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ملاحظات على السلوك البيولوجي للاكاروس اكاروفيناكس تراى بولى (بيمو تيدي – أكاري)

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الملخص العربي

اجريت دراسة على بيولوجية الاكاروس A. tribolii على بيض كل من حشرتى Tribolium castaneum T.confusum واتضح من الدراسة ان عدد البيض الذى استهلك بواسطة الاكاروس فى فترة دورة الحياة له كان 17.3بيضة فى حالة تقديم بيض الحشرة Tribolium castaneum وذلك فى اول يوم من التغذية و11.6بيضة عند التغذية على بيض الحشرة T.confusum وفياليوم الثانى للتغذية لوحظ ان الاكاروس تغذى على 12.7 بيضةعلي الحشرة T. castaneum و7.6بيضة فقط من حشرة T. confusum أما بالنسبة للتغذية في اليوم الثالث فإن عدد البيض الذي أستهلك كان 8.4 و 4.8بيضة علي الترتيب .ومن الدراسة أتضح أن الأكاروس أستغرق حوالي 23.5 ساعة في أول يوم من فترة ماقبل الولاده والتي نقصت لتسجل 15 ساعة فقط في اليوم التاني أما فترة الولاده فلم تسجل في أول يوم من حياة الأنثي البالغة ولكن فترة الولاده ظهرت بعد اليوم الثاني من عمر الأنثي و قد أستغرق الأكاروس فترة مقدارها 11.75 ساعة في اليوم الثاني له و 15ساعة في اليوم الثالث وتوقفت فترة الولاده في اليوم الرابع من حياة الأم البالغة وأستغرقت الأم زمنا مقداره 12ساعة في فترة مابعد الولاده

NOTES ON THE BIOLOGICAL BEHAVIOUR OF *ACAROPHENAX TRIBOLII* NEWSTEAD & DUVALL (ACARI: PYEMOTIDAE)

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ABSTRACT: ***The number of consumed eggs by the pyemotid mite Acarophenax. tribolii during its life cycle was significantly differed according to the species of Tribolium used. The number of consumed eggs was 17.3 eggs in case of T castaneum in the first day of feeding and 11.6 eggs in case of introducing T confusum as prey for mite feeding. On the other hand, the number of consumed T castaneum eggs was higher (12.7 eggs) than those of T confusum (7.6 eggs) in the second day of A. tribolii feeding. The number of consumed Tribolium eggs in the third day of mite feeding was very low in comparison with those consumed in the first two feeding days where the number was 8.4 and 4.8 eggs only in the third feeding day. The mite took in the first day of pre-parturation period 23.5 hours which decreased to 15.0 hours only in the second day. The parturition period of the mite did not recorded in the first day of the longevity period but the parturition period recorded 2 days after emergence. The parturition period was obviously noticed as 11.75 hours in the second day of this period and 15.0 hours in the third day and stopped in the fourth day of longevity. The post-parturtion period recorded 12.0 hours only but in the fourth day of the mite longevity.***

Key words*: Bilogy, Acarophenax tribolii, Pyemotid mite, Tribolium.*

INTRODUCTION

Acarophenax tribolii **is a common parasitic mite on different stored product bettles (Lepesme, 1944). Young females of this species are found on adult bettles and their pupae; especially where the cuticle is thin, on the inter-segmental membranes and, on the adult, on the large area of soft cuticle beneath the flight wings, (Evans *et al,* 1961). Mignon *et al.,* 1996 have observed, in case of big infestation, till about hundred of adult mites on rear dorsal extremely of the *Tribolium castaneum* adult elytras and between leg articulations. Conventional chemical control is the most frequently technique used to protect stored grains against insect attacks, (White and Leesch, 1996). Although, chemical control is responsible for the increase in the development of resistance among several pest species as well as for food contamination by chemical residues. Consequently there is a search for alternatives that minimize such negative effects,(Brower *et al., 1996).* Several researchers consider biological control an important tool to solve problems caused by chemical control. *Tribolium castaneum* (Herbst) can be found all over the world, mainly because of the international trade of agricultural products, (Sokoloff, 1974). The insect is highly tolerant to climatic changes, and is one of the most harmful pests occurring in processed grain (wheat flour, ration, bran and com flour), particularly when in bulk, (Rees, 1996).The efficiency of the mite in controlling other pest coleoptera is already known and was described in previous works of Faroni *et al., 2000;* Oliveira *et al.,* 2002, 2003, in which harmful parasite of beetles pests of Bostrichidae family were reported. In addition, the mite was tolerant to the most frequent insecticides used to control stored products pests, Goncalves *et al.,* 2004 and, for this reason, it may be used as a natural enemy in integrated pest management programs in storage facilities, particularly in tropical regions. Due to problems related to this beetle's insecticide resistance, Zettler and**

Cuperus, 1990, evaluate the potential of using the mite *A. lacunatus* as parasite of *T. castaneum*. Oliveira *et al*., 2006 noticed that the increase in *Acarophenax lacunatus* (Cross & Krantz) mite density led to a linear increase in parasitism on *Tribolium castaneum* (Herbst) and a consequent reduction in populations of this insect. The following study was done to evaluate the preference of *A. tribolii* to the eggs of the hosts *Tribolium castaneum* and *Tribolium confusum*, when it was reared on these hosts and to determine if there is selection in the lines of this mites having better performance on insects.

MATERIALS AND METHODS

The populations of *Tribolium castaneum* and *Tribolium confusum*, used in this study were raised continuously on cow pea grains. *Tribolium castaneum* (Herbst.) was reared on wheat flour under laboratory conditions of 25±1°C and 60±5 % R.H. for several generations at the stored product (EL.Lakwah , 2000). Before use, all the populations were maintained at 25±2 °C, 65±5 % relative humidity (RH).The populations of *A. tribolii* were raised and maintained separately on colonies of *Tribolium confusum* . The eggs of each insect host were collected by sieving the mite-free colonies through a I mm sieve, and placed, separately, in the center of a 10-cm culture plate. The newly emerged females of *Acarophenax tribolii*, from each host population were transferred to the culture plates containing the eggs of the respective host on which they were raised. After 24h the females of *Acarophenax tribolii* in the physogastric process and fixed to the eggs were collected. The experiment was replicated five times for each treatment. The number of eggs of each host parasitized along the time of the experiment was calculated.

RESULTS AND DISCUSSION

Mite behaviour: A female of *Acarophenax tribolii* mite typically gives birth viviparous ranged from 4-15 females and one male. All of her little mite children hatch while still inside her womb and the male mates and impregnates all of his sisters. Then the brother dies and his sisters begin life by bursting their mother open and killing her. After feeding, young female leaves the host and commences to feed on the eggs of the bettles until after a few days, her body becomes so distended that she is incapable of walking. On third day, the gravid females die and from 4-14 young females emerge through the enlarged genital orifice.

Number. of consumed eggs during three feeding days of *Acarophen ax tribolii*:

As shown in Table (1), the number of consumed eggs by the pyemotid mite in their life cycle period was significantly differed according to the species of *Tribolium*. The number of consumed eggs was 17.3 eggs in case of *T. castaneum* in the first day of feeding. However, the average number of eggs was 11.6 in case of introducing *T. confusum* as prey for mite. On the other hand, the average number of consumed *T. castaneum* eggs was higher (12.7 eggs) than those of *T. confusum* (7.6 eggs) in the second day of *A. tribolii* feeding.

The number of consumed *Tribolium* eggs in the third day of mite feeding was very low in comparison with those consumed in the first two feeding days where the number was 8.4 and 4.8 eggs only in the third feeding day. However, the number of consumed eggs did not change the behaviour of the pyemotid mite, *A. tribolii*, Table (2). The data in Table (3) indicated that the mite lasted in the first day of pre-parturation period 23.5 hour which decreased to 15.0 hour only in the second day of this period. The statistical analysis of obtained data also indicated that, L.S.D. at 0.05 recorded 10.4. On the other hand, the same previously mentioned table showed that the parturition period of the mite did not recorded in the first day of the longevity

period but the parturition period recorded 2 days after emergence. The parturition period was obviously noticed as 11.75 Hour in the second day of this period and 15.0 hour in the third day and stopped in the fourth day of longevity. The statistical analysis of obtained data showed that L.S.D. at 0.05 level of parturition period = 10.24. Also, the tabulated data in Table (3) showed that the post-parturtio period recorded 12.0 hours only but in the fourth day of the mite longevity. Generally, it could be concluded that this mite may be used as a natural enemy in integrated pest management programs in storage facilities especially against *Tribolium*. Spp these results are in harmony with those obtained by Mignon *et al*., 1996 who observed that the gravid female dies and from 4-14 young female emerge through the enlarged genital orifice, when fed on the egg of tribolim spp.

Table (1): Average numbers of consumed eggs during the three feeding days of the pyemotid mite

Prey	Mean	S. D.	Range
1 st feeding day			
Tribolium castaneum	17.3	6.7338	(5-23)
Tribolium confusum	11.6	7.1056	(0-18)
2nd feeding day			
Tribolium castaneum	12.7	9.0437	(0-21)
Tribolium confusum	7.6	8.3026	(0-19)
3 rd feeding day			
Tribolium castaneum	8.4	6.7528	(0-17)
Tribolium confusum	4.8	5.452	(0-13)

Table (2): Statistical analysis of the consumed *Tribolium* eggs on the behavior of the pyemotid mite, *Acarophenax tribolii*

Feeding day	F. Test	P. level	L.S. D. at 0.05 level
No. of consumed eggs in the first day	3.39026	0.0821 ns	6.5038
No. of consumed eggs in the second day	1.7257	0.2055 ns	8.1564
No. of consumed eggs in the third day	1.72035	0.2061 ns	5.76638

Table (3): Duration of the longevity of the mite *Acarophenax tribolii* reared on eggs of *Tribolium castaneum and T. confusum*.

Duration	Mean(hr)	S. D.	Range
Pre-parturition period			
First day	23.5	1.291	22-25
Second day	15.0	6.00	12-24
Third day	-	-	-
Fourth day	-	-	-
L.S.D. at 0.05 level	10.4		
Parturition period			
First day	-	-	-
Second day	11.75	0.5	11-12
Third day	15.0	6.0	12-24
Fourth day	-	-	-
L.S. D. at 0.05 level	10.24		
Post parturition			
First day	-	-	-
Second day	-	-	-

Third day	**-**	**-**	**-**
Fourth day	**12.0**	**-**	**12**
L.S.D. at 0.05 level	**-**		

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الملخص العربي

اجريت دراسة على بيولوجية الاكاروس A. tribolii على بيض كل من حشرتى Tribolium castaneum T.confusum واتضح من الدراسة ان عدد البيض الذى استهلك بواسطة الاكاروس فى فترة دورة الحياة له كان 17.3بيضة فى حالة تقديم بيض الحشرة Tribolium castaneum وذلك فى اول يوم من التغذية و11.6بيضة عند التغذية على بيض الحشرة T.confusum وفياليوم الثانى للتغذية لوحظ ان الاكاروس تغذى على 12.7 بيضةعلي الحشرة T. castaneum و7.6بيضة فقط من حشرة T. confusum أما بالنسبة للتغذية في اليوم الثالث فإن عدد البيض الذي أستهلك كان 8.4 و 4.8بيضة علي الترتيب .ومن الدراسة أتضح أن الأكاروس أستغرق حوالي 23.5 ساعة في أول يوم من فترة ماقبل الولاده والتي نقصت لتسجل 15 ساعة فقط في اليوم التاني أما فترة الولاده فلم تسجل في أول يوم من حياة الأنثي البالغة ولكن فترة الولاده ظهرت بعد اليوم الثاني من عمر الأنثي و قد أستغرق الأكاروس فترة مقدارها 11.75 ساعة في اليوم الثاني له و 15ساعة في اليوم الثالث وتوقفت فترة الولاده في اليوم الرابع من حياة الأم البالغة وأستغرقت الأم زمنا مقداره 12ساعة في فترة مابعد الولاده