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EFFECT OF PRECOCENE II ON CERTAIN BIOPHYSIOLOGICAL ASPECTS OF THE ADULT FEMALE *SCHISTOCERCA GREGARIA* FORSKAL.

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Abstract

The aim of the current study was to evaluate the effect of precocene II on some biological and biochemical aspects in the adult stage of *S. grearia* .The three doses 100, 200 and 300 ug/g adult were topically applied during the early and late periods of the adult females.

During the first three days of the adult life the dose 100 ug resulted in 100% mortality particularly when it was administered during the first day. The second dose 200 ug induced 100% sterile adult females.

The application of the three doses during the late period of the adult stage (day 4) induced 46.7, 13.3 and 16.7 percentages of mortality after 48h from treatment , respectively . The metabolites protein , carbohydrates, lipids and cholesterol had decreased in the fat body of the survived adult females.

INTRODUCTION

Intensive studies were conducted on the role of the anti - juvenile hormone (JH) precocene II against the nymphal instars of *Schistocerca gregaria* (Unnithan *et al.*, 1983 and (1980); El - Gammal *et al.*, 1986).

Although Highnam *et al.*, (1963) found that JH from corpus allatum was facilitating protein uptake by the growing oocyte, Gellissen and Wyatte (1981) observed that precocene II prevented the synthesis of vitelogenin in *Locusta migratoria.*

Lange *et al.*, (1983), reported that during the adult development of *L. migratoria* male, precocene II induced a low level of protein biosynthesis in the fat body . This was attributed to the reduction in JH titre in the treated insects.

The present work was directed to study the sterile effect of the anti-JH precocene II on the adult females of *Schistocerca gregaria*. Some biochemical aspects were also evaluated.

MATERIALS AND METHODS

The newly moulted female adults were selected from the gregarious stock colony maintained under the crowded condition. The anti- JH precocene II (6.7 dimethoxy - 2.2 dimethyl - chromene) was the chemical used .

The tested doses of precocene II were 100, 200 and 300 ug/g adult. All doses were applied on adult female insects during the first 4,5 and 6 days of their life. Each dose was dissolved in 4 ul acetone then was topically applied to the cervical membrane of the adults by a Hamilton microsyringe type (NCH 701). Each dose was replicated three times with 10 individuals in each replicate. High mortality percentages were observed with the dose 100 ug/g in adults of one day - old after 48 h from treatment, this dose was therefore chosen to be also applied on 4,5 and 6 day-old adults required for chemical analysis later .

The fat bodies of the survived adults after treatment with 100, 200 and 300 ug on days 4 , 5 and 6 were collected on day 14 for chemical analysis.

Mortality percentages were recorded after 48h from treatment. The survived adults were dissected to collect their fat bodies for chemical analysis. During this stage , the existence of full mature eggs in the ovaries was observed. Percentages of sterile adults were then caluclated .

Quantitative analysis of the fat body metabolites, i. e protein, carbohydrate, lipid and cholesterol in the treated female adults was determined in days 4, 5 and 6 after treatment.

The fat body protein contents were determined by Buret reagent according to the method of Gornall *et al.*, (1949). The total fat body carbohydrates was estimat-

ed according to Trinder (1969). The modified method of Knight *et al.*, (1972), was adopted to determine total lipids. Fat body cholesterol was determined by the enzymatic colourimetric method of Richmond (1973).

RESULTS AND DISCUSSION

Biological effect of precocene II

Table 1 shows the effect of the three doses of precocene II during early and late adult stage. The dose 100ug gave 100% mortality when it was administered to 1-day old adult females. 200 and 300 ug caused complete sterility with no mortality achieved.

Table 1. The biological effects of precocene II on the adult females of *S. Gregaria.*

Dose ug/g adult	Treatment during early period *		Treatment during late period **	
	*** % Mortality	**** egg existence	*** % Mortality	**** egg existence
100	100.0	—	46.7	+
200	0.0	—	13.3	+
300	0.0	—	16.7	+
Control	0.0	—	0.0	+

* The early period is expressed by the first three days of the adult life.

** The late period is expressed by days 4,5 and 6 of the adult life.

*** Moratlity was observed after 48h from treatment.

**** Egg existence was observed by dissecting the female adults on day 14.

(-) Sterility.

(+) Eggs existence.

Treatment with the three does on 4 day-old adults produced 46.4 , 13.3 and 16.7 % mortality after 48h from treatment. The remaining adults had full grown eggs in their ovaries at day 14 after treatment .

It seemed that the dose 100 ug served as a physiological dose against the tissue building at the beginning of the somatic growth period . The low toxicity of precocene when was administered later could be explained according to Pratt *et al.* (1980). They showed that the relation between age and toxicity of precocenes is affected by post ecdysial changes in the integument which modifies the rate of precocene penetration as well as its metabolic detoxication.

This may clarify the acute toxicity of preconcene II against the adult female of *S. gregaria.* Bowers and Martinez - Pardo (1977) found that ultrastructural studies on *Oncoplettus fasciatus* treated with prcocene II resulted in a number of disintegrated nuclei, degenerating mitochondria, and autophagic vacuoles .

With regard to sterility induced by precocene II, Gellissen and Wyatt (1981) indicated that precocene II prevented the synthesis of vitellogenin (the yolk precursor protein) in adult females of *L. migratoria.*

Table 2. demonstrates the effect of precocene II on the fat body metabolites

Table 2. Effect of precocene II on the fat body metabolites on day 14 after adult treatment on days 4,5 and 6 of the adult life.

Dose ug/g adult	Effect of treatment during 4 th, 5 th and 6 th day					
	mg ptotein /g fat body ± s.d.			mg Carbohydrate/ g fat body ± s.d.		
	day 4	day 5	day 6	day 4	day 5	day 6
100	330 ± 2.1	330 ±2.2	570±3.3	5.40±0.94	9.42±0.73	11.83±0.81
200	390 ± 3.1	450 ± 5.2	400±4.1	8.28±0.42	12.0±1.50	9.60±0.16
300	500 ± 4.1	220 ± 3.6	450±5.1	10.00±0.37	7.08±0.98	10.98±0.70
Control	550 ± 2.4	———	———	12.00±1.40	———	———
	mg Lipid /g fat body ± s.d.			mg cholestrol/ g fat body ± s.d.		
	day 4	day 5	day 6	day 4	day 5	day 6
100	108.70±1.8	161.2±3.7	89.55±2.1	5.00±1.1	3.50±0.2	5.00±0.2
200	120.00±1.4	124.50±2.2	151.18±3.7	12.00±1.9	6.00±0.4	2.94±0.2
300	158.97±2.7	64.75±2.5	110.25±4.3	2.50±0.2	2.00±0.2	5.38±0.4
Control	199.60±4.9	———	———		———	———

when was applied with the three doses 100, 200 and 300 ug/g on female adults of 4,5 and 6 day-old. It is clear that the three doses of precocene reduced all the fat metabolites in day 14.

Precocene treatment on day 4 revealed that the fat body protein contents were 330, 390, 500 and 550 mg/g for the doses 100 , 200, 300 ug and the control, respectively . The fat body carbohydrate levels were 5.4, 8.28,10 and 12 in respect. Lipid contents were 108.7, 120.0 158.97 and 199.6 mg/g for the three dosed and the control, respectively. The fat body cholesterol with the same doses were 5,12 and 2.5 cholesterol/ g fat body compared with 6.4 mg in the control.

The fat body protein contents as affected by precocene II treatment on day 5 of the adult life were 330, 450 , 220 protein/g fat body for the three doses compraed with 550 mg in the control . The carbohydrate contents were 9.42 , 12.0 , 7.08 and 12.0 mg carbohydrate / g fat body for the 3 doses and the control, respectively . This treatment resulted in a reduction in the fat body lipid content as indicated by 161.28, 124.5 , 64.75 and 199.6 mg lipid /g fat body for the three doses and the control, respectively . The reduction was proportional to the dose level. The fat body cholesterol contents were 3.5 , 6.0, 2.8 and 6.4 mg cholesterol/g fat body for the doses and the control, respectively.

In general the three doses of precocene reduced all the metabolites during day 14 when the adult females were treated on day 6.

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تأثير البريكوسين (٢) علي المبايض والأجسام الدهنية للحشرات الكاملة للجراد الصحراوي شيستوسيركا جريجاريا.

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تهتم هذه الدراسة بتأثير مركب البريكسوسين علي النواحي البيولوجيه والكيميائية في الحشرات الكامله للجراد الصحراوي.

عند معاملة الحشرات الكاملة خلال اليوم الأول من عمرها بالجرعة ١٠٠ ميكروجرام ماتت جميعها أما عند المعاملة بالجرعة ٢٠٠ ميكروجرام نتجت حشرات عقيمة بنسبة ١٠٠٪ . وعند معاملة الجرعات ١٠٠،٢٠٠،٣٠٠ ميكروجرام / حشرة كاملة علي الحشرة الكاملة في يومها الرابع نتجت نسب مختلفه من الموت كانت أقل من ٥٠٪ بعد ٤٨ ساعة من المعاملة.

وأشارت النتائج المتحصل عليها بعد تقرير مستويات البروتين والكربوهيدرات والدهون والكولسترول في الأجسام الدهنية للحشرات بعد ١٤ يوماً من المعاملة الي خفض واضح في مستوي هذه المواد الحيوية اللازمة لحياة الحشرة.