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SUSCEPTIBILITY OF 5TH INSTAR *DIACRISIA OBLIQUA* WLK. LARVAE TO ORGANOPHOSPHORUS INSECTICIDES

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The 5th instar *Diacrisia obliqua* Wlk. larvae reared at 28± 1° and 60±2% R.H. were treated with different concentrations of Diazinon, Malathion, Nuvacron, Nuvacron combi and Dipterex. The larvae were found to be more susceptible to Nuvacron combi and Dipterex. The theoretical and practical implications of these investigations are also discussed.

INTRODUCTION

Diacrisia obliqua Wlk. is a polyphagous pest insect [1] and its caterpillars have been found voraciously feeding on cotton [2]. Its attack is, at occassion severe, resulting in gigantic losses, yet the information on the control of this pest insect is still meagre.

Thus, the present investigations were carried out to study the susceptibility of 5th instar *D. obliqua* larvae to organophosphorus insecticides such as Diazinon, Nuvacron, Malathion, Nuvacron combi and Dipterex.

MATERIAL AND METHODS

The principal materials used in the present investigations were the laboratory reared *Diacrisia obliqua* Wlk. 5th instar larvae and insecticides viz., Nuvacron, Malathion, Nuvacron combi, Diazinon and Dipterex. A brief account of the procedures followed is, therefore, given in seriatum as under:

A. Rearing of Test Insects; The culture of *D. obliqua* was maintained in the laboratory at 28±1° and 60±2% R.H. The adults were paired in the glass chimneys covered with muslin cloth. The castor leaves were provided as oviposition substrate and were closely examined for egg masses. The leaves having eggs were placed in the paired petri dishes 19 cm diameter. On hatching the larvae were transferred to insect cages and were provided with succulent castor leaves daily.

A homogenous stock of 5th instar larvae was built up. For each test 90-100 larvae were chosen at random, starved for 4 hr before treatment and divided into 9 batches of 10 individuals each. The larvae from one of these batches were treated with acetone serving as control. The larvae of other batches were exposed to different concentrations of the insecticides under examination.

B. Preparation of the Insecticide Solutions. The insecticide solutions were made on w/v in acetone. The test concentrations employed for dosing the larvae were 0.025, 0.05, 0.1 and 0.5% of all the insecticides.

C. Dosing the Larvae. The larvae were dosed individually with two micro litre of the insecticide solution. This volume was measured by electrically operated Arnold Micro Applicator "Agla Syringe Assembly" [3] and applied along the tip of the abdomen. The treated larvae were confined in the labelled petri dishes containing leaves for feeding.

D. Estimation of the Dose Mortality Response. The mortality estimates, were based on the knock down effect and mortality response of the dosed larvae after 24, 48 and 72 hr after treatment. Percentage mortality was corrected using Abbot's [4] formula. The data were analysed using probit analysis technique [5]. The susceptibility was based on LD_{50} (µg/g of insect body weight). The significance of the differences in the dose values was calculated at 95% level of probability (Table 1).

RESULTS AND DISCUSSIONS

A perusal of the data presented in Table 1 reveals that LD_{50} values varied significantly with the insecticide tested and the LD_{50} value of Diazinon was the least followed by Malathion, Nuvacron, Nuvacron combi and Dipterex meaning thereby that the larvae were more susceptible to Diazinon followed by Malathion, Nuvacron, Nuvacron combi and Dipterex.These results could be compared with the available insect/insecticide combinations of similar kind, e.g., the susceptibility of 4th instar *Pieris brassicae* (L.) larvae to Diazinon and Parathion [6] and the susceptibility of *Schistocerca gregaria* Forsk. and *Locusta*

Table 1. Percent mortality of *Diacrisia obliqua* Wlk. 5th instar larvae with different concentrations of the test insecticides and their LD_{50} values.

S. No.	Insecticide	Concentration	Percent mortality after 24 hr	48 hr	72 hr	LD_{50}(µg/g)
1.	Diazinon	0.025	10	20	40	0.58
		0.05	15	25	50	
		0.1	30	40	60	
		0.5	45	80	100	
2.	Malathion	0.025	10	15	30	0.59
		0.05	15	25	50	
		0.1	20	40	60	
		0.5	50	70	90	
3.	Nuvacron	0.025	10	30	50	0.60
		0.05	15	50	70	
		0.1	30	70	80	
		0.5	60	90	100	
4.	Nuvacron combi	0.025	10	20	30	0.80
		0.05	20	40	50	
		0.1	30	50	60	
		0.5	50	70	80	
5.	Dipterex	0.025	10	25	30	1.00
		0.05	20	30	40	
		0.1	30	40	50	
		0.5	40	70	90	

migratoria migratoriodies L. to gamma BHC and Diazinon [7].

The result of each insect/insecticide coombination is usually specific and generally reflects on the comparative defence capacity of the insects against the toxic doses of insecticides, it is brought in contact with. Thus, higher susceptibility of 5th instar *D. obliqua* larvae to Diazinon would reflect on comparatively lower defence capacity of the larvae against this insecticide than the other insecticides.

The degree of defence potential of an organism may be due to the change in the susceptibility which could be measured in terms of toxicity index - T.I. which is

$$= \frac{LD_{50} \text{ of the standard}}{LD_{50} \text{ of the test sample}} \times 100$$

Thus considering Dipterex as a standard the 'T.I.' of Diazinon, Malathion, Nuvacron and Nuvacron combi was found to be 172.41, 169.49, 166.66 and 125.00 respectively (Table 2). It could therefore, be concluded that the susceptibiility of an insect specices to an insecticide is the

Table 2. Toxicity index of the test insectides for *Diacrisia obliqua* (wlk. 5th instar larvae compared with dipterex.

S.No.	Insecticide	LD_{50}(µg/g)	Toxicity index	
1.	Diazinon	0.58	172.41	(1/5)
2.	Malathion	0.59	169.49	(2/5)
3.	Nuvacron	0.60	166.66	(3/5)
4.	Nuvacron combi	0.80	125.00	(4/5)
5.	Dipterex	1.00		

index of its defence capacity to resist the chemical offence of the insecticide and the extent of this response is based on the comparative magnitude of this inability. Thus, it could be said that the higher susceptibility of *D. obliqua* to Diazinon compared with other insecticides was probably due to its lower physiological defence capacity.

On the practical side, a higher susceptibility of 5th instar *D. obliqua* larvae to diazinon should invite its wider use against them in the field as compared with the rest. But the field population of this insect is always accompanied with different larval instars. This would, for satisfactory control of this insect, require either to wait for the most susceptible stage in their development or in case of emergencies the insecticide doses prescribed should be employed.

REFERENCES

1. N.P. Gargave and O.P. Katiyar, Indian J. Hort., **28**, 316 (1971).
2. M.A. Wahla, M.A. Bhatti and M. Saqib, Pakistan J. Agr. Sci., **15**, 21 (1978).
3. A.J. Arnold, Lab. practice, **16**, 56 (1967).
4. W.S. Abbot, J. Econ. Entomol., **18**, 265 (1925).
5. D.J. Finney, *Statistical Methods in Biological Assay* (Charles Griffin and Company London, 1952).
6. M. A. Wahla. Ph.D Thesis, UNCW, Bangor, U.K. (1973).
7. R. D. MacCuaing, Ann. Appl. Biol., **45**, 114 (1957).