

FEEDING CAPACITY OF THE SPIDER *Anelosimus studiosus* HENTZ (ARACHNIDA :THERIDIIDAE) FED ON DIFFERENT LARVAE OF LEPIDOPTERUS PESTS (GELECHIIDAE AND NOCTUIDAE

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ABSTRACT

Some biological aspects of the spider *Anelosimus studiosus* (Hentz) fed on first instar larvae of *Pectinophora gossypiella* (Saund.) and the second instar larvae of *Spodoptera littoralis* (Boisd.) were studied under laboratory conditions of $25\pm 1^{\circ}\text{C}$ and $65\pm 5\%$ RH. The female life cycles spider averaged 78.5 and 85.48 days, while it was 83.83 and 75.1 days for male when they fed on the above prey, respectively. Adult female and male consumed (129.66 & 101.30) and (103.30 & 785.60) larvae of *P. gossypiella* and *S. littoralis*, respectively. Adult female lived for 39.3 and 41.3 days on *P. gossypiella* and *S. littoralis* and deposited an average of 41.7 & 26.7 eggs when it fed on larvae of the above mentioned insects, respectively.

INTRODUCTION

Spiders are considered one of the important biological control agents of arthropod pests infesting different crops and fissures in soils (Levy, 1963 and El- Erksousy, 2000 & 2003). El- Erksousy *et al.*, 2002 and Sallam *et al.* 2010 studied the biological aspects of some species of family Theridiidae as biological control agents of *Aphis craccivora*, *Spodoptera littoralis* (Boisd.) and *Tetranychus urticae* Koch. Ahmed, 1998 reared on mixed diet of aphids & mites, respectively. Also, several authors studied the behaviour and development of several common footed spiders (Brach, 1977, Riechert and Hederick, 1993; Riechert and Maupin, 1998; Sih *et al.* 2004; Jones *et al.* 2007 and Riechert & Jones, 2008).

The present work aims to study some biological aspects of the spider *Aneiosimus studiosus* reared on second larval instar of the cotton leaf worm *Spodoptera littoralis* and the first instar of larvae of the pink bollworm *Pectinophora gossypiella* (Saund.).

MATERIALS AND METHODS

Rearing inset preys:

Larvae of *Pectinophora gossypiella* (Saund.) were reared on a modified artificial diet described by Rashad and Ammer (1985), while larvae of *Spodoptera littoralis* (Boisd.) were reared on fresh castor bean leaves *Ricinus communis* under laboratory conditions of $25\pm 1^{\circ}\text{C}$ and $65\pm 5\%$ RH.

Rearing the predator spider *Anelosimus studiosus* Hentz:

Adults and egg sacs of *A. studiosus* were collected from olive trees at El-Arish, Sinai governorate.

A. studiosus adult females & males were confined as couples in translucent plastic containers, 3cm in diameter and 15cm in depth until females laid their egg- sacs. The egg sacs were observed daily until hatching took place. The newly hatched spiderlings were reared singly for one generation on first instar larvae of *P. gossypiella* (PBW) and second instar larvae of *S. littoralis* (CLW)

Egg sacs collected from the females of the first generation were kept singly in glass tubes and allowed to hatch. The newly hatched spiderlings were transferred singly to glass tubes (7X3.5cm). The hatched spiderlings were divided to two groups, each of 45 tubes. The first group was reared on first instar larval of *P. gossypiella*, while the second one reared on the second instar of *S. littoralis*. Sufficient numbers of consumed prey larvae were offered daily and increased as the predator spiderlings grew up.

Also, the numbers of deposited egg-sacs and the number of eggs per sac were counted as well as duration of pre-oviposition, oviposition, post oviposition, longevity of females and males were estimated. Total consumption for each prey were assessed and examined by analysis of variance (ANOVA) using Costat program.

RESULTS AND DISCUSSION

Incubation periods of eggs:

The spider *Anelosimus studiosus* Hentz was successfully reared on first instar larvae of the Pink bollworm *P. gossypiella* (Saund.) and second instar larvae of the cotton leaf worm *S. littoralis* (Boisd.) which consider the main lepidopterous pests in Egyptian cotton fields. Both spider females and males pass through four spiderlings (larval instars) before reaching adult stage. As shown in Table (1) egg incubation period lasted 15.30 and 13.30 days when reared on the two pests, respectively at 25 ± 1 °C and $65\pm 5\%$ R.H.

Developmental time of spiderling stage:

Duration of the spiderlings generally increased with successive instars except for female and male third spiderlings on *P. gossypiella*. However total duration of the spiderlings (immatures) averaged (78.50 & 79.45) days for spider female and (85.80 & 75.40) days for males when they reared on *P. gossypiella* and *S. littoralis* respectively.

Also, data in Table (1) show that the different instar period of spiderlings female fed on PBW lasted 13.3, 18.3, 11.3 and 20.3 day while those fed on CLW lasted for 11.3, 16.25, 19.6 and 19.0 days from first to fourth instar, respectively, On the other hand the average duration male were 14.3, 18.6, 14.3 and 23.3 days on PBW and 10.0, 15.6, 19.3 and 17.6 days on CLW, respectively. El- Erksousy (2002) recorded that the total duration of male and female of *Anelosimus oulicus* were 61.2 and 67.2, respectively, when reared on *S. littoralis*

Table (1): Developmental stage of *Anelosimus studiosus* Hentz reared on *P. gossypiella* and *S. littoralis*

Immature instars	Duration in days ± S.E.							
	♀♀		P	LSD	♂♂		P	LSD
	<i>p. gossypiella</i>	<i>S. littoralis</i>			<i>p. gossypiella</i>	<i>S. littoralis</i>		
Egg	15.30±0.9b	13.30±1.1a	0.02*	0.83	15.3±0.1b	13.30±0.1a	0.00**	0.37
1 st spiderling	13.3±0.8a	11.3±0.3b	0.001**	0.68	14.3±0.4a	10.0±0.4b	0.00**	0.68
2 nd spiderling	18.3±0.3a	16.25±0.8b	0.00**	0.35	18.6±0.3a	15.6±0.3b	0.00**	0.68
3 rd spiderling	11.3±0.34b	19.6±0.5a	0.000**	0.48	14.3±0.5b	19.3±0.3a	0.00**	0.277
4 th spiderling	20.3±0.4a	19.0±0.5b	0.01*	0.84	23.3±0.8a	17.6±0.6b	0.00**	0.48
Total immature stages	78.5±1.5b	79.45±3.2a	0.000**	0.24	85.8±3.6a	75.40±6.1b	0.00**	0.46

Feeding Capacity:

Table (2) showed that the highly significant difference occurred in feeding capacity of *A. studiosus* between spiderlings instars when fed on first instar larvae of *P. gossypiella* and second instar larvae of *S. littoralis*. Obtained data cleared that the mean consumption rate increased with the progressive spiderlings instar. Also, data revealed that the average of total consumption of the tested predator *A. studiosus* from 1st to 4th instars fed on each of the two prey *P. gossypiella* & *S. littoralis* were 193.1, 243.5, 167.9 and 226.9 prey/female & male, respectively. On the other hand immature instar per female or male spider consumed an average 19.6, 23.6, 58.5 and 89.6 prey/female and 20.3, 24.0, 36.3 and 87.3 larvae/male for PBW and 38.6, 49.6, 61.0 and 94.3 prey/female and 37.0, 48.3, 53.3 and 88.3 larvae prey/male for *S.littoralis* larvae respectively.

Table (2): Food consumption of *Anelosimus studiosus* reared on *P. gossypiella* and *S. littoralis*.

Immature instars	Prey species		P	LSD	Prey species		P	LSD
	♀♀	♀♀			♂♂	♂♂		
	<i>p. gossypiella</i>	<i>S. littoralis</i>			<i>p. gossypiella</i>	<i>S. littoralis</i>		
1 st spiderling	19.6±0.8b	38.6±1.3a	0.00**	0.84	20.3±0.3b	37.0±0.1a	0.00**	0.48
2 nd spiderling	23.3±0.6b	49.6±2.6a	0.00**	0.68	24.0±0.6b	48.3±1.6a	0.00**	0.83
3 rd spiderling	58.3±0.6b	61.0±1.2a	0.00**	1.29	36.3 ±0.4b	53.3±1.6a	0.00**	0.73
4 th spiderling	89.6±0.6a	94.3±2.9b	0.00**	0.96	87.3±0.6b	88.3±1.8a	0.00**	0.48
Total immature stages	193.1 ±4.6b	243.5888±5.5a	0.00**	1.6	167.9±4.5b	226.9±a	0.00**	2.26

Oviposition period:

Table (3) showed that the pre-oviposition, oviposition and post oviposition periods for *A. studiosus* when reared on first larvae of *P. gossypiella*, these averaged 9.3, 6.3 and 23.3 days, respectively, while, prolonged to 10.3, 9.3 and 19.3, days on second instar larvae of *S. littoralis* at the same pattern.

Also, the number of deposited eggs/sac was affected by prey. Its average was (41.7) for female when fed on *P. gossypiella*, compared with 26.7 eggs on *S. littoralis*, . Also, high significant differences occurred between eggs/sac hatchability its percentages was 75.6 and 69.3%, when female fed on the above mentioned prey, respectively.

El- Erksousy (2002) recorded that the adult female of *A. oulicus* laid its eggs in sacs, each contained 15 to 20 eggs.

Generally, *A. studiosus* may be considered to be one of the biocontrol agents of newly hatched larvae of the pink bollworm time before penetrate cotton boll and on 1st & 2nd larvae of cotton leaf worm.

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تغذية المفترس العنكبوتي *Anelosimus studiosus* علي دودة اللوز
القرنفلية و دودة ورق القطن

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أجريت الدراسة في قسمي ديدان اللوز و الأكاروس خلال الفترة من يوليو ٢٠٠٨ حتي أغسطس ٢٠٠٩ لدراسة تأثير نوعين من الفرائس وهما العمر اليرقي الأول لدودة اللوز القرنفلية و العمر اليرقي الثاني لدودة ورق القطن علي بعض المظاهر البيولوجية لدورة الحياة للأطوار الغير كاملة و الكاملة و الكفاءة التناسلية و كذلك الكفاءة الأفتراضية للمفترس العنكبوتي تحت الظروف المعملية علي درجة حرارة $25 \pm 1^\circ\text{C}$ و $65 \pm 5^\circ\text{C}$ رطوبة نسبية و أظهرت النتائج أن أفضل تغذية للمفترس كانت علي يرقات دودة اللوز القرنفلية حيث أعطت اعلي نتائج بالنسبة لمعدل وضع البيض داخل كيس البيض للمفترس لكل أنثي كما أدت إلي قصر مدة نمو كل طور من أطوار العنكبوت وبالتالي مدة مجموع الأطوار المختلفة للعنكبوت ب ٦.٩ يوم للإناث المغذاة علي يرقات دودة اللوز القرنفلية مقارنة بالمغذاة علي يرقات دودة ورق القطن وقد أوضحت النتائج أن معدل الافتراض لمجموع الأطوار المختلفة ١٩٣.١٠ و ١٦٧.٠٠ يرقة من دودة اللوز القرنفلية لكل أنثي وذكر علي التوالي و ١٩٨.٦ و ٢٢٦.٩ يرقة من دودة ورق القطن لكل أنثي وذكر علي التوالي.

قام بتحكيم البحث

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Table (3): Oviposition period, fecundity, longevity and food consumption of *Anelosimus studiosus* when reared on *P. gossypiella* and *S. littoralis*.at 25C+1 and 65+5 R.H.

Food	Pre oviposition (days)	Oviposition (days)	Post oviposition (days)	Fecundity		Longevity		Food consumption	
				Total eggs inside sac	% hatchability	♀♀	♂♂	♀♀	♂♂
<i>P. gossypiella</i>	9.3±0.34 (9-13)	6.3±0.3a (6-7)	23.3±0.174 (20-25)	41.7±10.3 (25-60)	75.60±3.0 (70-80)	39.0±1.5 (36-41)	31.60±1.6a (30-35)	129.66±8.01 (119-145)	101.3±3.2a (95-125)
<i>S. littoralis</i>	10.3±0.3 (10-12)	9.3±0.3b (9-10)	19.3±0.7 (18-20)	26.7±1.69 (25-30)	69.3±2.3 (65-70)	41.3±1.4 (39-44)	21.66±1.7b (20-25)	103.3±8.9 (90-120)	85.6±0.34b (85-97)
LSD		1.308		8.54	2.03		6.54		8.87
P	Ns	0.003**	Ns	0.014**	0.006**	Ns	0.013*	Ns	0.008**