

**EFFECT OF CHEMOSTERILANTS ON
CERTAIN COTTON PESTS**

Abd *M. M. El-Megeed*

THESIS

Submitted in partial fulfilment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

in

ENTOMOLOGY



BY

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B. Sc. (Agriculture)

M.Sc. (Entomology)



Faculty of Agriculture
Department of Plant Protection
Ain-Shams University
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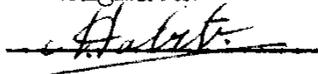
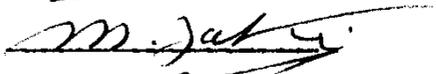
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I- INTRODUCTION

In the recent years, new methods for controlling destructive insects received great attention. One of these methods is sterilization by using chemicals, " the chemosterilants", instead of ionizing radiation.

Most popular among such chemosterilants are apholate, hempa, metepa, tepa, and thiotepa.

Due to the promising results achieved by some of these materials when used on certain insect pests, it was thought worthy to try some of them on the cotton leaf worm, Spodoptera littoralis Boisá. being the major agricultural pest in U.A.R. This insect is considered to be the key pest infesting great numbers of crops which hazard the national economy.

Aim of the present study

The present study aimed to investigate the toxicological, biological, and physiological effects of tepa, metepa, and methiotepa on the cotton leaf worm, Spodoptera littoralis Boisá through revealing the following points:

1. The effect on larval and prepupal mortality percentages.
2. The effect on development.
3. The effect on the maturity of ovaries and size of testes.

4. The reduction and viability of deposited eggs as affected by these chemicals.
5. Mating behaviour and spermatophore production.
6. The estimation of amino acids and ultra violet positive compounds.

II- LITERATURE REVIEW

1. Effect of chemosterilants on larval and prepupal mortality percentages

Much attention has been directed to the chemical, biological and toxicological evaluation of chemosterilants since the term was used some years ago.

The toxic effect of chemosterilants studied by Chamberlain (1963), on the screw-worm, Cochliomyia hominivorax showed that apholate caused some mortality when larvae or prepupae were treated, but no noticeable mortality occurred with adults treated at sterilizing dosages.

Crystal (1963), studied the effect of antimetabolites and alkylating agents on the screw-worm, Cochliomyia hominivorax. He reported that the aziridinyl compounds (tepa, metepa, thiotepa, methiotepa, and tretamine) as a group, lowered the survival of adults when topically applied if compared with that of the checks.

When topical application of 5 tested chemicals was administered to larvae of the house fly, Musca domestica and the screw-worm, Cochliomyia hominivorax, Gouck et al (1963), found that the chemicals caused more mortality than when fed to or used topically on the adults of both insects.

Lindquist et al. (1967), studied the effect of apholate on the boll weevil, Anthonomus grandis in the larval and adult diets which contained 0.01% and 0.001% apholate. They observed no effect on larval development and adult emergence. However, records of adult mortality showed that at the end of the 12 days through which the weevils were offered diets containing either one of the 2 concentrations of apholate, they suffered 100% and 55% mortality, respectively; while check mortality was 25%.

Collier and Downey (1965), tested metepa, tepa and apholate against the eggs, pupae and adults of the gypsy moth, Porthetria dispar. They found that pupal dips in 0.5% solutions of tepa caused high mortality of male pupae (24 hr. old). From 80 treated pupae, only 3 males emerged.

Toxicity of metepa to the adults of the pink boll worm, Pectinophora gossypiella was observed by Ouye et al. (1965). The mortality of the adult moths after topical application abruptly increased at 50 Ug/moth and the males were more sensitive than the female adults.

Parish and Arthur (1965), studied the effect of tepa, metepa, thiotepa, 1-methanesulfonyl aziridine, 1,1-sulfonyl bis aziridine, N-N-diethyl-1-aziridinyl acetamide, 1-trichloroacetyl aziridine, 1-trichloromethane sulfonyl aziridine, and 1-(1-aziridinyl acetyl)-aziridine in diets

of the house fly, Musca domestica flies, and found that all compounds produced some mortality. They also found that tepa, metepa, thiotepa, and 1-methane sulfonyl aziridine were the most toxic to the house flies.

Roach and Buxton (1965), studied the effect of tepa and apholate on the plum curculio, Conotrachelus nenuphar. They found that the mortality among treated insects with apholate at 1-2% was not noticeably higher than that among check groups. Data recorded from the tepa treatments showed that mortality was generally higher when the concentration was increased.

Abdallah (1966), studied the effect of tepa, metepa, and apholate on the mortality percentage of larvae and pupae of the cotton leaf worm, Prodenia litura (later Spodoptera littoralis). A larval treatment with different concentrations of the chemosterilants (0.5, 1.0, 2.5, 5.0, 7.5, and 10.0 Ug/larva) was done either by contact treatment or by oral application at the fourth larval stage. Mortalities were calculated during the 4th, 5th and 6th larval instars. It was found that, the higher the concentration of the chemosterilant was, the higher was the mortality in the larval stage, and at any treatment used. The three chemosterilants were similar in this respect, and both methods of application produced approximately the same