RESISTANCE TO PYRETHROIDS IN THE HOUSEFLY *MUSCA DOMESTICA* (DIPTERA MUSCIDÆ)

A THESIS

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By

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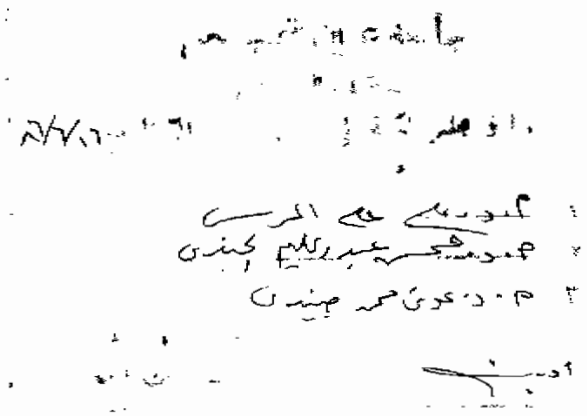

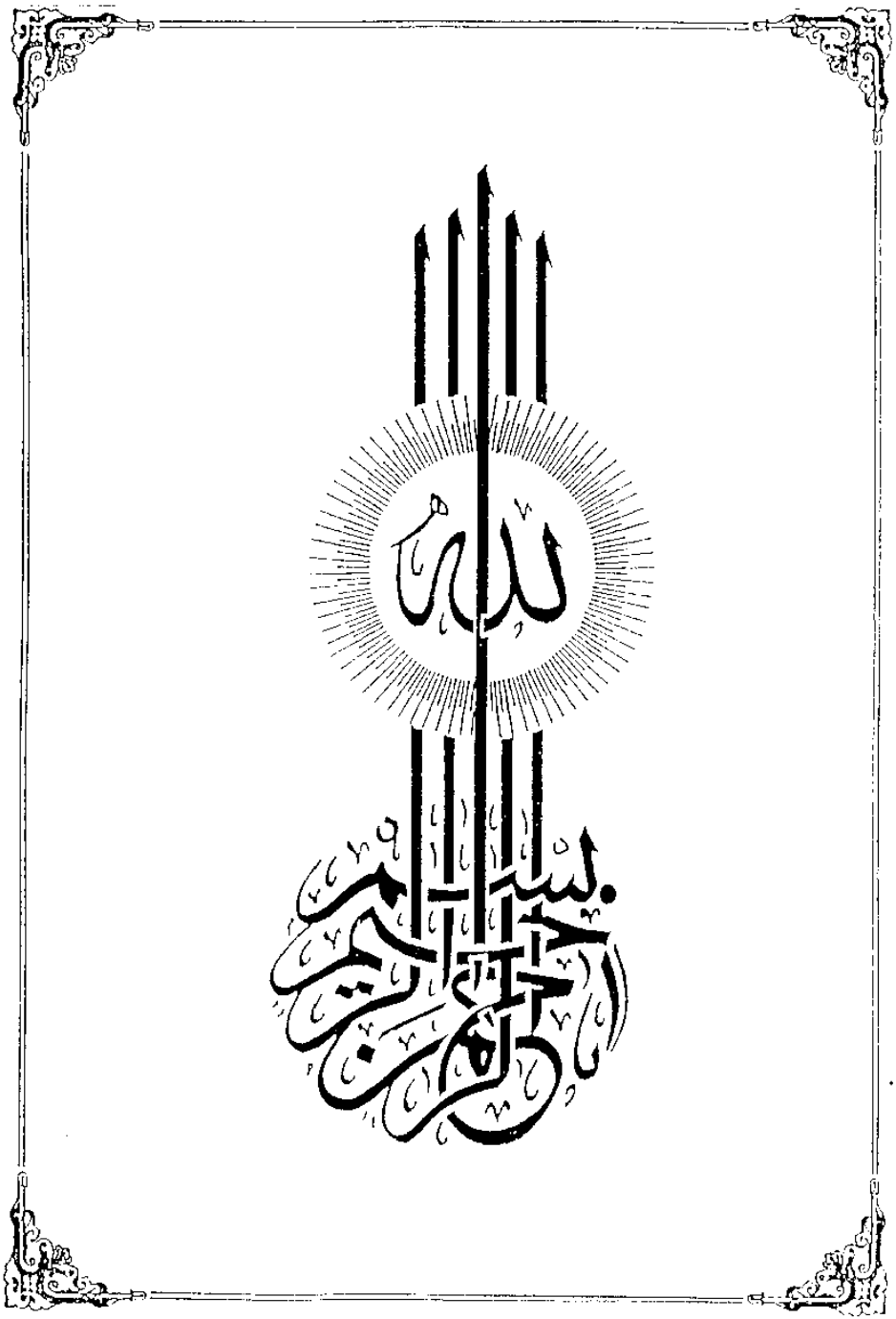

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INTRODUCTION

Introduction

The rapid development of resistance in insects to the action of insecticides has created an alarming and complicated problem for entomologists. The housefly, Musca domestica probab still holds the record as the insect species that has shown the greatest ability to develop extensive and rapid resistance to insecticides of different groups.

Pyrethroids have several advantages: they are relatively stable and highly toxic to insects, have potential for the contr of household and agricultural pests, and show particular promis for controlling pests in cool weather because of their negative temperature coefficient of toxicity. Nevertheless, this new group of compounds are also subjected to the occurrence of resistance since it has been reported that resistance to them has generally been in the form of cross-resistance developed either by selection with other groups of chemicals or with the same group.

The proper choice of insecticides necessitates the accumulation of informations on the rates of development and reversion of resistance, cross-resistance characteristics of the resistant population, identification of the defence mechanisms responsible for resistance and the mode of inheritanc of the types of resistance involved.

The present work was directed to cover the following points in the housefly :

1. The potential use of pyrethroids as control agents.
2. The rates of development and reversion of pyrethroid

resistance.

3. Cross-resistance characteristics of the pyrethroid resistant strains to several other insecticides.
4. The effect of synergists and insecticide mixtures on the selected strains.
5. The mode of inheritance of pyrethroid resistance in the housefly.

REVIEW OF LITERATURE

Review of Literature

1. Maintenance of culture :-

Several authors studied the optimum conditions required for the survival and maintenance of the larvæ and adults of the housefly, Musca domestica, in the laboratory.

Bacot (1911), used broth and agar media in his studies on the relationship of the housefly and Bacillus pyocyaneus .

Wollman (1922), used gelose as a medium for rearing housefly in a typhoid Bacillus culture .

Glaser (1924 & 1927), demonstrated that the horse manure was the best and the most practical medium for rearing housefly. Adults feed on sugar or assimilable starch, together with a solution of protein or products of protein hydrolysis.
He also selected milk as a natural food for adult flies.

Grady(1928), conceived the idea of supplementing the larval medium with yeast cells suspended in water. He used milk, lump sugar, sweetened bread and yeast suspended in water for adult diet.
He also described the breeding procedures and observation of activity and longevity throughout the year .

Basden (1947), used dried distillar's yeast for rearing

the larvæ of the housefly Musca domestica L .

Gerberich (1948), reared the housefly larvæ on common bacteriological medium .

Wilkers et al. (1948), found that the larvæ could be reared in a medium in which all or part of the alfalfa meal was replaced by sawdust. The use of sawdust had a marked effect on the production of the flies .

Hafez (1949), reported that a piece of cotton wool , moderately soaked in diluted milk was a good medium for oviposition and rearing of the housefly larvæ .

Busvine et al. (1953), used monkey faeces as larval food throughout the investigation for eliciting oviposition. They found that good sized flies of all strains were obtained at laboratory temperature (80 - 84 °F) .

Anonymous (1956), recommended the Peet-Grady method for rearing the housefly. The C.S.M.A. standard dry larval medium composed of a mixture of alfalfa meal, dried breuer's grains and soft-wheat bran in equal amounts by weight was used .

Moreland and McLeod (1957), bred the housefly maggots on a bran-alfalfa medium. The dry and wet ingredients varied from one experiment to another. They concluded that the amount

of water in the medium was important for the reproduction of reproducible numbers and weights of pupæ. Also the amounts of yeast and molt used in the medium were of no significance.

Busvine (1962), described a method for rearing housefly larvæ using a mixture of dried milk, dried yeast and agar.

Soliman et al. (1967), raised the housefly larvæ on a medium consisted of wheat-bran, cotton seed trash, granulated yeast and water, in a ratio of (5:10:1:5) parts .

2. Evaluation of new synthetic pyrethroids against various insects :

Recently, substantial advances had been made in improving the larvicidal and adulticidal activity of synthetic pyrethroids against various species of insects.

Yoshihiko Nishizawa (1971), stated that active synthetic pyrethroids always showed superior knockdown activity and higher killing activity than the inactive compounds. He added that all of the synthetic pyrethroids were found to be more stable than the pyrethrins .

Yoke et al. (1975), evaluated the relative potencies of four insecticides against a strain of the housefly Musca domestica vicina L. .They found that bioresmethrin was the best followed by GH74 , malathion and carbaryl at different temperatures. In addition, their toxicity was potentiated by the synergist piperonyl-butoxide .

Schmidt et al. (1976), stated that permethrin was the best insecticide due to its killing effect and repellancy against stable-fly and horn-flies on cattles, followed by methoxychlor.

Harris et al. (1978), found that pyrethroids were more effective with decreasing soil temperature i.e. they showed negative temperature coefficient of toxicity in soil .