TOXICOLOGICAL STUDIES ON CERTAIN APHID SPECIES INFESTING GRAMINEOUS CROPS «GRAMINACEAE»

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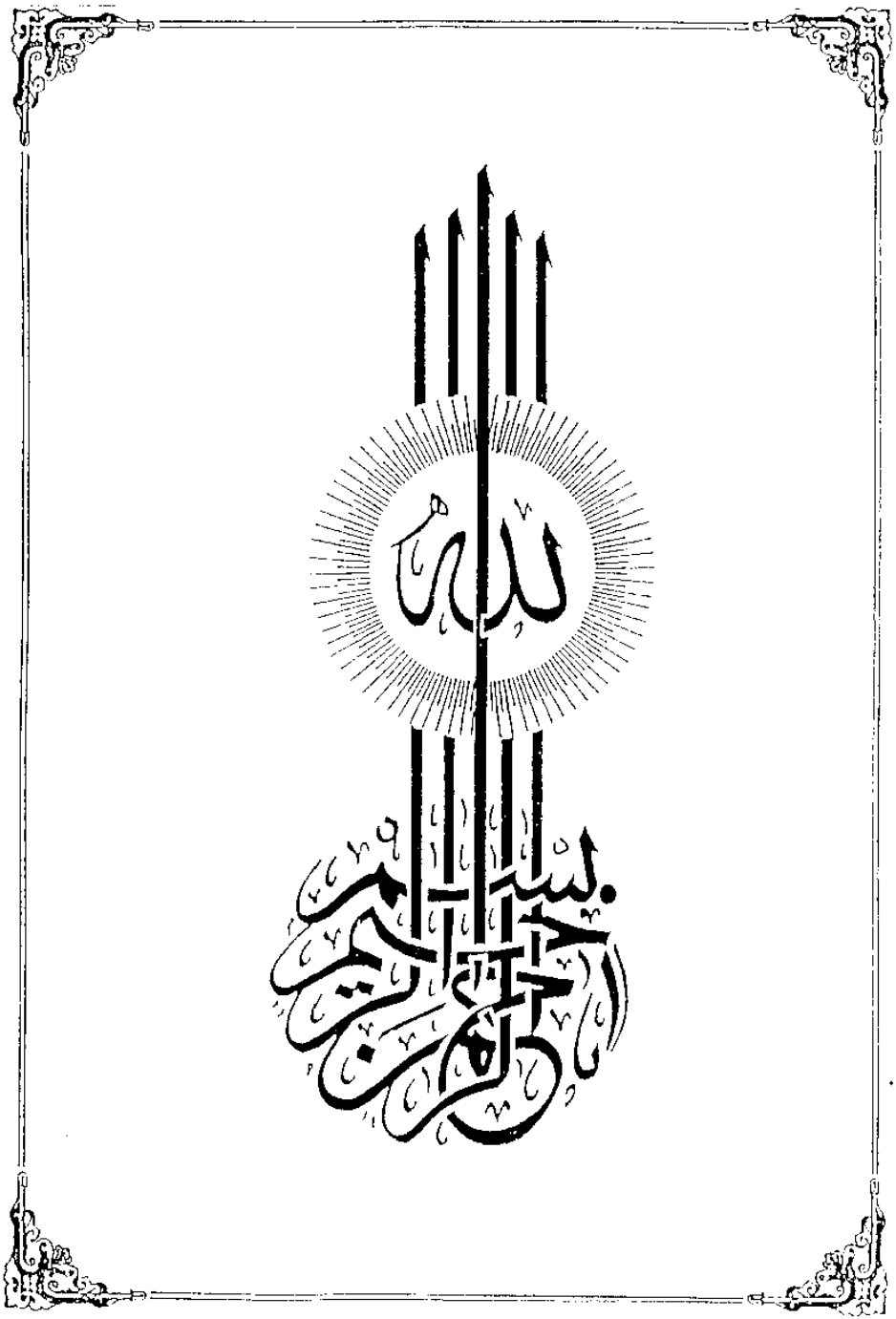

ological studies on certain aphid species infesting gramineous crops " Graminaceae "

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I. INTRODUCTION

Aphids are one of the most serious pests in Egypt infesting agronomic, horticultural and ornamental plants. Owing to their minute size, the high productive potentials and their management to withstand the adverse environmental conditions as hibernating eggs or searching for cool shelters among humid areas of roots during summer. These criteria have enabled aphids to survive for long history which dates back about 300 million years to the Mesozoic period (Adams and Van Emden, 1972).

Aphids, are capable to face the agricultural practices made by man such as mass breeding of resistant crop varieties and pesticides by developing new tolerant or resistant biological races identified as "biotypes". As examples, biotypes were happened with the corn leaf aphid on maize plants and the green-bug, Schizaphis graminum on graminous crops.

In addition to sucking plant juice, developing of sooty moulds owing to their secreted honey dew, transmitting virus diseases; aphids may cause injury only due to their direct feeding on plants. S. graminum damage for instance relies upon secreting toxicant

exudates while feeding. This secretion may cause the host to be killed within few days as happened with susceptible wheat and sorghum. Carter (1962) however, stated that the damage caused by aphids feeding falls under a more complex category called "Aphididae-induced phytotoxemia", and that "the occurrence of pale yellow spots with redcenters on graminous plants as a result of S. graminum feeding. This adverse effect may be due to the injection of some enzyme-like substance through feeding".

Wheat, barley, sorghum and maize plants are, however, considered to be the major cereal crops planted in ARE mainly as a source of grains. They are cultivated in an approximate areas of 1380612, 113623, 433596 and 1898103 feddans, respectively. These gramineous crops are cultivated in Egypt all the year round, thus their native aphid pests are existing without aestivation or hibernation.

Plant breeders and agronomists have, however, managed in developing new cultivars or varieties of cereal crops which have the property of nigh yield of grains as well as fodder for animals. It was noticed that during the course of breeding a new juicy broad leaved plants appeared. At the same time aphid outbreaks on the

produced new wheat and maize hybrids were encountered. Accordingly, chemical control was followed to overcome this problem, where several insecticide types were sprayed in cereals. Unfortunately, aphids developed biological strains "biotypes" which are highly tolerated or resistant to the applied chemicals. This was more pronounced with the OP'insecticides in case of the green-bug S. granarium (Biotype "D").

The present study has been carried out to investigate the aphicidal activity of certain chemicals against different species and stages of aphids infesting cereals under laboratory and field conditions. The rate of resistance development of aphids to the evaluated chemicals was also studied. Moreover, an attempt has been tried to investigate the prevailing biotypes under climatic conditions of Egypt.

II. REVIEW OF LITERATURE

1. Resistance of Aphids to insecticides :
   - 1.1. Susceptibility of different developmental stages of aphids to insecticides.
   - 1.2. The rate of development of resistance of aphids to insecticides.
2. Effect of sublethal concentrations of insecticides on the biological aspects of aphids.
3. Bioresidual activity of insecticides against aphids under field condition.

II. REVIEW OF LITERATURE

1. Resistance of aphids to insecticides :

Resistance of insect pests to insecticides is one of the most serious problems in pest control. According to Georghiou (1981), the number of insect species showing resistance to insecticides increased to 414 in 1979. It is difficult to imagine the cessation of the development of this phenomenon which is acknowledged as one of the evolutionary resultant of pesticide application. However, it is possible to reduce the rate of development of resistance by wise and ideal use of insecticides.

The most accurate way to monitor the resistance is through bioassay evaluation in the laboratory. Large numbers of insect individuals and long time are required to obtain results, which even then can be ambiguous; especially when resistance is light and the population is heterogenous.

1.1. Susceptibility of different developmental stages of aphids to insecticides :

Sarup *et al.* (1969) tested the efficacy of thirty-two pesticides as contact poisons against the viviparous adult females of *Aphis craccivora* Koch infesting pea.

They found that, out of these aphicides, twenty-nine, viz. phorate, methyl demeton, phosphamidon, dimethoate, parathion, methyl parathion, EPN, orthodibrom, morphothion, dichlorvos, pyrethrins, malathion, fenitrothion, azinphos-ethyl, diazinon, formothion, carbaryl, endrin, isodrin, carbophenothion, aphidan, lindane, endosulfan, phenthoate, nicotine sulphate, mecarbam, dieldrin, chlordane and trichlorphon proved to be more toxic than P'P' DDT, whereas, the remaining two insecticides, viz. toxaphene and aldrin were less toxic than P, P' DDT. They added that amongst seven aphid species, D. carthami was more resistant to chlordane, aldrin, isodrin and parathion; M. persicae to P,P' DDT, toxaphene, endrin and malathion; B. brassicae to lindane and carbaryl; whereas the remaining four species, viz. L. erysimi, R. maidis, A. gossypii and A. craccivora were comparatively less resistant to the tested insecticides. They finally reported that the insecticides belonging to carbamate group (Carbaryl), organophosphates (Malathion and Parathion), and Lindane were better aphicides when compared with P,P' DDT and insecticides of cyclodiene group (Chlordan, Isodrin, Aldrin and Toxaphene).

Saleh et al. (1971) compared the efficiency of malathion, ekatin, metasystox R, and thiocron insecticides under laboratory conditions against Aphis