

EFFECT OF SOME NONCONVENTIONAL CHEMICALS
COMBINED WITH INSECTICIDES ON THE BIOTIC
POTENTIAL OF THE COTTON LEAFWORM,
SPODOPTERA LITTORALIS (BOISD.)

A THESIS

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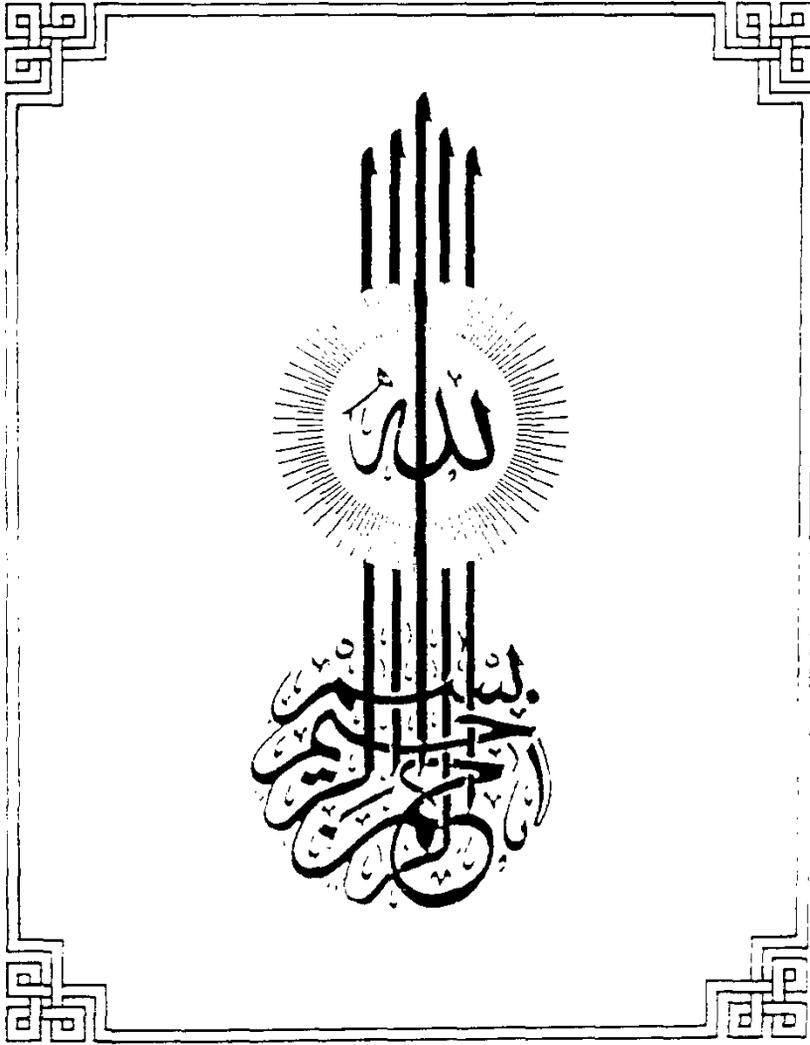
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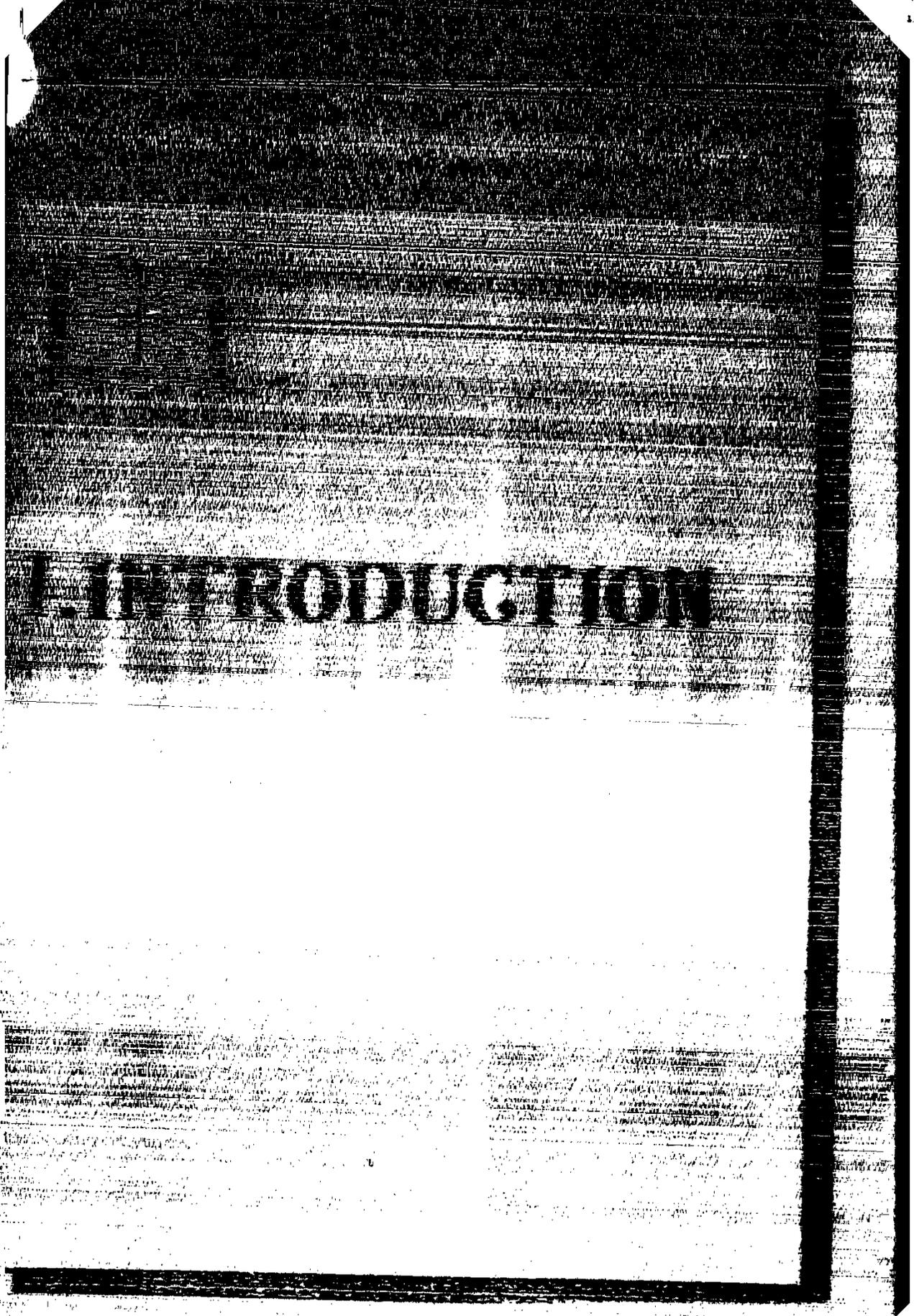
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I. INTRODUCTION

Excessive use of insecticides has led to several long-term problems and the environmental quality has been deteriorated. In recent years, many well established methods of insect control have come under increasing assault because of their undesirable effects on the environment. A new approach which has captured worldwide attention is the use of analogues and antagonists of insect growth inhibitors to control pest populations. Should this approach prove feasible, then insect growth inhibitors may replace some of the compounds now used for pest control which have unwanted ecological side effects or high toxicity of mammals.

The discovery of insect growth inhibitors, as insecticides of an entirely new type, created quite a stir among entomologists interested in the practical use of these substances. Within the last years, intensive research by chemists and biologists all over the world has led to the discovery or synthesis of hundreds of substances. Without being actually toxic, these substances disturb the course of morphogenesis and thus prevent the normal development of the most diverse group of insect species.

A new class of insect growth inhibitors, the benzoyl phenylurea was found to interfere with cuticle

deposition, leading to abnormal endocuticular deposition as well as abortive moulting.

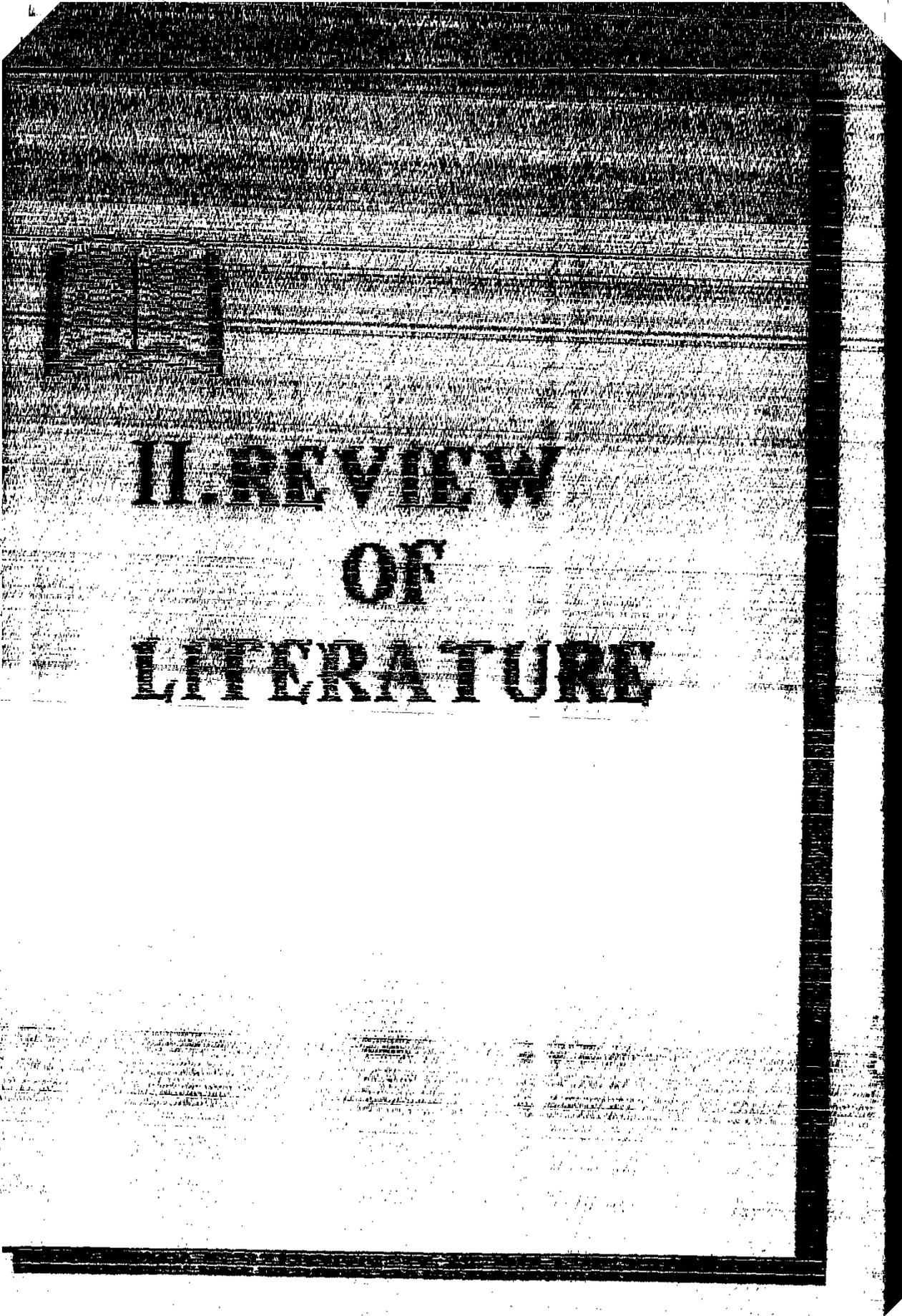
Insect growth inhibitor-insecticide combinations have been especially useful in coinciding infestation with several pests. Insecticide mixtures when synergized can reduce the required doses of toxicants, thus reducing the costs of chemical control programmes. Another very important reason for applying toxicant mixtures is the possibility of finding a mixture of two or more toxicants to which pests show negatively correlated tolerance. Theoretically, this could prevent the emergence of resistant strains.

The Egyptian cotton leafworm, Spodoptera littoralis (Boisd.), the most destructive pest of cotton in Egypt, has acquired various levels of resistance to most of the insecticides used for its control. This has caused a rework to the need for pest control programmes by what ever means practical.

The present work aimed at elucidating the effect of the insect growth inhibitors, triflumuron and chlorfluazuron and their combinations with certain insecticides on the biotic potential of Spodoptera littoralis, under laboratory conditions.

The relative susceptibility of the selected strains with some pesticides for only one generation to several insecticides belonging to different groups; and joint action of mixtures of insect growth inhibitors with insecticides were also investigated.

It is hoped that this work will give prospects of being able to contribute in the control of the cotton leafworm, *Spodoptera littoralis*, by these compounds. Hopefully, they may become key parts of the network of the integrated control we are establishing to aid in finding the best way to control or suppress the population of this serious insect pest.



**II. REVIEW
OF
LITERATURE**

II. REVEIW OF LITERATURE

1. EFFECT OF INSECTICIDES, INSECT GROWTH INHIBITORS AND THEIR COMBINATIONS ON BIOLOGICAL ASPECTS OF TREATED INSECTS:

Many authors studied the effect of sub-lethal doses of insecticides, IGIs and their combinations on several biological aspects of the cotton leafworm, *Spodoptera littoralis* (Boisd.).

a. EFFECT OF INSECTICIDES ON THE BIOLOGY OF *SPODOPTERA LITTORALIS*:

Literature dealing with the effects of insecticides on the biology of the cotton leafworm is voluminous. During the last two decades, several publications have appeared on the effects of newer insecticides on certain biological aspects of this insect pest.

Abdel-Fattah (1970) reported that sub-lethal doses of dipterex caused an increase in the duration of larvae of *S. littoralis*. The duration and weight of pupae treated with sub-lethal doses of sumithion varied according to the applied doses and the age of the treated larvae.

El-Sawaf (1971) found that sub-lethal doses of camphechlor and dipterex significantly decreased the ovarian development of *S. littoralis*.

Hodjat and Muini (1971) stated that the sub-lethal doses of 5 ug folithion and 2.5 ug dimecron shortened the larval period of *S. littoralis* and prolonged the pupal period.

Abo-Elghar *et al.* (1972) studied the effect of LC_{50} of endrin on the larval stage of *S. littoralis*. Treatment with endrin had no apparent direct effect on the duration of treated larvae, but prolonged it later in the progeny. Endrin shortened the pupal stage and decreased hatchability percentages.

Ellabany (1972) found that fenitrothion and cyolane slightly decreased the fertility of the parent moths of *S. littoralis*; while endrin showed no effect. Low doses of endrin and cyolane prolonged the pre-oviposition period, shortened the oviposition period and decreased the number of egg-masses per female. But high doses retarded the beginning of oviposition of the parent females, distinctly prolonged the oviposition period and disturbed the number of egg-masses. This number increased in case of fenitrothion and cyolane.

Essac *et al.* (1972) reported that the effect of sublethal doses of insecticides on *S. littoralis* larvae differed from one chemical to another, from one dose to