

THE EFFICIENCY OF A SYNTHETIC JUVENILE HORMONE KINOPRENE FOR THE CONTROL OF *Aedes aegypti*

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The lower concentrations of the chemical, kinoprene i.e. 0.01 ml and 0.02 ml per litre of water were ineffective to produce the mortality of the larvae when 3rd instars were exposed for 24 hours, although a considerable pupal mortality was observed at these concentrations. These concentrations, however, affect the emergence of adults from the pupae so formed. The mortality rate of larvae and pupae was found to be much higher when 3rd instars were treated with high concentrations of 0.4 and 0.1 ml/litre. The chemical also adversely affect the emergence of adults from such pupae.

INTRODUCTION

The best way to control dengue haemorrhagic fever, which is a critical problem in many South-East countries, is by controlling *Aedes aegypti* mosquitoes, the prime urban vector. Larvicides are widely used for the control of *A. aegypti* but they cause environmental pollution and hazards to the health of man and to non target organisms. Insect growth regulators are marvellous type of pesticides which are very safe to man and non-target organisms when used at appropriate rates (Phanthumachinda & Wattanachai, 1978). The use of juvenile hormone as an insecticide was first advocated by Williams (1956). He prepared the first active extract of JH from cecropia moth, *Hyalophora cecropia* and showed that injection or topical application of the extract to young lepidopterous pupae blocked adult differentiation. Riddiford & Trumen (1978) recently used methoprene for the control of flood water mosquitoes when applied at less than 1 part per billion in their breeding water and without any adverse effect on any other aquatic fauna. Kinoprene is a JH-mimic with different specificity acting systematically for controlling the aphids. Nasser *et al.* (1973) found that kinoprene when applied topically to the last female nymphal instars of *Paratetranychus citri* at a dose of 2.0 and 0.2, $\mu\text{g}/\text{insect}$ gave significant reduction in the total number of offsprings produced per female. Wongsiri *et al.* (1978) revealed that methoprene gave 66% mortality when applied to the 2nd instar larvae of yellow fever mosquito *A. aegypti* at a dose of 0.01 parts per million.

A review of literature clearly reveals the fact that although a considerable work has been done on the efficiency of synthetic juvenile hormones on a number of pest species including mosquitoes but a meagre data is available regarding the effects of such chemicals on the yellow fever mosquito, *A. aegypti*. The present investigation is, therefore, made to find out the effect of a synthetic juvenile hormone, kinoprene on this species.

MATERIAL AND METHODS

During the present investigations the eggs of normal strain of *A. aegypti* were allowed to hatch in the laboratory. Larvae were kept in water filled enamel trays for further rearing at a temperature of $30 \pm 1^\circ\text{C}$. 0.1 ml, 0.04 ml, 0.02 ml and 0.01 ml of kinoprene were dissolved in each tray containing one litre of water. Fifty, 3rd instar larvae were kept in separate trays in each concentration. The same number of untreated larvae were also kept as check. Three replicates of each concentration were used.

RESULTS AND DISCUSSION

The results obtained (Table I) show that the lower concentrations of the hormone are not fatal to the larvae and all the larvae treated with 0.01 and 0.02 ml/litre of kinoprene survived, however, these concentrations cause some mortality in the pupae so formed and also affect considerably the emergence of adults from such pupae. The larvae when treated with the higher concentrations of 0.04 and 0.1 ml/litre of water showed 8% and 24% mortality, the pupae formed from the survived larvae also showed 17.4% and 28.9% mortality respectively. The emergence of the adults from the survived pupae also affected adversely and only 52.6% and 44.4% emergence was observed at the concentrations of 0.04 and 0.1 ml/litre respectively.

Table I. Effect of kinoprene (ZR 7 7 7) on 3rd instar larvae of *Aedes aegypti*.

\bar{a} Concentration in ml	% Larval mortality	% Pupae mortality	% Adult emergence
0.1	24.0	28.9	44.4
0.04	8.0	17.4	52.6
0.02	0.0	8.0	54.3
0.01	0.0	8.0	56.5
Control	0.0	4.0	96.0

\bar{a} average from three replicates

It may be concluded from the results obtained that obviously the hormone has an adverse effect on apolytic process in which the epidermal tissue is retracted from the old cuticle which is apparent in the present investigation that the higher concentrations upto a certain extent check the moulting of larval instars into pupae and also the emergence of adults from such pupae.

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REFERENCES

- NASSER, S.G., STAAL, G.B. & MARTIN, J.W. 1973. Control of the citrus mealybug with insect growth regulators with juvenile hormone activity. *J. Eco. Entomol.* 66 : 851 p.
- PHANTHUMACHINDA, B & WATTANACHAI, P. 1978. Effectiveness of Methoprene (Altosid) in water jars in Bangkok, Thailand for the control of *Aedes aegypti* (L.) WHO/VBC/78.699. 1-3.
- RIDDIFORD, L.M. & TRUMEN, J.W. 1968. Biochemistry of Insects. Academic Press, New York.
- WILLIAMS, C.M. 1956. The juvenile hormone of insects. *Nature* 178 : 212-213.
- WONGSIRI *et al.*, 1978. Comparative tests of Abate, Dimilin and Altosid SR 10 against *Aedes aegypti* larvae. Unpublished report of Department of Zoology, Chulalongkorn University, Chulalongkorn.