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EFFECT OF JUVENILE HORMONE ANALOGUE AND PRECOENE 11 ON THE GROWTH AND METAMORPHOSIS OF HOUSE FLY *MUSCA DOMESTICA*

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ABSTRACT

Larval instar duration of the house fly *Musca domesticais* influenced by the application of GHA and precocine . Topical use of ug / ul of JHA KD 183 prolonge Juvenile period compared to the control . On the contrary , application of ug / ul of precocine decreased it . Application of both substances has no effect . The emergence inhibitors were also influenced by such treatments . It reached 52 . 39 % by the use of JHA , (- 14 . 28 %) by the use of precocine . .

INTRODUCTION

Two hormones control development and metamorphosis in *M . domestica* , these are the moulting (ecdyson) and Juvenile hormone . Corpora allata is the source of JH . Shortly after emergence brian hormone stimulate CA to release JH which acts on ovary and fat bodies . The ovary thene produce 20- hydroxy ecdyson which activates the fat body to produce the female protine vitellogenine which is added to yolk to complete the egg maturation (Hagedorn *et . al* 1977 , Aqui *et . al* 1985 ; Alsharook , 1989) .

In insects , JHAS are growth regulators . They either prevent moulting (ecdysis) or inhibits their embryonic development (Slamea *et . al* 1974) .

There are several types of JHA vary in theire activities and effects on insects resistance , for example the activity of JH S31183 on the house fly *M . domestica* was significantly high than that of metheprene (Kawada , 1987) . The stage of insects which treated by JHA was involved in the variation of JH activity (Radwan *et . al* 1984 ; Hatakoshi *et . al* 1987) .

Precocene , anti juvenile hormone , has agreat role in growth and reproduction , they reduce the egg production in the emerged adults and cause reduction in the duration of last nymphal life of stinke bug (Mukhopadhyay *et . al* 1988) .

The efficency of the chemicals depends on their quality and quantity . for example application of 2ug of JHA was sufficient to stimulate egg devlopment in *M . domestica* , while 5ug of (20 - hydroxy ecdyson) has no effect (Adams & Filibi 1985) .

The aim of the present study is to investigate the effect of these two substances and pointout which of them is more active than the other on growth and development of the house

flies and to determine which stage of the life cycle is more affected by low concentration of JHA to revele the suatible application of these substances which can be used as acontrol tool of reproduction through the life cycle .

MATERIALS AND METHODS

1 - Rearing : - The adults were collected by sweepnet , transfered to cages (130 x 100 x 90 cm) made of wood and wire screen .

Moist bread and sugar was used as a feeding source for larvae , another jars contaning water with powdred milk and sugar was used for adults feeding . female adults were placed with mature males for mating . After oviposition , baches of eggs were transferred to new cages frequently to obtain known age larvae .

2 - Solutions used : - 1 Ug of JHA KD 138 (Fig 1) was dissolved in 1 Ul of acetone (1: 1 part) .

1 Ug of standared precocene 11 was dissloved in 1 Ul of acetone . This concentrations was choised according to previous studies .

3 - Experimental : - Tow experiments were carried out

Exp . 1

1U 1 of JHA , 1 Ul of precocene 11 were applied topically seperatly each on 25 2 nd instar larvae .

1U 1 of precocene was applied topically on 25 2 nd instar larvae and followed by JHA application after 24 hrs .

1 U 1 of acetone was applied topically on 25 2 nd instar larvae as control . Application of solution was carried out on 1 - day old of 2 nd instar larvae .

Exp . II : - This experimente was planned as exp I but on 3 rd instar larvae .

The percent of adults emergence inhibitors was calculated from the following formula : -

$EI\ \% = 100 - T / C \times 100$

were T = emergence in treatments , and C = emergence of isolated individuals in untreated (Mulla & Darwazeh , 1979) .

4 - Statistic : - Statistical analysis of the data was conducted by using complete Randomize Design (C . R . D) and Duncans multipe range test (Steel and Torrie 1980) .

RESULTS AND DISCUSSION

The results of the 1 st exp . showed that the treatment of the 2 nd instar larvae with JHA prolonged their stadium till day 8 , compared with control where all larvae ecdysed to 3 rd instar on day 6 table (I) , fig . (II) .

In contrast , precocene 11 shortened the stadium (table 1) . Here moulting started after 1 st day of treatment and the ecdysis of all 2 nd instar larvae to 3 rd instar were completed after 4 day of treatment .

In group (III) , again precocene 11 induced the moulting on the 1 st day , while JHA prolonged it when applied after 24 hrs . of precocene treatment .

Statistical analysis of exp . I data showed highly significant differences between precocene II and JHA effects on the stadium of the treated larvae . The prolongation of group III larvae duration in compared with control is due to the effsct of JHA , since JHA has agreat ability to penterates the integument and to reach its target organ . This agrees with the results of (Herzog & Monroe , 1972) . The shortness of the stadium of group III larvae may be due to the counter - effect of precocene II on the corpora allata (C - A) and its interferance with JH biosynthesis or disruption of brain regulation of (C - A) , so the precocene depress the JH titer (Bowers *et . al* , 1976 ; Hagedorn et . al , 1977 ; Aqui *et . al* , 1985) .

With the contineous of life cycle , the 3 rd instar larvae , pupa & adults , which emerged from the treated larvae , were affected too in the same way but their is an important point that the adults which emerged from group II & III was inactive , more of them have no ability to fly and died after short time , this reveles to conclude that these adults (males or females) have no ability to mating and producing anew generation , so they may be sterile . The application of precocene II induced abnonormality and sterilization to *Spodoptera mauritia* (Santha & Nair 1988) .

For adults , emergence started on day II with JHA treatment , day 6 with precocene and day 8 when both substances applied .

The emergence inhibitor percente (EI %) was increased with JHA treatment and decreased with precocene II treatment .
this shown as follows .

1 - Emergence inhibitor of Group I (JHA) = 100 - 10 / 21 x 100 = 52 . 39 %
2 - Emergence inhibitor of Group II (precocine) = 100 - 24 / 21 x 100 = (- 14 . 28) %
3 - Emergence inhibitor of Group III (precocine + JHA) = 100 - 16 / 21 x 100 = (24 . 19)

This agrees with the results of (Adams & Filib , 1988) .

In exp . II (table II , fig II) , similar effects of the two substances was seen . Pupation was delayed to day 5 in group I , day 2 in group II and day 3 in group III compared to the normal life cycle (Mohammed *et al* 1980) .

Expermental and statestical analysis of both exeperiments data leed to conclude that is :-

1 - The effective role of JHA on metamorphosis is highly then that of precocene .
2 - The doses of JHA and precocene which was applied are sufficent to used as agood tool for the houseflies control .
3 - The JHA are more active when applied on the late instar larvae .

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Table : 1 . Influence of hormones on the stadium (days) of 2 nd - instar Iavae *M. domestica* .

Insect instar	Type of treatment Juvenile hormone (JHA)	Precocine	Precocine+JHA	Acetone
2 nd -3 rd instar	8 c*	4 d	6 c	6 c
2 nd instar-pupa	13 b	7 c	8 c	9 c
2 nd - adult	19 a	12 b	15 b	14 b

Table 2 : Influence of hormones on the Stadium (days) 3 rd - instar Iarvae M. domestica .

	Type of treatments			
Insect instar	JHA	Precocine	Precocine +JHA	Acetone
3 rd - pupa	12 c*	8 e	11 c	10 d
3 rd - adult	16 a	12 c	14 b	13 a

*similar letters revel that their is no significant difference at 0 . 05 level according to Duncans test .

تأثير مشابه هرمون الحداثة والبريكوسين Precocene II على نمو وتحـــول حشـــرة الذبابة المترلية *Musca domestica*

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الخلاصة

تتأثر فترة تحول الاطوار اليرقية المختلفة لحشرة الذبابة المترلية *Musca domestica* بأستعمال مشابه هرمون الحداثة والبريكوسين . وقد تبين ان الاستعمال السطحي لـــ ug / ul من مشابه هرمـــون الحداثة يعمل على اطالة فترة التحول اليرقي وان الاستعمال الســـطحي لـــــ ug / ul مـــن البريكوسين يعمل على تسريع فترة التحول ، في حين ان استعمال المادتين معا ليس لـــــه تاثـــير واضح على فترة التحول والنشوء مقارنة بحشرات المقارنة .

كما تبين ان عملية تثبيط خروج البالغات تتاثر هي الاخرى فتصـــل الى 39 . 52 % في حالـــة استعمال مشابه هرمون الحداثة و (– 28 . 14 %) في حالة استعمال البريكوسين .

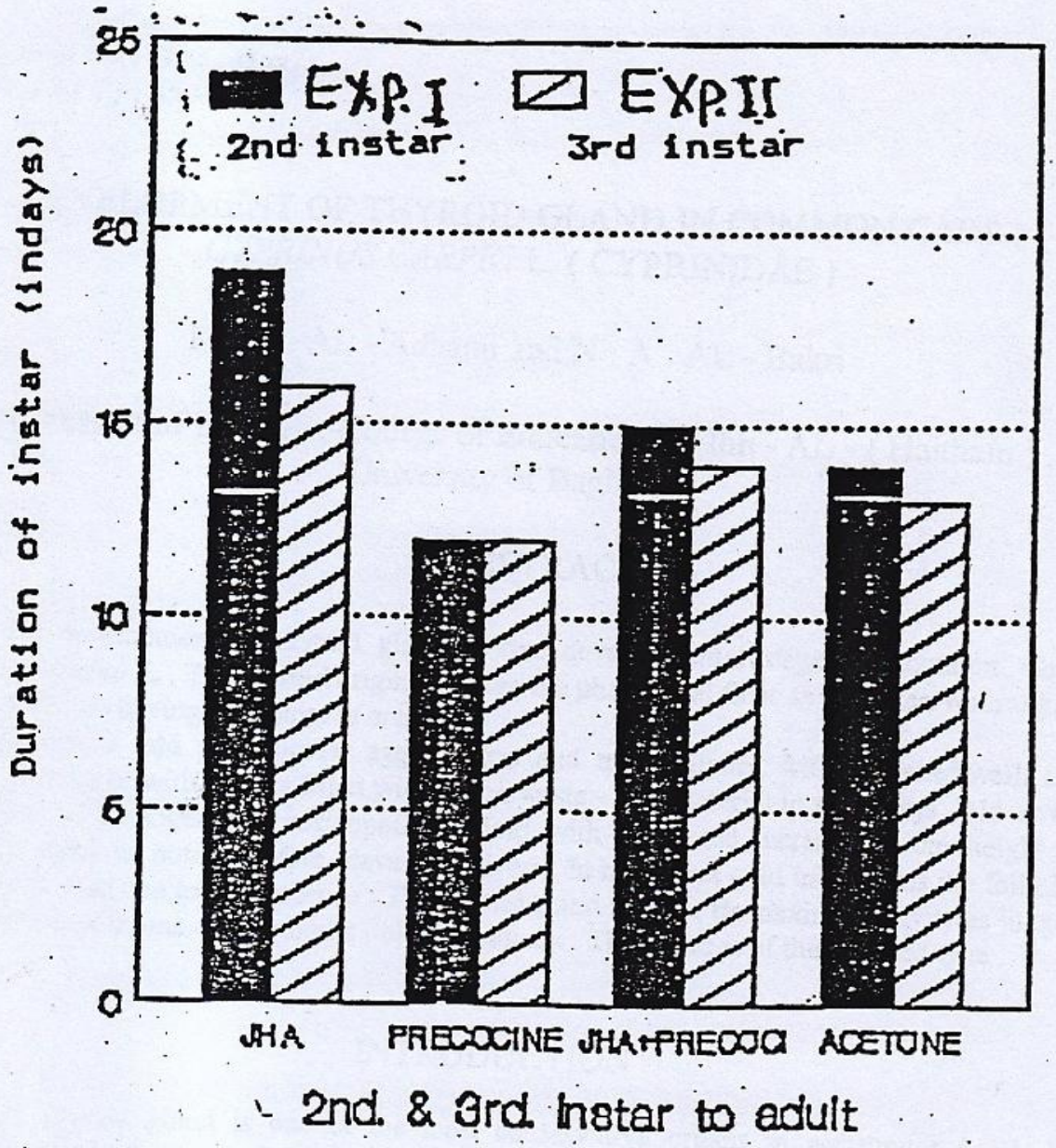

Fig. II Effect of hormones on adult emergence of the house flies.