FACTORS INFLUENCING THE TOXICITY OF CERTAIN INSECTICIDES AGAINST THE COTTON LEAFWORM, SPODOPTERA LITTORALIS, BOISD

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A C K N O W L E D G M E N T

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C O N T E N T S

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I N T R O D U C T I O N

The cotton leafworm, Spodoptera littoralis Boisd (Prodenia litura,F.) is no doubt the principal and the most important economic cotton pest in U,A.R. causing in some seasons serious damage in spite of the big effort made to control it.

The cheif method of control up till now, is hand picking of egg masses. This method could be considered as a practical and successful mean of control especially in normal years of infestation. However, in cases of severe infestation, hatching might take place and the method for chemical control becomes of vital importance.

Following the large scale application of the new synthetic insecticides against the cotton leafworm in Egypt, different problems started to appear. Amongst these problems is the failure in some cases of chemical control attributed to the variations of temperature and humidity.

It was thus the purpose of the present investigation evaluating the effect of these factors on certain modern insecticides suggested for controlling the cotton

leafworm. Moreover, the possibility of synergizing these insecticides was another aspect of this research which may permit more economical control of pests.

Such information will no doubt assist in the chemical control of the principal and most important cotton pest in U.A.R.

PART I

REVIEW OF LITERATURE

I) Effect of Temperature on the Toxicity of Insecticides:

Hartzell and Wilcoxon 1932, sprayed the rose chafer adults, *Macrodactylus subspinosus* F., with pyrethrum. They suggested that if the insects received a dose insufficient to kill, recovery at higher temperature was more rapid but if on the other hand, the dose was lethal, death occurred more rapidly at higher temperatures.

Craufurd 1938, found that the rate of toxicity of derris to *Ahasverus advena*, Watt. was regularly increased with the increase of temperature during treatment.He also found that the insects bred at 20°C. under the same conditions after treatment showed higher susceptability than those bred and kept after treatment at 25°C. under similar percent relative humidity of 76%.

Shepard 1939, stated that temperature was highly important in determining the effectiveness of a fumigant. Volatility increased whereas surface adsorption decreased with raising temperatures.

Ellisor and Blair 1940, showed that lead arsenate,

basic coper arsenate and calcium arsenate were more toxic to velvet been caterpillar, Anticarsia gommatilis Hbn., and the southern armyworm, Prodenia eridenia Hbm., at 60°F. than at 80°F., while synthetic cryolite gave the same M.L D. at the two temperatures used.

Eagleson 1942, described the effect of temperature on the recovery of houseflies from knockdown effect due to the toxic effect of pyrethrum and lethane (p-butoxy-B-thiocyanodiethyl ether) and showed that the percentage of recovery increased regularly with the increase of temperature from 22°C to 38°C.

Harries et al. 1945, studied the insecticidal action of pyrethrum extracts on the beat leafhopper Eutettia tenellus, Bak. and found that higher toxicity obtained with higher temperatures during spraying and with lower temperature after spraying. When the same temperature was maintaned during and after the spraying, the resultant effects was a higher kill at lower temperature.

Lindquist and Wilson 1945, showed that the knock-down with rise of temperature was slower in the case of house flies exposed to DDT and faster in the case of house flies exposed to pyrethrum and mosquitoes and bed bugs exposed to DDT.

David 1946, found that a 10°C. drop in temperature reduced the observed kill by about 20 per cent when adults of Aedes aegypti were treated with pyrethrum.

Potter and Gillham 1946 ,found that both pyrethrum and rotenone were more toxic to honey bees, Apis mellifera as contact poisons at 20°C. than at 34.5°C., but the reverse was observed with nicotine. They concluded that the increase in toxicity under cool conditions after treatment was due to the physiological conditions of the insect at these temperature rather than to the effect of temperatures on the poison or the diluents.

Gaines and Dean 1949 , investigated the effect of temperature and humidity on the toxicity of certain insecticides on the boll weevils, Anthonomus grandis Both. The toxicity of calcium arsenate remained nearly the same under all temperatures. The toxicity of DDT and Chlordane reduced by high temperature. While high temperature and high relative humidity has less effect on the toxicity of toxaphene than of the other insecticides tested.

Hoffman and Lindquist 1949a , examined the effect of temperature on the residual effect of several chlorinated hydrocarbons on house flies. They reported that DDT and Methoxychlor caused greater mortality at low temperature than at high temperature,while the reverse was true

with Heptachlor, Parathion, Chlordane, Dieldrin and toxaphene.

Hoffman et al. 1949 b, showed that more ticks were killed at 70°F. than at 90°F. when exposed to wool treated with DDT, Methoxychlor and dichlorodiphenyl dichloroethane, while the reverse was true with toxaphene, BHC and Chlordane.

Guthrie 1950, showed that DDT, pyrethrins and Lindane topically applied to the German cockroaches were more toxic at the lower temperature, while the reverse was true with Aldrin and Dieldrin. They added that temperature had the greatest effect on the toxicity of DDT, while the effect on the other compounds was considerably less.

Woodruff 1950, reported that nicotine and rotenone injected into nymphs and adults of Milkweed, showed increasing mortality with corresponding increase in temperature up to 29°C. while DDT produced a positive temperature coefficient between 10° and 25°C, and a negative temperature coefficient between 22° and 29°C.

Vinson and Kearns 1952, reported that both of the topical and injected doses of DDT on the female American cockroaches showed negative temperature coefficients between 15° and 35°C.