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SOME BIOLOGICAL ASPECTS OF THE SPIDER *THANATUS FORMICINUS* (CLERCK) (ARANEAE : PHILODROMIDAE) UPON FEEDING ON *PSAMMOTERMES HYBOSTOMA* DESNEUX TERMITES

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ABSTRACT

Laboratory studies of *Thanatus formicinus* (Clerck) with feeding on *Psammotermes hybostoma* termites proved that the developmental period of spiderlings varied with sex and between siblings. Females lived longer periods and consumed larger number of prey compared with males. The incubation period of eggs ranged between 9-15 days. The eggs hatchability recorded 73.4 % of the total deposited eggs. Each ootheca contained 25-40 eggs with a mean of 31.6 eggs. Mean number of eggs /female was ranging 189-253 eggs. Spiderlings females consumed a total prey average of 383.6 prey and 349.9 prey for spiderlings males. The mean number of prey consumed by females adult was 936.9 prey / female and 715.4 prey for males adult. Food consumption throughout the period of life span was 1320.5 prey for females and 1065.3 prey for males.

Key Words: Spiders, Araneae, *Thanatus formicinus* (Clerck), *Psammotermes hybostoma* Termites, Biology.

INTRODUCTION

Spiders are arachnids of widespread occurrence in nature feeding voraciously on other arthropods especially insects (Whitelock, 1975). *Thanatus formicinus* is one of the two predominant spiders in Fayoum field crops namely; clover, sugarbeet and maize. The biological aspects (generation periods, male and female lifespan) and food consumption of *T. formicinus* were varied as prey species i.e., *Tetranychus urticae*, *Empoasca* sp., *Tribolium confusum*, *Musca domestica* and *Spodoptera littoralis* as results of (Mahmoud 2004). Some biological aspects of other species of arachnids; *Anelosimus aulicus* (Koch) and *A. tepedariorm* were studied by different authors (Rahil,1988; Rahil and Hanna 2001 ; El-Erksousy et al. 2002; Justin , 2010 and Jim, 2010).

Termites are a group of social insects that belong to the order Isoptera. They are important pests in many countries particularly in the arid tropics and subtropics (Emerson, 1955 and Harris, 1961& 1967). Hafez (1980) reported that there are – at least - 11 species of termites

in Egypt eight of which are “ground-nesting” or “subterranean” and three are “dry-wood” or “non-subterranean. Among the predominant subterranean termites in Egypt is *Psammotermes hybostoma* (Desneux) (Isoptera : Rhinotermitidae) which cause considerable damages to any cellulose containing materials (El-Sherif, 1969; Said, 1979; Ali, 1980; Khalil et al.1982.

Nel, 1970, stated that predators (mainly ants and spiders) often interfered in the foraging and probably played an important part in limiting the damage done by the termite *Hodotermes mossambicus* (Hagen). Newlands, 1975 found that spider *Loxosceles spinulose* in May 1972 under rubble and shaded logs and in an old termite nest in the northern Transvaal south Africa. Wilson and Clark, 1977 mentioned that birds and predacious arthropods (especially the spider *Ammonaxenus psammotermis* (Simon) were the major predators and peak termite activity occurred during the heat of the day. Wesolowska and Cumming, 1999 mentioned that the first termitivorous jumping spider (Araneae: Salticidae) where it was observed preying

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on *Odontotermes transvaalensis* termites inside the chimney of their mound.

The present study was designed to reveal some biological aspects of *Thanatus formicinus* for better understanding of their role in biological control.

The present work was designed to study some biological aspects of *Thanatus formicinus* (which lived on the ground and feed on the ground insects) for better understanding of their role in biological control of termites which concedes a serious ground pest.

MATERIALS AND METHODS

A)Laboratory rearing of spiders:

The biological aspects of *T. formicinus* were observed under lab. conditions (20-32 C and 45-62 % RH.) to obtain data on the durations of the different stages in the life cycle, fecundity of females, pre-oviposition, post-oviposition and oviposition periods, as well as food consumption of spiderlings and adults.

For this purpose, the spider was collected from fields and individually confined in Petri dishes (10cm) provided with workers of termites *Psammotermes hybostoma* as food. Some confined females being copulated before collection, oviposited in few days . Immatures were daily observed and supplied with food until adulthood, then copulated and separated. The deposited oothecae remained with mothers until hatching. The resulting spiderlings were singly transferred to new dishes to be fed on workers of termites and daily observed for a complete generation.

B) Collection method of termites:

Termites were collected by used Corrugated cardboard traps as mentioned by El-Sebay(1991). *P. hybostoma* specimens were collected from an area at El Hashatra village, Yousf El Sedek district El-Fayoum Governorate. This particular village is known to be commonly infested with *P. hybostoma*. This area was carefully cleaned-up of any cellulose materials using cardboard trap which consisted of corrugated-cardboard paper wrapped in rolls of 5-7 cm. diameter and

12 cm. height all covered with polyethylene except for the lower-most 2 cm. which were left uncovered.

Traps were distributed with 2m. distance from all direction. Traps were thoroughly soaked in water then vertically buried into the soil to 12 cm. depth with the upper end of the trap located just at soil surface. Removed traps were introduced in polyethylene bags and replaced with new ones. Traps were transferred to the laboratory for thorough examination. cardboard rolls were carefully unrolled to obtain castes which classified into larvae, nymphs, soldiers, workers and alates (according to Harris, 1961 and El-Sherif and Kaschef, 1973). Workers of termites were used as food for *T. formicinus*

RESULTS AND DISCUSSION

Biological aspects of *Thanatus formicinus* :

T.formicinus was reared on termites under lab. condition of 20-32C and 45-62% RH. Obtained results indicated that:

Egg incubation period, hatchability and fecundity:

The results showed that the incubation period of eggs ranged between 9-15 days with a mean of 11.4 days. The number of newly hatched spiderlings from the deposited eggs represented 73.4 % of the deposited eggs. Each ootheca contained 25-40 eggs with a mean of 31.6 eggs / ootheca. The total mean number of eggs was 224.4 eggs/ female , ranging between 189-253 eggs (table 1)

Duration of spiderlings:

Developmental periods of spiderlings varied with sex and between siblings. Individuals passed through 6 immature instars; for females these periods ranged between 12-18, 10-13, 14-23, 11-17, 17-23 and 13-18 days with a mean periods of 16.7, 11.8, 18.4, 13.4, 14.3 and 11.6 days, respectively. The mean total period was 86.2 days (73-92). The respective period for males range were 11-16, 7-15, 5-14, 8-13, 9-17 and 10-13 days; respectively. The mean total immatures period for males was 80.0 days (69-91 days) . Female developmental period was longer than that

for male; therefore males reached maturity before females (table 2).

Adult longevity and lifespan :

Pre-oviposition period ranged between 6 – 8 days with a mean of 6.8 days . The oviposition period ranged between 42-56 days with a mean of 50.7 days. The post-oviposition period ranged between 8-18 days with a mean of 13.7 days. Longevity

of females ranged between 56-80 days with an average of 70.2 days, while longevity of males lasted from 51-63 with a mean of 56.5 days. Females lived a mean of 155.5 days , ranged between 139-164 days and for male the average was 136.5 days, ranged between 125-143 days. The life span of females was longer than that of males (table 3).

Table(1): Incubation period , egg hatch % and fecundity of *Thanatus formicinus* upon feeding on *Psammotermes hybostoma* termites at (20- 32 C)and (45-62)RH%.

Parameters	Range	Mean SE
Incubation period (days)	9-15	1.1 ±11.4
Egg hatch %	45-100	3.1± 73.4
No.oothecae/ female	6-8	2.9±7.1
No.eggs/oothecae	25-40	1.5±31.6
No.eggs/female	189-253	6.7±224.36

Table (2): Duration of *Thanatus formicinus* spiderlings upon feeding on *Psammotermes hybostoma* termites at (20- 32C)and (45-62)RH%.

Instars	Range	Mean±SE
1 st ♀	12-18	16.7±1.5
♂	11-16	14.8±2.1
2 nd ♀	10-13	11.8±1.7
♂	7-15	12.8±1.8
3 rd ♀	14-23	18.4±2.3
♂	5-14	12.8±2.8
4 th ♀	11-17	13.4±2.5
♂	8-13	12.0±2.9
5 th ♀	7-23	14.3±1.3
♂	9-17	13.2±1.1
6 th ♀	13-18	11.6±2.6
♂	10-13	14.4±2.1
Total ♀	73-92	86.2±5.3
♂	69-91	80.0±4.3

Table (3): Longevity and lifespan of *Thanatus formicinus* adult upon feeding on *Psammotermes hybostoma* termites at (20- 32C)and (45-62)RH%.

Adult			Range	Mean±SE	
Longevity	♀	Pre-oviposition	6-8	6.8±1.2	
		Oviposition	42-56	3.4 ±50.7	
		Post-oviposition	8-18	2.2 ±13.7	
		Total	56-80	6.1 ±71.2	
	♂	Total	51-63	4.2 ±56.5	
Lifespan	n	♀	Total	139-164	5.3±156.5
		♂	Total	125-143	136.5±6.4

Food consumption :

Generally instars and adult females of *T.formicinus*, consumed high numbers of prey than that for males (Table 4).

Spiderlings:

Spiderlings females consumed a total mean of 19.4, 39.4, 69.0, 65.9, 88.2 and 101.7 prey, respectively; with total prey average numbers of 383.6 prey. While the males spiderlings consumed 15.3, 34.4, 51.4, 60.1, 86.0 and 97.1 prey;

respectively. With a total prey average numbers of 349.9 prey (table 4).

Adults :

The mean number of prey consumed by females adult was 936.9 prey / female. The total mean during the pre-oviposition , oviposition and post-oviposition periods were 54.4, 754.5 and 137.0 prey, respectively. While the total mean numbers of prey consumed by adult male was 715.4 prey. Food consumption throughout the period of life span was 1320.5 prey for female and 1065.3 prey for male. (table5).

Table (4): Mean consumption of *Thanatus formicinus* spiderlings upon feeding on *Psammoterm hybostoma* termites at (20- 32C) and (45-62) RH%.

Instars		Range	Mean±SE	D.R.
1 st	♀	17-22	19.4±1.2	1.66
	♂	13-18	15.3±0.75	1.03
2 nd	♀	38-41	39.4±3.4	3.33
	♂	30-41	34.4±1.7	2.69
3 rd	♀	63-75	69.0±3.3	3.75
	♂	49-70	51.4±2.9	4.01
4 th	♀	61-71	65.9±2.4	5.07
	♂	50-67	60.1±3.5	5.00
5 th	♀	81-95	88.2±4.2	6.17
	♂	80-85	86.0±2.1	6.51
6 th	♀	90-115	101.7±2.7	7.06
	♂	90-110	97.1±5.6	6.50
Total	♀	359-408	383.6±7.3	4.45
	♂	306-365	349.9±5.1	4.37

D.R. = Daily rate of food consumption

Table (5): Mean consumption of *Thanatus formicinus* adults upon feeding on *Psammotermes hybostoma* termites at (20-32C)and (45-62)RH%.

Adult		Range	Mean±SE	D.R.
Longevity	Pre-oviposition	48-64	54.4±2.1	8.0
	oviposition	630-840	754.5±10.2	14.7
	Post-oviposition	80-180	137.0±6.2	10.0
	Total	758-1068	936.9±11.4	13.35
Life span	♂ Total	762-809	715.4±6.7	12.70
	♀ Total	1132-1412	1320.5±9.1	8.49
	♂ Total	1001-1140	1065.3±8.2	7.80

D.R. = Daily rate of food consumption



Fig.(3): Adult female



Fig.(4): Adult male

Generally, the present data indicated that, the developmental period of spiderlings, adult longevity, life span and food consumption were varied with sex and between siblings. Where females were up than males. In this respect, Rahil (1988) reared *Steatoda triangulosa* Walck. On larvae of house fly, *Musca domestica* Fab at 25°C with 57 % RH. and recorded that the incubation period was 17.9 days. The duration of spiderlings was 66.3 days. The oviposition period was 10.11 days. The female and male longevity average were 98.7 and 58.4 days and the total deposited eggs were 76.8 days. Food consumption of female spiderlings and adult were 6.3

larvae and 4.8 larvae, respectively, while 6.2 and 3.9 larvae for spiderlings and adult males. Also Mahmoud (2004) reared these species with different prey namely; *Tetranychus urticae*, *Empoasca* sp., *Tribolium confusum*, *Musca domestica* and *Spodoptera littoralis*. The mean of developmental period from egg to adult of females was 63.6, 54.7, 51.9, 54.3 and 53.2 days, respectively. Longevity period was 94.2, 107.9, 127.0, 141.6 and 171.0 days. The average life span was 157.8, 162.6, 178.9, 195.9 and 224.2 days. The total mean number of prey consumed by adult female was 1763.3, 1039.0, 988.0, 984.0 and 2994.3 prey, respectively.

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دراسة بعض المظاهر البيولوجية للعنكبوت الحقيقي (Clerck)
Thanatus formicinus
عند التغذية على أفراد نمل الرمال الأبيض تحت أرضي
Psammotermes hybostoma

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الملخص العربي

أثبتت نتائج الدراسات المعملية للمظاهر البيولوجية للعنكبوت الحقيقي *Thanatus formicinus* تحت الظروف المعملية (20-32 م) و(45-62 % رطوبة نسبية) أن فترات مراحل التطور تختلف باختلاف الجنس (ذكور وإناث) وبين الأفراد بعضها داخل الجنس الواحد ووجد أن الإناث تعيش فترات زمنية أطول وتستهلك عدد أكبر من الفرائس التي تتغذى عليها مقارنة بالذكور وكذلك أوضحت النتائج أن فترة حضانة بيض هذا العنكبوت تراوحت ما بين 9-15 يوما بمتوسط 11,4 يوما وكانت نسبة فقس البيض حوالي 73,4 ونضع الأنثى خلال فترة وضع البيض في المتوسط 7,1 كيس وكل كيس يحتوى على حوالي 31,6 بيضة . وقد وجد أن الأطوار غير الكاملة لإناث العنكبوت تستهلك في المتوسط 383,6 فردا من شغالات النمل ومثيلتها من الذكور تستهلك في المتوسط 349,9 فردا . أما الأفراد الكاملة من إناث العنكبوت تستهلك في المتوسط 936,9 فردا ومثيلتها من الذكور تستهلك 715,4 فردا . ولذلك يمكن أن يلعب هذا النوع من العناكب دورا هاما في مجال المقاومة الحيوية لنمل الرمال الأبيض .