalamkajianini, benaperangakan di ambildariKeriandandibela di rumahkaca. Varietipadi Taichung akanditanamsebagaimakananbenaperangsehinggabenaperangtersebutberubahmenjadibetinadewasa.

DuajenisracuniaituImidaclopriddanFipronilakandigunakanuntukdisuntikkebahagiantoraksbenaperangtersebut.Peratuskematianbenaperang yang telahdikajiakandicatatuntukdianalisistahapkerintangannya.Tahapkematianakandicatatselepas 24 jam danselepas 48 jam. Hasileksperimenmenunjukkanpopulasi BPH padatahun 2013 telahrintangterhadapracunImidaclopriddankurangrintangterhadapracunFipronildengan ratio dari 2.71 dan 0.59.Denganmembandingkanpopulasi BPH 2013 dengan 2012, Fipronilmempunyaitahaptoksik paling tinggi LD_{50}(1.05 – 67.26 µg/g)

dimanaianyahanyamemerlukanisipadusedikituntukmembunuhseparuhpopulasi BPH manakalaImidaclopridkurangtoksikdengannilai LD_{50}(1.05 – 67.26 µg/g).

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CHAPTER 1

INTRODUCTION

1.1 Introduction

The Brown Planthopper (BPH), *Nilaparvatalugens* from Delphacidae family and Homoptera order is a small plant hopper that feeds on rice plants. Feeding can cause plant injury,which show a hopperburn, due to a highly dynamic interaction between complex insect stimuli and the plant's response (Backus, Serrano, & Ranger, 2005). During 1970s, many countries in tropical Asia who develop rice field have received severe damage by BPH. The population of BPH easily can increase because of several factors such as high tillering varieties, nitrogen fertilizer and good water management. BPH have been assumed as the most destructive pest in 1970s (Thomas, 1979).

BPH actually can be controlled by several methods such as chemical method, cultural method, mechanical method, physical and biological method. However the most effective method to control BPH is by applying the insecticide (chemical method). Not only preventing the spreading of the disease, but insecticide also can cause a direct damage on BPH vector. Neonicotinoid pesticide is chemical that have been use in controlling the BPH, that is including imidacloprid, thiamethoxam, dinotefuran, nitenpyram, acetamiprid, thiacloprid, and imidaclothiz(Jeschke & Nauen, 2008). Many of these chemical is highly effective against the population of BPH.

Even so this insecticide shown a magnificent result in encounter the problem of BPH, at the same time it also brings a problem called resistance. Intensive use of these chemical has prompted of adaptation of BPH to the chemical (Wang et al., 2009). Insecticide resistance is the ability of insect to adapt the pesticide that was previously effective at controlling it. Exposure to the same of insecticides applied has made increases in BPH feeding activity, reduced length of the nymphal stages , increase adult longetivity, oviposition period, and stimulate reproduction (Ling, Zhang, & Zhang, 2011).

Rice farmers in Malaysia often apply similar insecticides in controlling this insects and this could lead for resistance in the BPH(Ooi & Heong, 1988). In laboratory studies, mortality of BPH was dependent on the dosage of applied insecticide. The sublethaleffectdoses of insecticides that show higher rates of LD_{50} bring the result of BPH have developed resistance. The results indicate that BPH had potential to developed high level of resistance to common insecticides.

However, insecticides resistance in field populations of BPH is under control. In this paper, the insecticides resistance was studied to check if the results from laboratory treatment were true and is there any difference of resistance percentage from last year compare to this year.

1.2 Problem Statement and Objective

Continuous use of similar insecticide could result of resistance among the BPH population. If resistant happen and persist, farmer will have a problem in controlling the pest and higher pesticide concentration will be used, which will lead to more contamination into the environment. Therefore, the objective of this study is to determine if there is any insecticide resistance occurs in brown planthopper from Kerian, Perak. Secondly, to determine the level of brown planthopper resistant levels towards two different types of commonly insecticides by comparing with last year's case studies from Muhammad Adip (2012).

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