

**EFFECT OF INSECT GROWTH  
REGULATORS AGAINST  
Culex pipiens (Diptera - Culicidae)**

**A THESIS**

Submitted in Partial Fulfilment of the  
Requirements for the Award of the Degree of  
MASTER OF SCIENCE

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By

**REDA FADEEL ALY BAKR**

B. Sc.

Department of Entomology  
Faculty of Science  
Ain Shams University  
Cairo

M.Sc

16813



**1982**

THESIS EXAMINATION COMMITTEE

| NAME  | TITLE | SIGNATURE |
|-------|-------|-----------|
| ..... | ..... | .....     |
| ..... | ..... | .....     |
| ..... | ..... | .....     |



### BIOGRAPHY

Date and Place of Birth : 25<sup>th</sup> August, 1955, Qalyubia.

Date of Graduation : June 1978.

Degree Awarded : B.Sc.Special Entomology.

Grade : Very good.

Occupation : Demonstrator in Entomology  
Department, Faculty of Science,  
Ain Shams University.

Date of Appointment : 1-10-1978.

Date of Registration for the

M. Sc. Degree :

COURSES STUDIED BY THE CANDIDATE  
IN PARTIAL FULFILMENT OF THE REQUIREMENTS  
FOR THE (M. Sc.) DEGREE.

Language:

: (French, M.Sc. Course)

Examination passed on: March 1980.

Entomology Courses:

1. New Approaches to Insect Control.
2. Environmental Pollution.
3. Implication of Problems in Suppression and Control of Insects.
4. Insect Pathology.
5. Population dynamic.
6. Comparative anatomy of insects.
7. Methods of Research and Thesis work.

Examination passed on: February, 1980.

Statistical Course:

Biological statistics,

Examination passed on: February, 1980.

Supervisors:-

Professor Dr. Auni M. Guneidy

Assistant prof. Dr. Naima A. Abdel Razik.

Assistant prof. Dr. M.S. Hamed.

Head of Department.

Prof. Dr. Zaki M. Rostum

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# I- INTRODUCTION

## I. INTRODUCTION

Of the some thousand or more important species of mosquitoes in the world, about 300 are posing a serious threat to human health and well-being.

To control mosquito-borne diseases and to improve the quality of living, large -scale and continuous mosquito control programs are implemented by many international and national agencies. The increasing threat of mosquito resistance to chlorinated hydrocarbons and organophosphate larvicides has initiated research in alternative chemicals for mosquito control. The potential control value of insect growth regulators has been extensively tested in both laboratory tests and field trails. These types of compounds became available for experimentation, field evaluation, and commercial exploitation quite recently (1969-1970). Insect growth regulator is a term encompassing a relatively new group of chemical compounds that alter growth and development in insects. Their effects have been observed on embryonic, larval and nymphal development; on metamorphosis, and on reproduction in males and females. These chemicals include analogues and mimics of insect Juvenile hormones and other developmental regulating agents.

Structurally, some of these compounds are only distantly related to the known naturally occurring insect hormones. The insect growth regulators, as these types of compounds are known, induce a variety of responses in the target and non target organisms. They can inhibit hatching of eggs, induce delayed mortality in the larvae and pupae, and result in the inhibition of adult emergence.

Unlike the quick-acting organophosphate and other larvicides, the effects of the insect growth regulators may not be visible until a few days or weeks after treatment. To date, only two insect growth regulators have been extensively experimented with against mosquito larvae and selected groups of non target organisms. One of these, methoprene or Altosid, has been in commercial use since 1974 in the United States for mosquito control, while the other, diflubenzuron or Dimilin, has been employed in mosquito control in Canada, Europe, and Africa since 1977 and is on the verge of becoming available for mosquito control in United States.

In general, both these insect growth regulators, exhibit a remarkable wide margin of safety for Fish and birds. They, however, manifest various degrees of chronic and acute toxicity to some aquatic invertebrates in the taxa phylogenetically related to insects or the order Diptera in particular.

AIM OF THE PRESENT WORK:

The present study was undertaken as an attempt to determine the following:- -

- 1) Effect of the insect growth regulators on hatching of freshly mosquito eggs.
- 2) Effect of the insect growth regulators against different larval instars, determination the longevity of various formulations of these chemicals against the most sensitive larval instar and effect of temperature on the stability of IGR's.
- 3) Study of latent effects on progeny of adults baited and exposed to thin films of chemicals under investigation.

## **II- LITERATURE REVIEW**

## II. LITERATURE REVIEW

### 1. Maintenance of Cultures:-

The suitable conditions required for the survival of mosquito larvae and adults in laboratory were previously described by many authors.

Among these Boyd et al. (1938), reported that the presence of fresh yeast is important for rearing of A. quadrimaculatus larvae.

Hackett and Bates (1938) found that mud, bread, yeast, algal culture, dried blood, serum and dog biscuit were seemed to be necessary for the development of mosquito larvae.

The suitable size of the breeding cages, the breeding conditions (temperatures and relative humidity) and diets for rearing of the adult mosquitoes were studied by several authors Hackett and Bates (1938), Marcovitch (1938). Russel and Mohan (1939), Deame and causy (1943). Mohan (1945), Theodor and parsons, 1945, Wayer (1965).

Hackett and Bates (1938), Theodor and Parsons (1945) recommended a variety of light colours are important for successful swarming, mating and oviposition of some species of mosquito adults.

Eugene et al. (1968) and soliman et al. (1969) found that the sex ratio is important factor for fertilization of A. stephensi and A. pharoensis adult.

Eugene et al. (1969) described the mass rearing of Culex pipiens. Eggs rafts are kept in a plastic container (12.7 x 12.78 x 6.35 cm.) half filled with water. The larvae reared in enamel bowls using tap water and purino dog as food.

## 2. Treatment of eggs:-

### Viability of eggs:-

Slama and Williams (1966); First described Juvenile hormone as an inhibitor of insect embryogenesis, showing that application of the analogue to freshly laid eggs of the bug, Pyrrhocoris apterus prevented their hatching.

Ascher and Nemny (1974); proved experimentally that the PH 6040 is very high toxicity to Egyptian cotton leaf worm, Spodoptera littoralis eggs in laboratory experiments; 100% kill was obtained by dipping young eggs in a 0.000025% a.i. dilution in water of a 5% liquid formulation of the compound.

Ables et al. (1975); reported that in the laboratory, topical application of Dimilin at 10000, 100, 50 and 10 ppm