

ALTOSID, DEVELOPMENTAL STAGES OF CULEX

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EXPERIMENTS ON EFFECT OF ALTOSID
 (GROWTH REGULATOR)
 ON SOME DEVELOPMENTAL STAGES OF CULEX
 UNIVITTATUS THEOBALD.
 (DIPTERA: CULICIDAE)

(With 4 Tables)

By

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جارب على تأثير الالوسيد (منظم النمو) على بعض أطوار النمو

لحشرة الكيولكس يونيفيتاتس

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في التجارب العملية لتقدير الكفاءة الحيوية لمنظم النمو في مكافحة بعوض الكيولكس يونيفيتاتس كانت LC50 لهذا المركب على بيض الحشرة 1276 جزء في المليون وظهر أن تركيز 0.137 جزء في المليون ليس له تأثير قاتل على البيض كما أن تعريض هذا البيض لمدة يومان لتركيزات من هذا المركب ينتج عنه إطالة الطور اليرقي وطور العذراء وقتل من 10.21-14.62% من طور العذراء الناتج كما تؤدي التركيزات الأعلى إلى تخفيض نسبة الإناث الناتجة. ونتج عند تعريض يرقات الطور الأول والثاني لهذا البعوض لتركيزات مختلفه من هذا المركب إلى نسبة موت عاليه ولكن التأثير كان غير معنوي في منع اليافعات من الخروج من العذاري وكان الطور اليرقي الثالث والرابع أكثر الاطوار حساسيه بينما كانت عذاري هذا البعوض أقل حساسيه من اليرقات.

SUMMARY

The LC50 of Altosid against *Culex univittatus* eggs was 1.1276 ppm. The compound at 0.0137 ppm had no ovicidal activity. Exposure of *Culex univittatus* eggs for 2 days resulted in prolongation of larval and pupal period; 10.21-14.62% mortality in resulting pupae and reduced female ratio at higher concentrations. Exposure of first and second instar larvae of *Culex univittatus* to different concentrations resulted in larval mortality, but the effect on inhibition of adult emergence was not significant. The third and fourth instar larvae were the most sensitive whereas pupae were less sensitive to Altosid.

Keywords: *Culex univittatus*, Theobald and Altosid (growth regulator)

INTRODUCTION

Altosid (insect growth regulator) was found to affect larvae and pupae of many species of insects in different countries. CUMMING and

MOKAGUE (1973) found that Altosid inhibited adult emergence of *Simulium decorum*; PREE (1974), studied the effective of insect developmental inhibitors against both lar-

vae and pupae of the apple maggot, *RHAGOLETIS POMONELLA*; *RETENAKARAN*, (1973, 1974) induced ovarian development and re-sorption of fat bodies and induction of sexual maturity in the white pine weevil, *Pissodes strobi* by some analogues of juvenile hormone; *EDWARDS* (1975), observed the juvenile hormone analogue caused broad death and prevented egg laying in *MONOMORIUM PHAR-AONIS*; *REID et al.* (1992) used of insect growth regulators with juvenile hormone activity for german cockroach; *SHAFI et al.* (1987) and *WADLEIGH et al.* (1991) observed the diffubenzuron and penfluron cause death of nymphal stages of german cockroaches due to moult inhibition.

The objective of this paper is to test the effect of Altosid (growth regulator) on the eggs, different stage larvae and pupae of *Culex univittatus*.

MATERIAL AND METHODS

Two formulations of Altosid (emulsion and granules) were kindly provided by Zoecon corporation 975 california to be tested against culicine mosquitoes. It is a Juvenile hormone analogues which is known to regulate insect growth.

As far as it chemical and physical properties, Altosid is isopropyl 11-methoxy-3, 7, 11 trimethyl dodeca 2,4 dienoate, Patent pending, C19 H34 O3. It is colourless liquid with molecular weight 310, specific

gravity 0.8856 gm./c.c at 20 °C and vapour pressure 2.37×10^{-5} m Hg at 25 °C and 1.60×10^{-4} mm Hg at 40 °C. Altosid is soluble in non-aqueous organic solvents and its water solubility is 1.39 ppm. Lc50 to rats is greater than 50.000 mg/kg., greater than 80 ppm for blue gills and greater than 4.4 ppm for trout. Dermal and eye irritation is minimal to rabbits (*ANONYMOUS*, 1972).

Effect of Altosid on hatching eggs of *Culex univittatus*

The following concentrations 0.0137, 0.0238, 0.0495, 0.1273, 0.2645, 0.4814 and 1.1276 ppm, were used in conducting these experiments in the laboratory (Assiut, was the source of mosquitoes tested during the present work).

One egg mass was put in every plastic pot (10 cm diameter) containing 100 ml water from the breeding place of the mosquitoes in the laboratory. After hatching the number of larvae were counted in every concentration and in the control, 3 replicates were used for each treatment.

Effect of Altosid on different larval instar of *Culex univittatus*

Sufficient larvae in their early first, second, third and instar were obtained from laboratory breed. 50 selected larvae of every instar were transferred to a plastic pot (10 cm diameter) which contained 100 ml of tap water and 1 ml of appropriate concentration of Altosid. The control pots were prepared as described

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above without using Altosid. Three replicates were prepared for each treatment. After an exposure period of 48 hrs, larvae were transferred to a plastic pots filled with tap water and fed on yeast and fine bread until pupation. Pupae were transferred to cages till adult emergence. Dead larvae and pupae were recorded. The tests were performed under water temperature of 20-30 °C.

The same technique was conducted on the pupae of *Culex univittatus*.

RESULTS

Are presented in Tables 1 - 4.

DISCUSSION

Data (Table I) represent the ovicidal effect of Altosid on *Culex univittatus* eggs (0-24 hrs age). No ovicidal activity was found at concentration of 0.0137 ppm. The gradual increase of Altosid concentration was accompanied by gradual decrease in hatching rate. The Lc50 (The concentration which inhibits 50% of egg hatching) was found 1.1276 ppm.

Larvae which succeeded to hatch in the previous treatments were reared in the laboratory to study the latent effect of Altosid on larval mortality, larval periods, pupal period, pupal mortality and sex ratio (Table 2).

Data reveal that exposure of *Culex univittatus* eggs for 2 days to the concentrations tested caused 8-20% mortality of the larvae. Altosid

was found to prolong larval and pupal periods. The period of the former stage was 8.5 days with Altosid concentration of 0.1273 ppm compared with 7.92 days in the control. The period of the latter stage was 3.58 days at concentration of 0.1273 ppm compared with 2.81 days in the control.

Besides, this compound caused 10.21-14.62% mortality of the resulting pupae. The effect seems to extend to the female ratio as it was observed that, at concentration of 0.1273 ppm, female ratio as 76.83%, gradual increase of concentration was accompanied by gradual decrease in female ratio (at concentration 1.1276 ppm female ratio was 40.33%). However, it might be indicated that on comparatively lower concentration of Altosid, the compound killed males in contrary, with higher concentrations.

ITTYCHERIAH, *et al.* (1974) found that Altosid analogues CRD9499 (10,11 epoxy methyl 3,7,11 trimethyl, 1-2, 6 dodecadienamide) reduced adult emergence of *Culex tarsalis* when it was used by topical application to eggs. He found also that the inhibition being significant at dosage of 10 ppm. Exposure of *Aedes aegypti* eggs for 7 days to 0.0001-1 ppm concentrations of Altosid caused 12.7-79.2% inhibition of hatching and 20-100% mortality of the resulting pupae (NAQUIL *et al.*, 1976).

Laboratory experiments on the effect of Altosid were conducted on

the first to fourth instar larvae as well as pupae of *Culex univittatus*. As indicated from larval mortality and inhibition of the adult emergence (Table 3,4), high mortality in the first and second larval instars of *Culex univittatus* were obtained by using Altosid. The third and fourth instars were less sensitive. Hence, it might be indicated that Altosid

might induce larvicidal effect on the early instars, whereas on the late instar, it might act as inhibitor of adult emergence. These results agree with those obtained by *BETRAS and SIVERLY 1971*) on *Culex pipiens pallens*, *ITTYCHERIAH et al. (1974)* on *Culex tarsalis* and (*FARGHAL 1979*) on *Culex pipiens molestus*.

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Table 1: Effect of Altosid on hatching rate of *Culex univittatus* eggs.

Concentration ppm	% Hatching			Mean
	Replicate 1	Replicate 2	Replicate 3	
0.0137	100	100	100	100
0.0238	96	90.23	96	94.07
0.0495	99	94.51	98	97.17
0.1273	82.30	72.80	70.30	75.13
0.2645	51.40	53.14	50.77	51.77
0.4814	48.43	54.50	52.30	51.74
1.1276	51.33	48.11	52.33	50.59
Control	100	100	100	100

Table (2): Effect of Altosid on some biological properties of *Culex univittatus*.

Criteria	Concentrations ppm					
	0.0495	0.1273	0.2645	0.4814	1.1276	Control
Larval mortality	8	16	20	20	20	10
Larval periods/days	7.83	8.5	8.23	8.41	8.39	7.92
Pupal periods/days	3.06	3.58	3.44	3.10	3.06	2.81
Pupal mortality	10.21	10.50	11.93	11.30	14.62	9.32
Female ratio	42.18	76.83	68.31	48.12	40.33	46.14

Table (3): Effect of Altosid on different larval instar of *Culex univittatus*.

Instars*	Concentration of Altosid (ppm)	Larval mortality	% adult inhibition
First	0.0137	75.8	4.81
	0.0238	72.6	5.77
	0.0495	87.3	8.34
Second	0.0137	16.0	9.34
	0.0238	25.8	26.71
	0.0495	51.3	40.5
Third	0.0137	7.81	13.61
	0.0238	16.73	43.72
	0.0495	18.21	56.81
Fourth	0.0137	3.81	52.80
	0.0238	7.36	87.32
	0.0495	15.61	93.70

* Control in all instar larvae 0.00

Table (4): Effect of Altosid on the *Culex univittatus* pupae.

Concentrations ppm	% Adult Inhibition			Mean
	Replicate 1	Replicate 2	Replicate 3	
0.0137	5.42	5.91	6.24	5.85
0.0238	16.21	17.30	14.20	15.90
0.0495	13.08	18.91	17.22	16.40
Control	3.77	4.11	3.05	3.64