EFFECT OF INSECTICIDES ON SEEDS CONTENTS AND COTTON FIBERS

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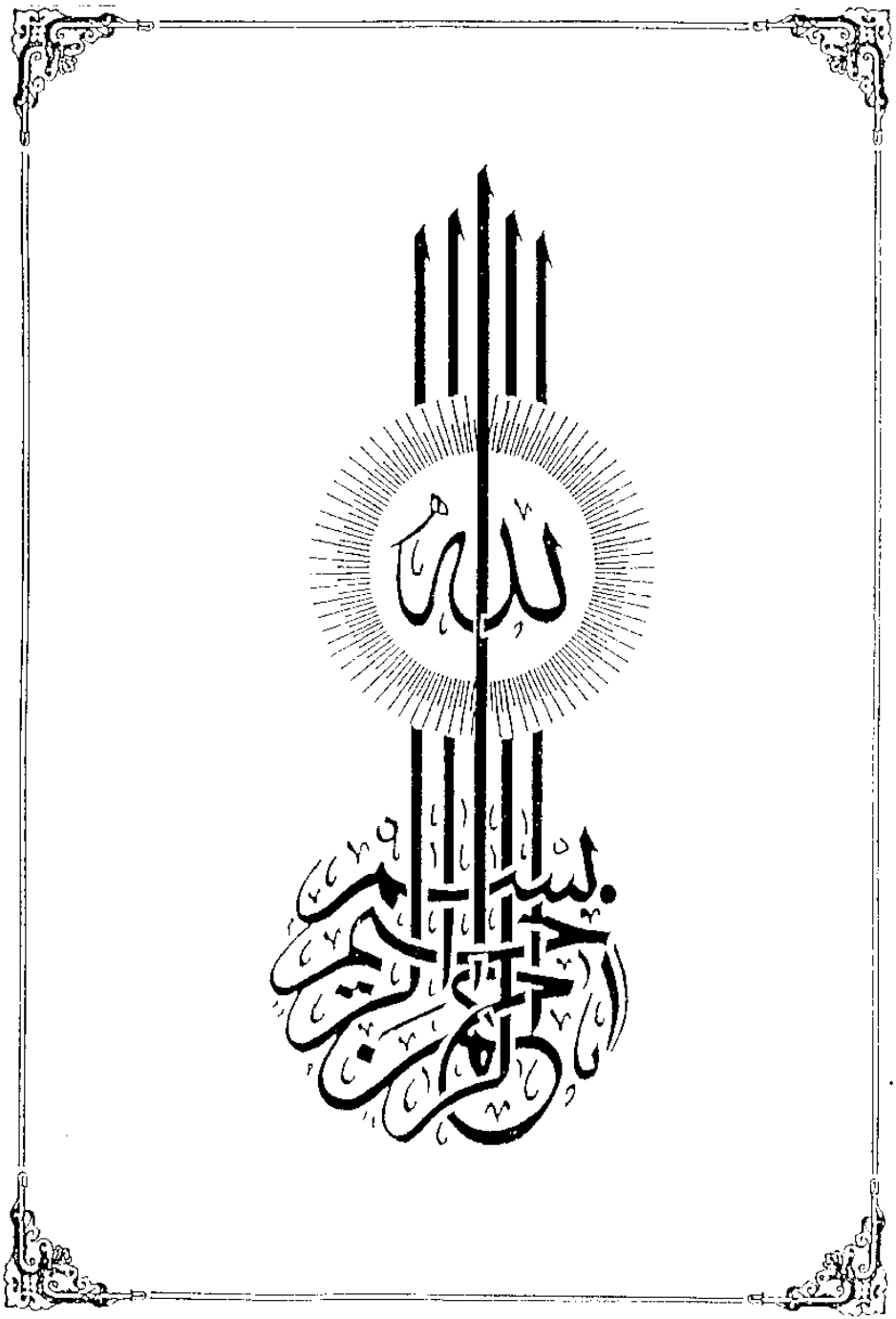

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INTRODUCTION

Cotton, still is concerned the back bone of the Egyptian economy, therefore all efforts are combined to increase the amounts of cotton fibers and seeds produced per faddan. One of the important factor for the production of high yield, is controlling of diseases and insects. Several kinds of insecticides are used for controlling of the insects. Most of these compounds are organophosphorus insecticides, they are highly effective on controlling insects.

A factor of a major importance for the comprehensive usability of organophosphates as insecticides is their behaviour towards the plant. This behaviour is found to be one of three possibilities according to the chemical nature of the organophosphate compounds: The first possibility is the effect of the compound on the plant surface and behaves like the natural dust contamination, therefore, it exerts no direct influence on plant and produces its toxicity to pest on the plant surface.

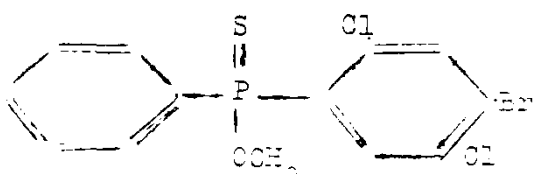
The second possibility is the capability of the compound to penetrate into the plant tissues by physical properties such solubility but not translocated within the plant, such compound produces its toxicity effect on the plant surface but not inside the plant tissues.

The third possibility is the capability of the chemical compound to be penetrated and translocated in the plant. Such compounds are said to have systemic action. Davidek and Seifert (1973) stated that all these compounds are toxic to insects but these organophosphorus insecticides, specially those of the systemic group may affect the plant growth, yield, seed composition and the fiber characteristics when they are used in controlling insects of the cotton plants.

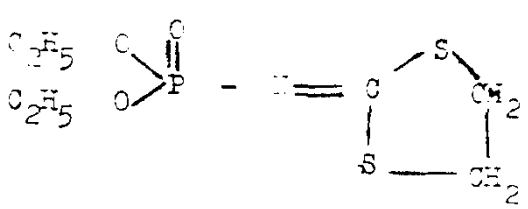
This work was carried out to throw lights on the effect of systemic phosphorus insecticides on the cotton yield and its fiber characteristics and also on its seed contents.

The insecticides which were used are:

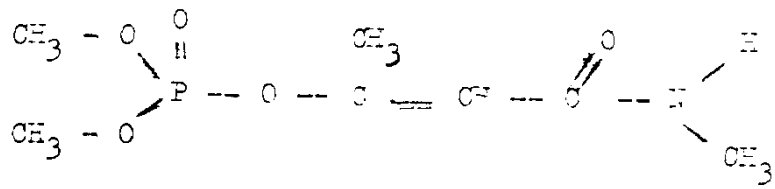
1. Phosvil (O-(4-bromo-2,5-dichlorophenyl)O-methyl phosphorothioat)



2. Cyolane (2-(Diethoxyphosphinyl imino)-1,3 dithiolan)



3. Nuvacron (3-(dimethoxyphosphinyloxy)N-methyl cis-croton amid)



These insecticides caused high mortality of cotton pests in Egypt specially Spodoptra Littoralis and boll worms as mentioned by Azab (1971), Shoeib and Hamel (1972) and Khalil and Rizk (1972).

REVIEW OF LITERATURE

The effect of insects infestation on the field crops and the use of the insecticides in controlling insects is well known, while the influence of the insecticides upon the chemical constituents of plants received no little attention.

Zeid and Out Komp (1951) reported that treating broad bean plants with Scharadan, Barathion and Paraxon showed an increase in their carbohydrate contents expressed as glucose and sucrose. Such increase in carbonydrates was higher in case of using Scharadan than the other insecticides. They added that preliminary determinations indicated an increase in the nitrogen composition of plants tested.

Hacskaylo and Eagle (1955) reported that when Scharadan or Dementon were applied to cotton plants as a foliar spray had affected the viability of the seed produced. They added that the Scharadan treated plants produced seeds tended to be higher in protein and lower in oil contents than the untreated plants. Whereas, Dementon treated plants produced seeds which were comparatively higher in oil and lower in protein.

Hacskaylo (1957) concluded that the reducing sugars, sucrose and starch were accumulated in growing plants pretreated with Phorate while both soluble and protein nitrogen decreased.

He added that the chloroform soluble and insoluble phosphorous in leaves of young plants tended to increase by increasing Phorate concentration.

Rodrivez et al. (1960) found that on treating the black Volintins bean plants with DDT, both their total and reducing sugar and nitrogen contents were increased.

Selim et al. (1967) reported that spraying bean plants with Thiocron revealed a considerable increase in their reducing sugar contents of the bean plants when compared with the plant sprayed with Delnav. Considering (all concentrations of) the different contents and regardless of sampling period, the application of Delnav caused an increase in the plant constituents more than caused by Thiocron. Total sugars in the bean plants tended to decrease due to the use of high concentrations of Delnav, especially in the early samples, while there was an increase due to the increase of the concentration of Thiocron. Thiocron treatments at any period of the plant growth exceeded that of Delnav in their total nitrogen contents of plants. Total soluble nitrogen in plants was comparatively greater in the case of using Thiocron than that of Delnav. The seeds of the plants treated with Thiocron contained higher percentages of carbohydrates and fats than those

treated with Delnav, while the ash contents of plants were higher in of the Delnav treated plants.

El Herrawy (1970) reported that on treating the grean bean plants with organophophorus insecticides the carbon content in the leaves was increased, but there were no significant differences in both nitrogen and phosphorus contents. But in the fruits and mature seeds the nitrogen content was increased.

It is interested to mention that Wilkinson et al. (1972) stated that the oil contents of cotton seed (Gossipium hersutum) from the crops treated with herbicides representing eight families of compounds were analysed by GLC and found minor changes in the oil fatty acids composition. They also reported that the application of herbicides influenced the cotton seed oil quality due to the effect of four sequential herbicide applications selected from the compounds Trifluralin, Chloropropane, Fluometuron, Alpha, Noreadiurn, MSMA, Linuron and Prometryne when the GLC determination of fatty acids of oils were taken into consideration. The sequential herbicide treatments did not greatly affect the fatty acid composition of the cotton seed oil which was composed of myristic 1%, palmitic 23% palmitoleic 0.6%, stearic 2.6%, oleic 18.5%, linoleic 53.7%, linolenic 0.2% and arachidonic acid 0.3%.

Worthington and Smith (1973) stated that the foliar fungicide application to peanuts for control of Cerespora leaf spots during one and two growing seasons caused considerable changes in fatty acid composition of peanut oil as levels of linoleic acid were comparatively higher in oil, from Argentine and lower in Florigiant variety plots treated with fungicides compared with control samples. These treatments of peanut plants with Fungicides affected the oil stability and their fatty acids composition.

Beachat et al. (1974) reported that the treatments of the peanuts (ground nuts) with selected foliar fungicides revealed significant differences in the percentage of their protein and oil contents.

Hacskaylo (1959) reported that the application of Thimet on cotton plants had a little effect on the fiber length except at very low concentrations of the insecticides, while the higher concentration of the Thimet caused a decrease in both the fiber length and in the final yield. All cotton plants received different doses of the Thimet had a coarse fibers, whereas, the untreated plants had more fine fibers. He also mentioned that the tensile strength was slightly reduced as a result of the medium rate of Thimet insecticides and at a high rate, it was more reduced.

He concluded also that Gutnion and Dieldrin in addition to DDT when applied on cotton plant produced coarser fibers than the control and there was a very slight difference in the tensile strength between treated and untreated plants. Nevertheless, there was a tendency of increased of tensile strength due to the application of different insecticides. He reported that using of DDT was considered as the main factor in reducing of the lint index.

Sorour (1968) reported that the treatment of cotton seeds with Thimet or Disystone preplanting, the yield tended towards an increase, seed index and lint characteristics were not affected.

Zeid and El-Khishen (1969) found that cotton fibers produced from the majority of cotton plots treated with different insecticides were all of the same length, strength, uniformity and colour. Emulsions of Endrin-DDT, Gutnion-DDT, Endrin and Dieldrin in DDT gave good effective results against most plots, as the cotton fibers produced were almost ideal in their colour, strength, stable length and high yield. The cotton yield from the untreated areas was lower bluish in colour, and shorter in the stable length, their fibers were weaker and its yield was lower.

Brown et al. (1961) reported that the cotton plots treated weekly with Toxaphene-DDT for 12 and 16 times, showed no significant effect on the yield, seed weight, lint index and lint percentages. Sixteen weekly applications of Calcium, arsenate however resulted significant reduction in yield, seed weight, lint index, boll weight and dry weight of plants.

Brown et al. (1962) reported also, that an increase in yield and boll production occured when Toxaphene-DDT was applied to cotton plants at weekly intervals for 6 weeks beginning with the appearance of first flower, Toxaphene-DDT had no effect on yield and boll production, if treatments were initiated when the oldest boll were about 30 days old and continued at weekly interval for 5 weeks. Yield and boll production were not affected by treatments of the cotton plants with Methyparation, but the treatments with calcium arsenate reduced the yield and boll production. Dry weigh of the plants were significantly increased by certain treatments of Methy-parathion and significantly decreased by certain treatments of Calcium arsenate. Toxaphene-DDT had no effect on leaf number and dry weight.

Leigh, (1963) found that when phorate was applied as seed treatment or when Phorate and Dy-syston were applied as granular formulation to cotton field either at planting time

or in June, the yield differences between treated and untreated plots were evident in 1959 and 1960, with significant increases from treatments in some plots and decreases in the others for both the planting time and midseason application. Differences in uniformity of the fiber length in 1959 and in fiber maturity in 1960 were evident at Shafter but not else where, when the treated plots were compared with the untreated. The lint percentages, fiber strength were not affected by the insecticide treatments.

El-Wakkad (1963) found that using of Toxaphene treatments increase the yield of seeds of cotton bolls in Ashmoni and Giza 47 while decreased it in Menofi, whereas the application of Coresan decreased the yield in these three varieties. He added that Toxaphene, Endrine, Metaisosystox and DDT increased the fiber length in Ashmoni than the control, neverless all of these insecticides reduced this property in both Giza 47 and Menofi. The fineness of the cotton fibers had been increased by application of Endrin and Metaisosystox on cotton plants varieties Ashmoni, Giza 47 and Menofi, the fiber strength had been increased in the three treated varieties by all insecticides.

Massek (1964) determined the effect of phosphorus insecticides and their mixtures on the cotton yield and its fibers properties along two seasons and found that the plots treated