TOXICOLOGICAL STUDIES ON CERTAIN INSECTICIDE RESIDUES ON SOME VEGETABLE CROPS

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Azmy Hamed Amin Hamed

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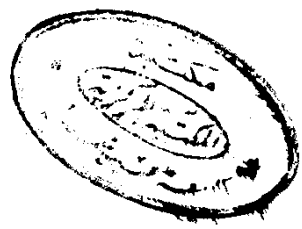

Plant Protection Department

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Name of Student : Azmi Hamid Amean Hamid.

Degree : M.Sc. Degree in Pesticides.

Approved by:

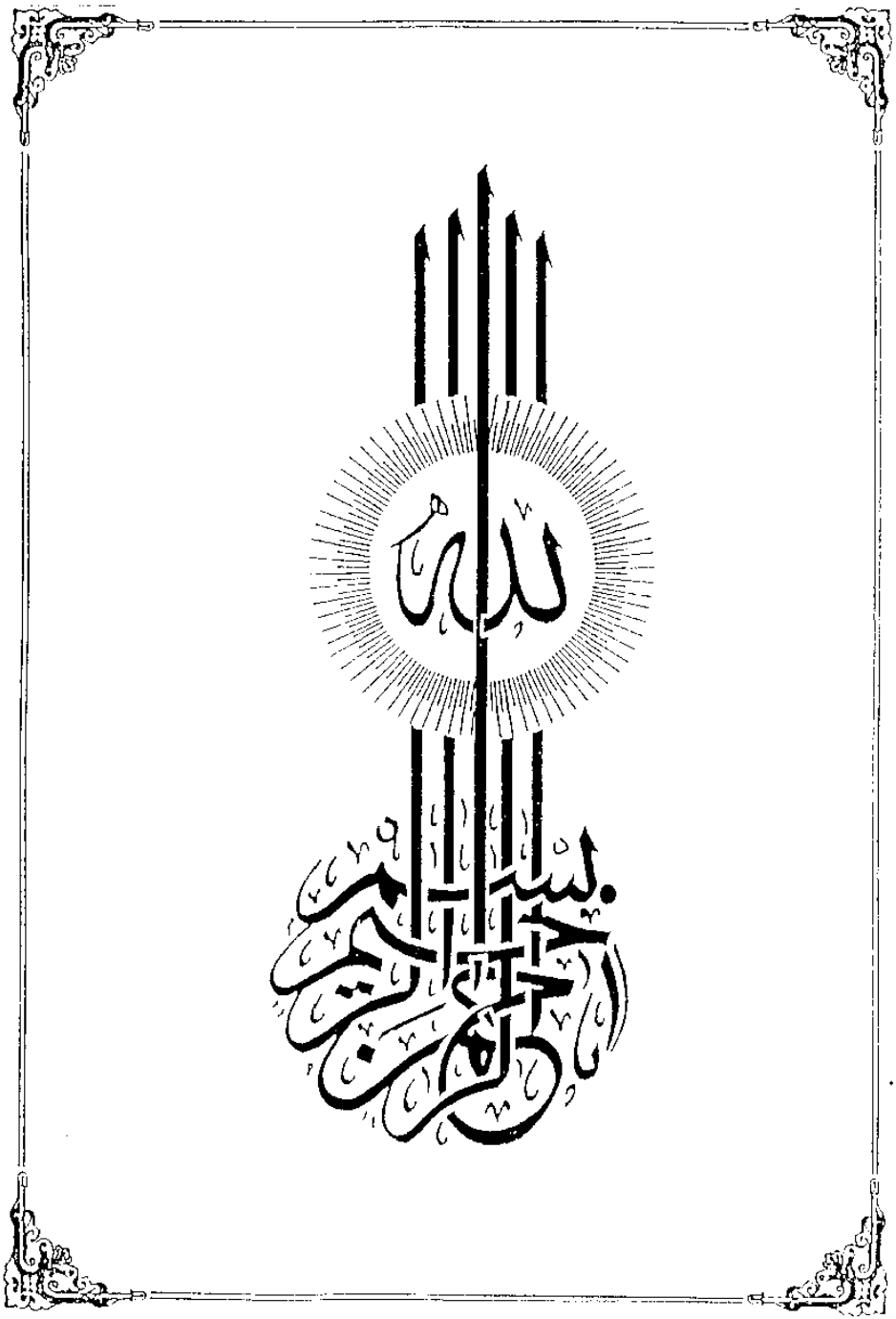
Prof. Dr.: M R. Abo Elghar

Prof. Dr.: M. F.A. Abdel-Kader

Prof. Dr.: A.M. Ghanem

Committee in Charge

Date: 2 / 12/1984.



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INTRODUCTION

I- INTRODUCTION

The remorselessly expanding world population and economic pressures make it increasingly important that the potential of pesticides to advance human welfare through improvements in public health and in the availability and quality of food is fully exploited. This requires, not only active ingredients highly effective against the pests. It has long been apparent that enlightened chemical approaches must also safeguard the environment; in addition treatments should be well adapted to the needs and capabilities of the user within overall production systems, including those in developing countries. Much has already been achieved in these directions, but challenging problems and opportunities remain which well demand imaginative research.

With this background, the present study was taken up to show the efficiency of certain insecticides against one of the most important vegetable pests and its relation with the tolerance levels. Also the effect of those insecticides on the microconstituent, mainly minerals (when those vegetables are considered as the main microelement source for human nutrition) was studied.

For this reason, a set of experiments were designed

to study the following:

1. Degradation of Methomyl and Pyridaphenthion in and on lettuce and bean plants.

2. Efficiency of Mathomyl and Pyridaphenthion against the cotton leafworm, S. littoralis, when sprayed on lettuce and bean plants.

3. The effects of Mathomyl and Pyridaphenthion on some of the major microconstituents of lettude and bean plants.

REVIEW OF LITERATURE

II- REVIEW OF LITERATURE

(1) Residues of Insecticides in and on Plants

Kruger et al. (1973) reported that the application of Methomyl as a 0.03% suspension to greenhouse tomatoes, a build-up of Methomyl occurred on the fruit with repeated applications. As indicated, 1 week after the first spray residues were about 0.1 ppm, but 1 week after the third spray residues had reached 0.35 ppm.

Marei et al. (1974) studied the contamination of roquett, Eruca sativa, and radish, Raphanus sativa, with Bromophos (Nexion) during the control of field crop insects-leaf. Samples were collected for Bromophos residue determination at zero hour, 24 hrs, 48 hrs and 72 hrs, and 6 days. Residues in roquett samples were 9.1, 3.3, 1.4 and 0.7 ppm, respectively, while in radish samples were 11.9, 6.0, 2.5 and 0 ppm.

Braun et al. (1975) reported that Leptophos residue levels in beans, cabbage, cauliflower, celery, corn, onion and pea-pods were found to be less than 0.1 ppm when the chemical was used early in the season. They concluded, however, that residues of this chemical did persist for a considerable period, and suggested an interval in excess of 13 days if used near harvest.

Khalifa et al. (1976) stated that Cyolane residues was encountered after the 7th day of chemical treatment, particularly with the rates of 0.5 and 1.0 L/feddan on maize and clover. Also, Cyolane proved to be more persistent on maize plants than on clover. No residues could be recovered from Cyolane on clover by the end of the experiment (20 days). Although phosvel residues persisted long on maize plant, yet the amount recovered was, generally, less than the corresponding value recovered from Cyolane residues, at the same levels. Still on clover plants, no residues were kept by the 20th day after treatment.

Residues recorded by the end of the experiment (20 days) were 20.98, 22.40 and 32.31 ppm of Cyolane on maize and 0.0 ppm at all concentrations used on clover. When phosvel was sprayed on maize the values recovered on maize were 9.71, 25.25, 20.00 and 54.70 ppm but only 0.0 on clover, 20 days after spray.

Finlayson et al. (1976) reported that applying Carbofuran, Ethion, Fensulfothion and Phorate on carrots, showed a greater residues in the peel than in the pulp, and greater in the top portion of the carrot than in the lower section for all insecticides. More than 50% of the residues of Ethion, Fensulfthion

and Phorate were located in the top 0.3 cm of the carrot, Carbofuran residues in the same section were slightly less. Residue levels were generally increased with higher rates and number of applications. Total residues in whole carrots ranged from 0.06 ppm for Ethion at the lowest rate to 0.49 ppm for Fensulfothion at the highest rate.

El-Zemaity (1976) reported that there was no significant difference of Malathion residues on lettuce, potato and tomato leaves at the rates of 1 and 1.5 L/ feddan. However, at different intervals, differences between the amounts of residues were recorded. The same trend of results were obtained when sevin was sprayed at the rates of 2 and 2.5 kg/feddan.

Kuhr and Dorough (1976) reported that only the outer waste-leaves of cabbage treated successively with Methomyl under field conditions, had substantial residues (0.8 + 0.9 ppm) 8 days after the final application. At the same time, corn fodder contained 2 ppm Methomyl, but no residues were detected in the kernels.

Shaaban *et al*. (1976) sprayed orange trees twice at one month interval with Dimetheate at the rates of 1 and 7 cc/litre of water, and Malathion at the rates of

1 and 4 cc/litre of water. The initial deposit of Dimetheate on the surface of orange fruits were 0.39 ppm for the low rate and 0.58 ppm for the high one, while Malathion residues were 0.64 and 0.71 ppm. These residues declined to 0.18, 0.24, 0.19 and 0.23 ppm for Dimethoate and Malathion respectively. The initial deposits at the second application for Dimethoate and Malathion at the two rates were 0.39, 0.42, 0.79 and 1.71 ppm, and the residues 30 days after the second application were 0.60, 0.75 and 0.66 and 0.88 ppm respectively.

Marei et al. (1979) studied the presistence of Bromophos, Methomyl, Reldan and Volaton on leaves and fruits of beans, agg plants, potatoes and squash. Results showed that Volaton had the highest stability in the field, its residues were 0.10 and 0.54 ppm on egg plant and bean, respectively after 12 days from application. Bromophos was found to be the lowest presistent where no amount of such pesticide was detected after 9 days. No residues of Methomyl alter 12 days on potatoe, egg-plant and squash leaves could be detected and Reldan disappeared from all studied leaves after 12 days. The half-life values of Bromophos, Methomyl, Reldan and Volaton were 1-3, 3-6, 3-6 and 3-6 days respectively.

Results also showed that the residue amounts on bean fruits were 6.00, 5.22, 5.60 and 8.67 ppm for Bromophos, Methomyl, Reldan and Volaton, respectively. The initial deposits of Bromophos, Methomyl, Reldan and Volaton in eggplant fruits were 4.60, 4.70, 3.92 and 6.50 ppm, respectively.

Braun et al. (1980), studied Dissipation rates of Diazinon, Endosulfan, Leptophos, Methamidophos, Methomyl, Parathion and Pirimicarb on five minor vegetable crops, including cos and head lettuce, endives cauliflower and chinese cabbage. Residues from foliar treatment generally followed an exponential rate of decline. The number of days for residues to drop to below acceptable tolerance was highly dependent on the magnitude of the initial residue. Residue of insecticides used in furrow treatment for onions intended for picking were determined in the onions at the harvest and after picking. Fensulfothion and Fonofos levels were below the accepted tolerance of 0.1 mg/kg at harvest, while Chlorofenvinphos, Chlorpyrifos and Ethion were present above this level. Following picking, only Ethion residues were still present in the onions at levels greater than 0.1 mg/kg. The residues of Methomyl when sprayed at the rate of 1.2 a.i kg/ha on head lettuce were 93, 40, 21, 9.7, 7.1, 5.6, 2.5