QUALITY MEASUREMENTS OF THE GAMMA IRRADIATED MEDITERRANEAN FFRUIT FLY, *CERATITIS CAPITATA* (Wied.)

BY

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Title: Quality Measurements of the Gamma Irradiated Mediterranean Fruit Fly, *Ceratitis capitata* (Wied.)

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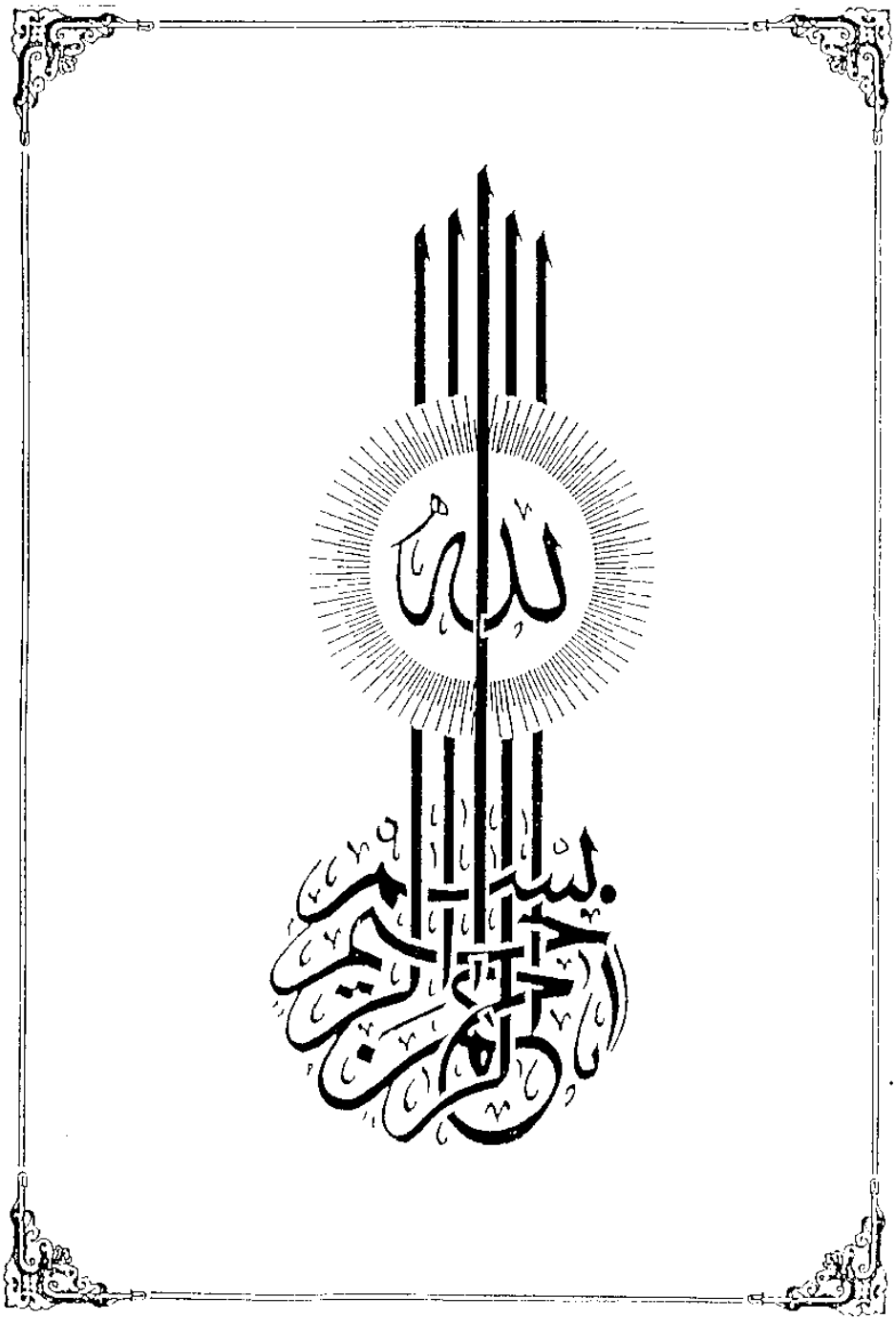

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LIST OF CONTENTS

CHAPTER PAGE

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CHAPTER I

INTRODUCTION

I- INTRODUCTION

The damage caused by the Mediterranean fruit fly (Medfly) Ceratitis capitata (Wiedemann) to Egyptian agriculture is increasing mainly because farmers are finding it harder to choose suitable means of control in view of the difficulties frequently associated with the use of insecticides, such as undesirable residues and biological disequilibrium. Recently, the sterile-insect technique has opened up new possibilities of this insect control in Egypt.

The use of sterile insects to eradicate or suppress populations of pests was conceived by Knipling, (1955) and applied successfully for the first time in 1954 against the screw-worm fly, Cochliomyia hominivorax (cocquerel) on the Island of Curaçao (Baumhover et al., 1955) and then in 1958 and 1959 in the South-eastern United States of America (Knipling, 1960).

Following this successful elimination of the fly, large-scale field applications of the sterile-insect technique (SIT) to control polygamous fruit fly species were achieved in many countries.

Many records have been obtained on the bad effects of gamma radiation on the vitality and consequently competability

of the males in the normal populations. The effect on the overall performance of the fly arises from a number of individual performance traits.

It has been a major concern of all entomologists involved in mass rearing and sterilization studies of fruit flies or other insects that the final products of rearing and irradiating operations need to be adequate for their intended purposes. Aspects of the functional quality of the sterile flies used in an eradication program can be evaluated by measuring their overall performance, or by measuring their individual performance traits viz: motility, orientation to habitat , sexual activity, sexual physiology /.... etc.

In the present study trials were made to assess the quality of irradiated insects with different gamma-ray doses.

It is hoped that results obtained from the present investigation may contribute to a proper understanding and offering help to the fruit fly control program using sterile-insect technique (SIT) in Egypt.

CHAPTER II

REVIEW OF LITERATURE

II- REVIEW OF LITERATURE

A. General Biology of Ceratitis capitata:

Lot of information dealing with the biology and life history of the Mediterranean fruit fly was recorded by many authors.

Back and Pemberton (1915) studied the life history of C. capitata in the U.S.A., and they in (1918) recorded 800 eggs for the caged female during its life time with the preoviposition period being 4 - 5 days after emergence.

In the Middle East, Bodenheimer (1925 and 1951), discussed the role of temperature and relative humidity on the development of the adult fly.

Efflatoun (1925 and 1927) described the different developmental stages of the fly and recorded its host plants in Egypt as being: orange, mandarine, peach, apricot, fig, mango and guava.

Rivnay (1941) in the laboratory found that most of the flies were inactive at temperatures 10 - 13°C and no oviposition occured below 16°C or at relative humidity above 85%.

Jenkins (1944), dealing with the adult fly in Australia, stated that the adult female oviposited a week after mating. He also concluded that the adult did not survive for more than 4 days without food.

Domato and Aramayo (1947) in Argentina, found that the fly completed its development from egg to adult in 38 days.

In 1950 , however, Rivnay stated that the life cycle was completed in 100 days at 16 - 19°C with a survival percent being 50% .

In Argentina, Vargani (1952), stated that the life cycle is completed in 30 days in summer and 60 days in winter. He also stated that the females feed for 4 - 7 days before oviposition.

In the same year, (1952) Blanck described briefly the binomics of the fly in France and discussed the climatic factors limiting its development and the effect of temperature on the individual stages.

Martin (1953) in Libya after microscopic examination of different fruits, came to the conclusion that unripe and slightly ripe fruits contained less larvae than ripe ones.

In Lebanon, Adel Abou Nasser (1954) recorded the duration of the adults reared on oranges as being 15 - 22 days in August and 34 - 45 days in September-November. The optimum temperature for development was found to be 13 to 24°C.

More biological observations were found in the works of Messenger and Flitters (1954) who studied the response of C. capitata to bioclimatic factors and concluded that when adequate food was provided, development is governed by temperature.

Feron (1957) studied the influence of light on oviposition. He found that a light intensity of 2500 lux. resulted in more oviposition than 50 lux. When a bright area (2500 lux.) and a dim one (30 - 50 lux.) were present in the fruit together, the dim one was chosen.

Christenson and Foot (1960) recorded that an average of 911 eggs per female during life time when fed on a special died, The oviposition estimated to about 300 eggs per female. They also recorded the duration of the egg and larval stages at different weather conditions. They stated that the pupal stage of Ceratitis capitata ranged from 9 to 11 days at a mean temperature of 76°F.and 6 days at 79°F. The duration may be extended to about 60 days by cold temperatures.

Feron (1962) found that flight towards the fruit was controlled by olfactive signals and at short distance of optical signals, and he also found that the undersides of the fruit was preferred to the upside for the females to oviposite.