Cytogenetic Effects of the Insecticide Cypermethrin on the Plants Vicia Faba and Allium Cepa.

Thesis

Submitted to
Botany Department
University College for Girls
Ain Shams University
in Partial Fulfilment of the Requirements
for the Degree of M.Sc. in
Botany (Cytology)

By

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National Research Centre

Cairo
A.R.E.
1986

Cytogenetic Effects of the insecticide Cypermethrin on the plants Vicia faba and Allium cepa

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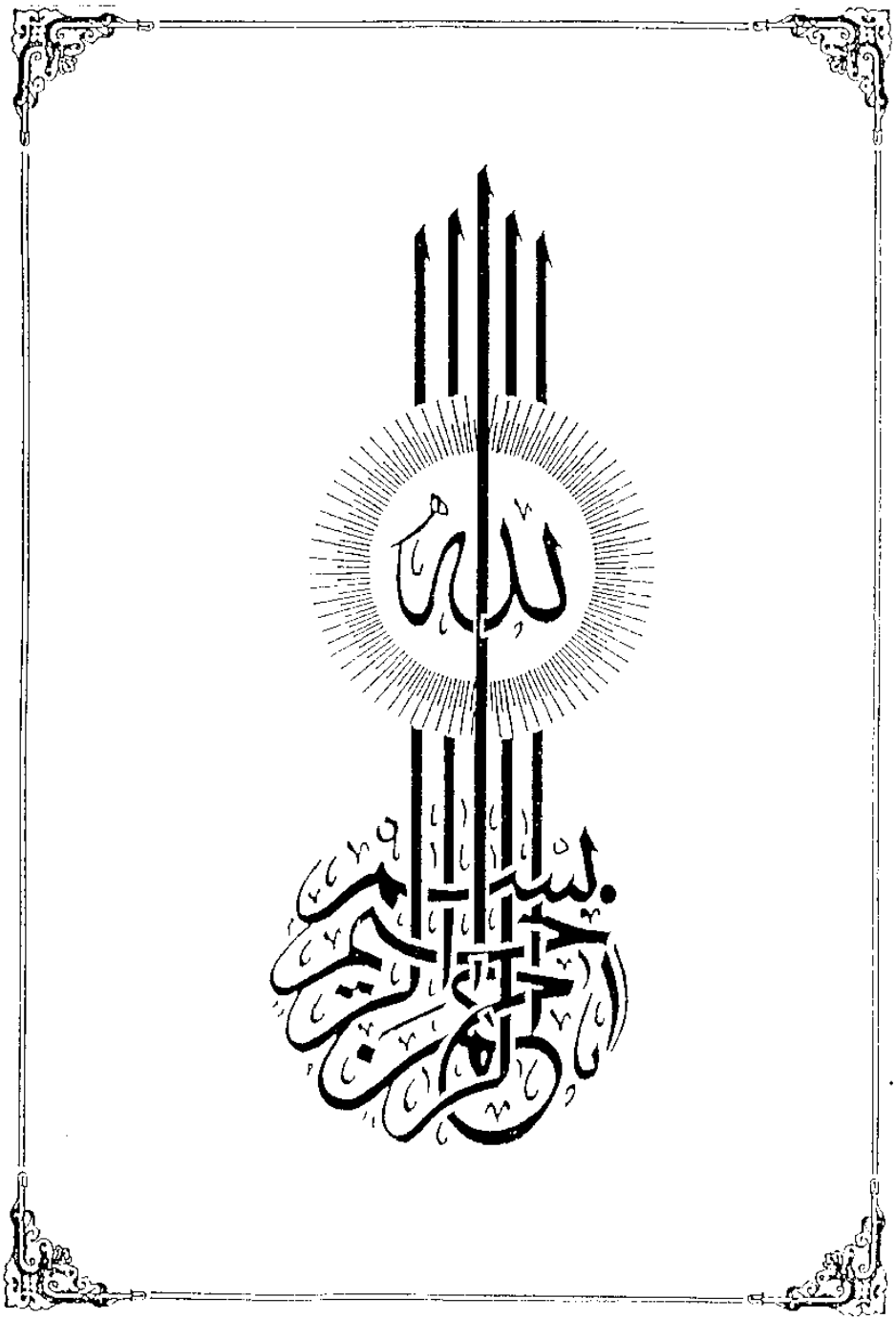

NOTE

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Botany Department ,University College For Girls-Ain Shams University :-

This Thesis presented by the condidate submitted in partial Fulfilment for the Masters Degree in Botany had been preceded by her success in the Following courses :

1- German Language.

2- English Language.

3- Biologecal statistics.

4- Methodology.

5- Advanced Cytology.

Head of Botany Department

CONTENTS

AIM OF THE WORK

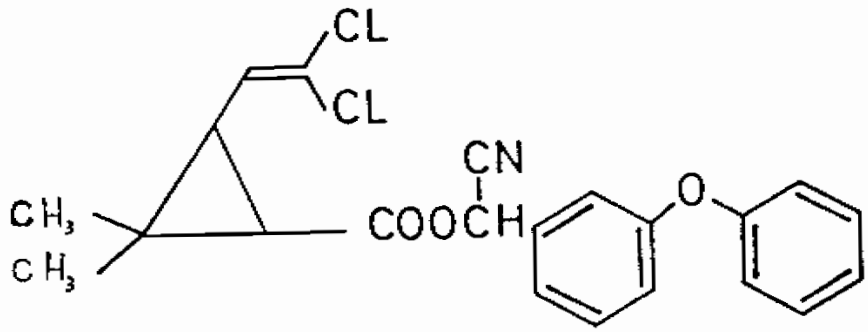
I- Aim of the Work

The aim of the present investigation is to study the effect of the synthetic pyrethroid insecticide Cypermethrin (I) on:

1- Seed germination, root- and shoot- growth of *Vicia faba* seedlings and root-growth of *Allium cepa*.

2- Root-mitosis of *Vicia faba* and *Allium cepa*.

3- Meiosis and pollen viability of *Vicia faba*.



(I)

([S, R] - ∝ - cyano-3 phenoxy benzyl- (1R, 1S, cis, trans) -2, 2- dimethyl-3-(2',2'-dichlorovinyl) cyclopropane carboxylate

"Cypermethrin"

INTRODUCTION

II-INTRODUCTION

Since the first successful development of the synthetic Pyrethrin, Allethrin by Dr. La Forge in 1947, a number of workers has started the modification of the natural pyrethrin which resulted in a remarkable change in its property. Particularly, the potent and photostable pyrethroids have been disclosed by the workers in Great Britain and Japan. Thus these pyrethroids are able to use for agricultural pest control in a large scale. **(Nakajima, 1982).**

The synthetic pyrethroids such as permethrin, Cypermethrin, and Deltamethrin are extremely potent and broad-spectrum insecticides. Although their toxicity to mammals and birds is relatively low, they are extremely toxic to fish and a variety of aquatic invertebrates. These chemicals have low water solubilities and are photostable. In soils, they are degradable via microbial hydrolysis at the ester linkage **(Khan, 1982).**

Miyamoto and Mikami (1982) discussed the degradation of the synthetic pyrethroids (Permethrin, Cypermethrin, Deltamethrin, Fenvalerate and Fenpropathrin) in plant, soil and the aqueous environment. The pyrethroids undergo a variety of photochemical reactions including trans/Cis and αR /αS interconversions except Fenvalerate.

When applied to the leaves of plants, they were penetrated to the tissues to almost the same degree, but little translocation to the untreated area occurred. When plants are grown in the treated soil, again little translocation of chemical to aerial parts of the plant occurs.

The pyrethroids are degraded in soil mainly by micro-organisms. Hydrolysis of the ester linkage together with oxidation are the major degradation routes. The products are further decomposed yielding CO_2 from radiolabeles at various positions of the molecules. The pyrethroids are immobile and can not be leached with water through soil. In the aqueous environment, pyrethroids were rapidly removed from the aqueous phase by adsorption on to sediments. (Miyamoto and Mikami, 1982).

Synthetic pyrethroids are toxic to the house flies, Musca domestica L. (Taylor et al., 1981), with no irritation to nasal passage (Adkins et al., 1971) and with no symptoms of irritation to animals (Faraone et al., 1978).

Synthetic pyrethroids are effective against larvae of various species of mosquitoes (Mulla et al, 1980, and Priester et al., 1981), and to larvae and adults of the Egyptian mosquito C. pipiens L. (Gaaboub, and Abu-Hashish, 1981).

Cypermethrin is also toxic to: larvae of the fall armyworm **(Mcclanahan, 1978)**, house flies and German cockroaches **(Scirocchia and Cesaroni, 1979)**; onion, seed-corn maggot flies and dark sided cut worm **(Harris and Turnbull, 1980).**

In the fields of wheat, shoot fly, Atherigona naqvii Steyskal damage was effectively controlled by foliar sprays of Cypermethrin during the early growth phases of wheat crop. **(Singh and Saxena, 1981).**

Cypermethrin used as field treatments of silage significantly reduced corn borer damage (Ostrinia nubilalis) and increased dry matter yield than untreated plots **(Raemisch and Walgenbach, 1983 and 1984).**

In mamals, Cypermethrin is readily absorbed, distributed, and metabolised. It is readily cleaved at the ester linkage and subjected to oxidative degradation and conjugation of the metabolic products. Elimination from the body following acute and subecute administration is rapid. **(JMPR, 1979).**

In a wide variety of studies, there was no carcinogenic or mutagenic potential as evidenced by short-term bioassays or long-term chronic study **(JMPR, 1979).** However, Cypermethrin showed mutagenic potential in our studies. In

one study, oral administration of the insecticide at a dietary level of 900 ppm for 7 and 14 consecutive days as well as double and multiple (Total 4) dermal treatments (360 mg/kg body wt.) induced a statistically significant increase in the frequency of PE_s with micronuclei in mouse bone marrow **(Amer and Aboul-Ela, 1985).**