QUALITATIVE EFFECTS OF SOME IGR'S ON FERTILITY & PRODUCTIVITY OF MEDFLY *CERATITIS CAPITATA* (WIED.)

By

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B. Sc. Sci. (Zoology and Chemistry), Mansoura University, 1987

A Thesis Submitted in Partial Fulfillment

of

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Under The Supervision of:

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ABSTRACT

The Mediterranean fruit fly or Medfly, *Ceratitis capitata* (Wiedmann) is a multivoltine and polyphagous insect. In Egypt, the Medfly is one of the most important insect – pests attacking many kinds of fruits causing a serious decline in both quantity and quality of fruit yield. Many trails to control or eradicate *C. capitata*, all over the world, have developed parallel to progress of the methods of pest control.

The present work included toxicological studies to evaluate the effect of certain new insecticides on *C. capitata* and aimed to study the lethal and juvenilizing effects of these pesticides on larval and pupal stages. Five pesticides of Insect growth regulator (IGR's) (match 5% EC (lufenuron), beticol 20% SL (acetamiprid), dimectin and mectin 1.8 % EC (abamectin), and elsan 50 % (phenthoate)) belonging to jvenile hormone mmics type of different chemical groups and different action were evaluated against larval and 5-day old pupae of *C. capitata* using surface contact treatments.

The main results of study are:

1- All tested pesticides were effective against the full grown. Match was the most efficient amongst the used chemicals. The efficiency of the tested compounds at LC_{50} was match> beticol> dimectin> elsan> mectin. The efficiency at LC_{90} was match> beticol> elsan> dimectin> mectin.

2- Regarding the toxicity index, match was the standard toxicant and the other toxicants of mectin, elsan, beticol and dimectin were 5.2, 15.85, 16.25, and 16.88 % as toxic as match at LC_{50} level. At LC_{90},

the toxicants were mectin> dimectin> elsan> beticol with 5.81, 6.43, 9.18 and 15.52 % of match.

3- Match was the most effective pesticides to five-day old pupae at both LC_{50} and LC_{90} followed by mectin> beticol> elsan> dimectin.

4- The mortality of full grown larvae varied according to both pesticide and concentration. Mortality increased with the increase of concentrations. The lower mortality values were varied from 28% with elsan to 39% with mectin at concentration of 31.25 ppm, while the higher values (96%) were recorded with mectin at concentration of 500 ppm.

5- The mortality of 5-day old pupae increased with the increase of pesticide concentrations. The lower mortality values varied from 20% with elsan and dimectin to 40 % with mectin at concentration of 31.25 ppm, while the higher value (93%) was recorded by using mectin at 500 ppm.

6- The malformations or abnormal pupae increase with the increase of pesticides concentrations and vice versa.

7- Match was the more toxic pesticide on larvae and pupae of *C. capitata* even at concentrations 1/5 dimectin, mectin, beticol and elsan. It has also higher effect on the mortality and malformation of both larvae and pupae.

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I- INTRODUCTION

The Mediterranean fruit fly or Medfly, *Ceratitis capitata* (Wiedemann) (Diptera: Tephritidae) is a multivoltine and polyphagous insect. It is a widespread insect-pest whose pressure limits the development and expansion of agriculture in many localities in subtropical and temperate regions, this insect has a high biotic potential and a wide range host. *C. capitata* originates in tropical countries in Africa, from where it has spread to the Mediterranean area and to parts of Central and South America. Now, Medfly has a wide geographical distribution in the world.

In Egypt, Medfly is considered as a one of the most important insect– pests attacking many kinds of fruits causing a serious decline in both quantity and quality of fruit yield. The first record of its presence in Egypt goes back to 1904, (El-Gawabi, 1928). In recent years, the natural population of this pest has greatly increased owing to the extensive cultivation of orchards in newly reclaimed sandy areas such as El-Khattara, El-Salhia and El-Nubaria regions with favorite host plants such as peach, apricot, mongoes, guava, pear, plum, fig and citrus. There are about ten generations of *C. capitata* each year under the Egyptian environmental conditions (Hafez and Fares, 1967).

Females of the Medfly make punctures in fruits by their ovipositors to lay eggs inside it. The magoots (larvae) of this pest feed on pulp of many fruits, but the full grown larvae (the third larval instar) usually leave the infested fruits and fall down to pupate in soil at a depth of 2-3 cm (Awadallah, 1974).

Many trails to control or eradicate *C. capitata*, all-over the world, were developed parallel to progress of the methods of pest control. The control of this pest took different stages. The simple early methods used for controlling *C. capitata* were by destroying all the infested fruits by burning, boiling or burying at a depth of not less than 30 inches (Word, 1964). Some researchers tried to control the immature stage (eggs and larval instars) within the infested fruits by using low temperatures (Back and Pemberton, 1916; El Hakim, 1977 and Hill *el al.*, 1988) or fumigation with certain evaporated pesticides such as ethylene dibromide (EDB) (Burditt *et al.*, 1963). On the other hand many researchers tried to control the adult stage using pesticides by spraying trees before infestation to protect fruits. Lead arsenate was first used (Newman, 1916 & 1925 and Myburgh, 1946). The chlorinated hydrocarbons such as DDT and BHC (Lindane) were sprayed on the trees to control the Medfly (Boselli, 1952; Ezzat, 1958 and Selim, 1969). DDT and BHC were also used as poison bait-sprays (Rayan, 1950; Zocchi, 1956 and Frezal, 1957). Some investigators used the synthetic organophosphorous insecticides in complete coverage spray on trees or as poison baits (Puzzi and Orlando, 1958; Planes and Del-Rivero, 1964).

The insect growth regulators (IGR's) were evaluated on the immature stages of *C. capitata* by many researchers (El- Fishawi, 1975; Martinez-Pardo *et al.*, 1979 and Saul *et al.*, 1983). The sterilized insects release programmers were used to eradicate or annihilate adults of the Medfly (Awadallah 1974). Also, some investigators used the pathogenic bacteria *Bacillus thuringiensis* for control of *C. capitata* (El-Abbassi,