



UNIVERSITI PUTRA MALAYSIA

***TOXICITY OF SELECTED NEWER INSECTICIDES AGAINST TROPICAL
ARMYWORM, *Spodoptera litura* (Fabricius)***

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**BY
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**A project submitted to Faculty of Agriculture, Universiti Putra Malaysia, in
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ENDORSEMENT

This project report entitled “Toxicity of selected newer insecticides against tropical armyworm, *Spodoptera litura* (Fabricius)” is prepared by Nur Ashikin Binti Khairudin and submitted to the Faculty of Agriculture in fulfillment of the requirement of PRT 4999 (Final Year Project) for the award of degree of Bachelor of Agricultural Science.

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TABLE OF CONTENT

CONTENT	PAGES
ENDORSEMENT	i
ACKNOWLEDGEMENT	ii
TABLE OF CONTENT	iii
LIST OF TABLES	v
LIST OF FIGURES	vi
LIST OF PLATES	vii
ABSTRACT	viii
ABSTRAK	ix
CHAPTER 1 INTRODUCTION	1
CHAPTER 2 LITERATURE REVIEW	
2.1 Insect	3
2.2 Characteristics	4
2.2.1 Egg	4
2.2.2 Larvae	5
2.2.3 Pupae	6
2.2.4 Adult	7
2.2.5 Life cycle	8
2.3 Damage caused by <i>Spodoptera litura</i>	8

	2.4 Insecticide	9
	2.4.1 Spinosad	10
	2.4.2 Emamectin benzoate	11
	2.4.3 Indoxacarb	12
	2.4.4 Chlorantraniliprole	13
CHAPTER 3	MATERIAL AND METHOD	
	3.1 Research location	14
	3.2 Materials	14
	3.2.1 Collection of <i>S.litura</i>	14
	3.2.2 Rearing of <i>S.litura</i>	14
	3.2.3 Insecticides	15
	3.3 Method	16
	3.3.1 Bioassay	16
	3.3.2 Evaluation parameter	16
	3.3.3 Experimental design	16
CHAPTER 4	RESULT AND DISCUSSION	18
CHAPTER 5	CONCLUSION	25
	REFERENCES	27
	APPENDICES	31

LIST OF TABLE

TABLE	TITLE	PAGE
1	Specification of selected insecticides used in this project	15
2	Toxicity of spinosad against <i>S.litura</i> (120 hours)	18
3	Toxicity of emamectin benzoate against <i>S.litura</i> (120 hours)	20
4	Toxicity of indoxacarb against <i>S.litura</i> (120 hours)	21
5	Toxicity of chlorantraniliprole against <i>S.litura</i> (120 hours)	22
6	The LC ₅₀ value of four insecticides against <i>S. litura</i>	23
7	Mortality of early third larvae <i>S.litura</i> for five day after exposed to spinosad	31
8	Mortality of early third larvae <i>S.litura</i> for five day after exposed to emamectin benzoate	32
9	Mortality of early third larvae <i>S.litura</i> for five day after exposed to indoxacarb	33
10	Mortality of early third larvae <i>S.litura</i> for five day after exposed to chlorantraniliprole	34

LIST OF FIGURE

Figure	Title	Page
1	Life cycle of <i>S.litura</i>	8
2	Chemical structure of spinosad	10
3	Chemical structure of emamectin benzoate	11
4	Chemical structure of indoxacarb	12
5	Chemical structure of chlorantraniliprole	13
6	Comparison of mean values of data regarding the effect of spinosad concentration and controls on percentage larvae mortality of <i>S.litura</i> .	19
7	Comparison of mean values of data regarding the effect of emamectin benzoate concentration and controls on percentage larvae mortality of <i>S.litura</i> .	20
8	Comparison of mean values of data regarding the effect of indoxacarb concentration and controls on percentage larvae mortality of <i>S.litura</i> .	21
9	Comparison of mean values of data regarding the effect of chlorantraniliprole concentration and controls on percentage larvae mortality of <i>S.litura</i> .	22

LIST OF PLATES

Plate	Title	Page
1	Complete metamorphosis of <i>S.litura</i>	4
2	Freshly egg laid under the leaf.	5
3	Newly hatched larvae of <i>S.litura</i>	6
4	Later stage larvae of <i>S.litura</i>	6
5	Pupae of <i>S.litura</i>	6
6	Adult moth of <i>S.litura</i>	7
7	Different concentrations of insecticides.	17
8	Pegaga leaf was dipped 10 seconds in insecticides	17
9	Pegaga leaves were left to air dry	17

ABSTRACT

Tropical armyworm, *Spodoptera litura* is an insect pest in the family Noctuidae which natively can be found in Asia Pacific region. This pest is considered as an important agricultural pest and the presence of this pest causes many economic losses to the crops. Recently, new insecticides have been introduced into the market. However, the toxicity of these insecticides against *S.litura* is not well known. A laboratory study was conducted to determine the toxicity of four new insecticides against the early third instar larvae by using leaf dip bioassay technique. Four newer insecticides were spinosad, emamectin benzoate, chlorantraniliprole and indoxacarb. The third instar larvae were exposed to the treated leaves of different concentration of these insecticides and mortality of the larvae was recorded at 24, 48, 72 and 96 and 120 hours after treatment. The data were subjected to Probit Analysis to determine the LC₅₀ values. The order of the toxicity was chlorantraniliprole > emamectin benzoate > indoxacarb > spinosad. The LC₅₀ of chlorantraniliprole was 21.67 µg/ml while spinosad was 234.95 µg/ml. Chlorantraniliprole gave the lowest value of LC₅₀, thus the most toxic against *Spodoptera litura*.

ABSTRAK

Ulat seribu tropika, *Spodoptera litura* adalah perosak serangga dalam keluarga Noctuidae yang secara asal boleh didapati di rantau Asia Pasifik. Perosak ini dianggap sebagai perosak pertanian yang penting dan kehadiran perosak ini menyebabkan banyak kerugian ekonomi kepada tanaman. Baru-baru ini, racun serangga yang baru telah diperkenalkan ke dalam pasaran. Walau bagaimanapun, ketoksikan racun serangga ini terhadap serangga perosak *S.litura* masih tidak diketahui. Kajian makmal telah dijalankan untuk menentukan ketoksikan empat racun serangga baru terhadap larva instar ketiga *S.litura* dengan menggunakan teknik bioesei celupan daun. Empat racun serangga bar yang telah digunakan dalam kajian ini adalah spinosad, benzoate emamectin, chlorantraniliprole dan indoxacarb. Larva instar ketiga telah diletakkan ke dalam bekas yang mempunyai daun yang telah di celup dengan kepekatan racun yang berbeza dan kematian larva itu direkodkan pada 24, 48, 72 dan 96 dan 120 jam selepas rawatan. Data yang telah diperolehi telah dianalisis dengan menggunakan ujian komputer iaitu Analisis Probit untuk menentukan nilai LC_{50} . Susunan ketoksikan adalah chlorantraniliprole > emamectin benzoate > indoxacarb > spinosad. LC_{50} daripada chlorantraniliprole adalah 21.67 $\mu\text{g} / \text{ml}$ manakala spinosad adalah 234,95 $\mu\text{g} / \text{ml}$. Chlorantraniliprole memberi nilai yang paling rendah LC_{50} , dimana racun ini merupakan racun yang paling toksik terhadap *Spodoptera litura*.

CHAPTER 1

INTRODUCTION

In Malaysia, agriculture is one of the important sector of Malaysia's economy with this sector contributed 9.2 per cent to Gross Domestic Product (GDP) and provides employment of the population about to 16 per cent. Recently, our local farmers starting to grow their own vegetables in larger scale in order to fulfill the demand from the consumer as well as to maintain food security. Besides vegetables, some farmers choose to cultivate several herbs related to agriculture for commercial purposes and the market value of herbal industry in our country projected to reach RM32 billion in 2020.

In our biodiverse country, there are many herbs species can be found such as *Cosmos caudatus* which is known as "Ulam Raja" and *Centella asiatica* which known as "Pegaga". The famous herb that has been cultivated by the farmers in our country is "pegaga" due to its reputation to produce healthy product such as medicines, cosmetic, dietary supplement and functional food. Other than that, "pegaga" is also famous among Malay community and often use in daily dishes. However, local herbs industry in our country is still in early stage and most of them is cultivated in small scales. Moreover, the product produced by the farmers is not acceptable by the consumer because of its low quality and this problem happen due to several factors.

In agriculture sector, there are lot of challenges that farmers have to be faced because agriculture is dealing with unpredictable events such as weather, insect pest and diseases. The main challenging is low quality and production yield due to pest. This serious problem can lead to not profitable to the farmer.

There are many types of pest in this world that can attack the plant such as aphids, mealy bug, caterpillars and worms. The main arthropod pest that attacked on herbs plant are lepidopteran larvae (Caterpillar).

Tropical armyworm, *Spodoptera litura* is the common pest found on herbs. This pest is one the most destructive pest and it has wide host range with more than 120 species (Venette et al., 2003). On the most crop, the larvae of *S.litura* are the leaf eater. They will feed extensively undersides of leaves causing skelatonization the leaves and leading to striping of the plants. The development of field crop might be stunted or late to develop if heavy feeding on young plant occurred and cause heavy loss to the crops.

Recently, the attack of *S.litura* has increased and farmers complained the failure to control the *S.litura* in their farm which caused damaged to their field crop. This is because, most of the farmer take the fast action to control this pest by using conventional insecticide due to its effectiveness and also quick effect. The indiscriminate used and excessive dosage have resulted development of resistance to the pest as well as hazard and harmful effect to human and environment. Due to these problems, new insecticides have been introduced into the market. Since new insecticides are new modern era of chemicals having novel mode of action and more selective than conventional insecticides, they have been used among the farmers to control the pest including *S.litura*. However, the toxicity of these insecticides is not known and there is no toxicity monitoring on these insecticides.

Therefore, this experiment was conducted based on the objective to determine the toxicity of selected newer insecticides against tropical armyworm, *S.litura*. The outcome from this experiment will enable us to choose the correct insecticides in controlling the insect pest population that caused damage to field crop.

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