Egypt. J. Agric. Res., 77 (4), 1999

BIOLOGY OF THE SPIDER *PLEXIPPUS PAYKULLI* (ARANEIDA : SALTICIDAE)

G.M. SHEREEF [1], M.A. RaKha [2] And G.M.E.SAOOAM [2]

1 Faculty of Agriculture, Cairo University, Giza, Egypt.

2 Plant Protection Research Institute, Agricultural Research Centre, Dokki, Giza, Egypt

(Manuscript received 2 Jume 1998)

Abstract

Biological studies on *P.paykulli* was conducted at 25°C and 60-70% R.H when fed on *S.littoralis* larvae (1-4 stages) . Gravid female deposited one egg sac contained 30-40 eggs. The incubation period averaged 28. 46± 5.73days. The female spider required 10-11 Spiderlings, while the male required 7-8 spiderlings.Developmental time averaged 317.25±24.67 days and 239. 77±17.58days for female and male, respectively.

INTRODUCTION

Dean *et al.* (1987) observed predation by the hunting spiders (Family: Salticidae) P*hidippus audax* (Hentz), *Metaphidippus galathea* (Walckenaer), and *Misumenops celer* (Hentz) (Family : Araneidae) on the cotton fleahopper, *Pseudatomoscelis seriatus* (Reuter). Fifty percent or more of the prey items consisted of the cotton fleahopper, an important of cotton pest in Texas and neighbouring states.

Jackson and Macnab (1989) observed disply, mating, and predatory behaviour of the jumping spider *Plexippus paykulli* (Araneae : Salticidae).

MATERIALS AND METHODS

Stock cultures of the spider species, *Plexippus paykulli* (Audouin, 1825) originated from the field were conducted. Collected individuals (about 2 cm) were separetely confined to a translucent glass or plastic container, with provisions for air exchange. These plastic containers (30 ml) facilitated good observation of the spider. Special care and bi-daily observations were required in order to obtain bi-daily details of the biological aspects. *P.paykulli* was fed on cotton leafworm (CLWL). *Spodoptera littoralis* (Boisd.) (Lepidoptera : Noctuidae) (Ist to 3rd instar larvae).

These prey individuals were selected according to field observations to be the dominant ones.

For life cycle study, individual females from the laboratory culture or the field were allowed to oviposit and the newly hatched individuals were transferred to separate vials to complete their develpment under the controlled conditions.

The experiments were carried out in an incubator at 25±1°C and 50-60% R.H. and food was supplied bidaily.

RESULTS

1. Feeding behaviour : This spider was noticed to feed on *S.littoralis* egg clusters and new hatch up to the fourth instar. Also, it fed on *s.littoralis* adult stages by catching the moth between the thorax and the head then suck out its contents.

Spiders of family salticidae are known as " jumping spiders " where they jump rather than walk and have a sharp view ability. Salticid spider usually comes close to its prey and watches its movements, then follows the prey for a while before jumping on it. Under laboratory condition, *Plexippus paykulli* caught CLWL from the mesothorax and continued to move around with it for few seconds, while embodying its chelicerae in the prey. The larva started to settle down and the spider started to suck out its contents . The outer cuticle was usually left over after the spider's feeding. After feeding, the spider's abdomen became inflated and the spider usually rested for few minutes on the containers wall before searching again for a new hunt. It was noticeable that this spider did not use any webbing to trap its prey. Immatures up to the fourth spiderlings were able to feed on CLWL up to the 3rd instar. The fifth and sixth spiderlings could feed on CLWL up to the fourth inster. Older stages were able to feed on all stages of CLWL.

2. Oviposition and egg incubation: Gravid females were obtained from cotton plants using beating net during August 1992 . Female usually fed upon 10- 15 CLWL per day (Ist and 2nd stages) or 5-7 larvae of fourth instar, then started to web on one of the upper corners of the container. Eggs were laid in a cluster. The egg sac contained a range of 30 to40 eggs. The female covered the egg mass with webbing and started to escort it. During this incubation period, the female fed upon less amount of CLWL. She usually left the egg sac for feeding and just return back to hang on over the egg sac. The mean incubation period was 28. 46± 5.73 days Table, 1.

The colour of the egg sac became darker and little movement started inside, about one to two days before the end of incubation period. Individuals usually hatched and stayed togethr before liberating themselves from the silky sac. They moved downwards to the container's floor. The newly hatch did not feed up to 3 days. After this resting period, the eyes and setae on the legs became dark colour. At this stage, individuals were able to feed on the newly hatch of CLWL, while their escorting mother was able to feed upon older instars, until the first moult marking the end of the first spiderling. Before the end of each spiderling, individuals rested for one or two days, then underwent through ecdysis. After the second ecdysis, the individuals separated because of cannibalism. The female died fast after oviposition when it was separated from the egg sac or after a short time (i . e few days) from egg hatch.

Developing spiders were monitored individually and developmental times for both sexes are presented in Table 1. Light photographs of *P.paykulli* and its different stages are presented in Fig 1 .

Males developed faster than females and reached maturity after 7-8 spiderlings, while females reached maturity after 10- 11 spiderlings. Average developmental time for male was 239. 77±17.58 days and lived for 35±5 day as adult. Average male life span was 274.77 days. Average females developed over 317.25± 24. 67 days and adult lived for 75±5 days with a whole life apan 392.58 days.

DISCUSSION

Plexippus paykulli was slow in development and required more moults to reach maturity for both sexes on S.*littoralis*. In general, male spiders require less moults or spiderlings and developmental time than females to reach maturity (Muniappan and Chada, 1968; Lesar and Unzicker, 1978; Mansour *et al.*, 1980 ; Foelix 1982; Rahil, 1988). This phenomenon seems to be essential to reduce the chance of mating between siblings and hence inbreeding. This behaviour assures the population genetic diversity and increase its ability to face unfavourable conditions.

Results obtained from this study as well as mentioned published ones indicated slow development of immatures compared with common arthropod pests in the agriculture ecosystem (i.e. their food source). This phenomenon would reduce the ability of spiders of fast population dynamics response. Oviposition in protected sacs and female escorting would increase their survival chances and so reduce the risk of discontinuity of the population.

Table 1. Developmental times of *Plexippus paykulli* different stages at 25°C using *Spodoptera littoralis* larvae as food source.

Stage	Females					Males				
	N	Min.	Max.	M	SD	N	Min.	Max.	M	SD
Egg incubation	15	22	37	28.46	5.73	15	22	37	28.46	5.73
1st spiderling	15	30	40	34.46	4.06	15	29	38	34.06	2.89
2nd spidrling	15	28	35	30.26	2.54	15	28	34	30.00	2.20
3rd spiderling	15	27	30	29.50	1.03	15	27	30	28.26	1.16
4th spiderling	15	26	29	27.20	1.14	15	26	29	27.46	1.06
5th spiderling	15	25	28	26.26	1.16	15	24	28	25.86	1.50
6th spiderling	15	24	28	25.66	1.63	15	23	25	23.86	0.83
7th spiderling*	15	23	27	24.66	1.63	15	20	24	21.93	1.43
8th spiderling	15	22	25	23.46	1.12	9	19	21	19.88	0.78
9th spiderling	15	21	25	22.80	1.16	-	-	-	-	-
10th spiderling**	15	19	25	21.80	1.99	-	-	-	-	-
11th spiderling	10	20	24	22.60	1.58	-	-	-	-	-
Total		221	350	317.25	24.67		220	259	239.77	17.58
	Female					Male				
Adult longevity	75±5					35±5				
Life span	392.58					274.77				

* 5 males reached maturity after 7 spiderlings

** 9 females reached maturity after10 spiderlings

The ability of spiders to feed on wide range of prey species with flexeable developmental strategy keeps them as important but not glorious biological control agents. Spiders can be considered of K-selective type of increase which means existence in the ecosystem in low, but stable efficiency. This behaviour would reduce the chances of artificial manipulation for the purpose of biological control. Their role in natural control can enhanced through reduction of disturbing horticultural producers including pest control tactics.

REFERENCES

1. Audouin V. 1825 Explication sommaire des planches d' Arachnides de l' Egypte et de la Syrie, publiees par jules-Cesar savigny. In : Description de l' Egypte ou recueil des observations et des recherches qui omt ètè faites en Egypte pendant l'expèdition de l'armee francaise. Histoire Naturelle. Tome Premier 1809, Paris, 4e partie, pp 99-186, Atlas, pls 1-9 (Arachnides).

2. Dean, D.A.,W.L., Sterling, M., Nyffelr, and G. Breene. 1987. Foraging by selected spider predator on the cotton fleahopper and other prey. Southwestern Entomol.,12 :263-270.

3. Foelix, R.F. 1982. Biology of spiders. Harvard Univ. press, London, England, 306pp.

4. Jckson, R.R . and A. M. Macnab. 1989. Display, mating, and predatory behaviour of the jumping spider *Plexippus paykulli* (Araneae: salticidae). New Zealand J.Zool ., 16 (2) :151-168.

5. Lesar, C.D. and J.D. Unzicker.1978. Life history, habits, and prey preferences of *Tetragnatha laboriosa* (Araneae, Tatragnathidae). Environ. Entomol., 7:879-884.

6. Mansour, F., D. Rosen, A. shulov. and H.N Plaut. 1980 . Evaluation of spiders as biological control agents of *spodoptera littoralis* larvae on apples in Israel . Acta Oecol . Applic ., I (3) :225-232.

7. Muniappan, R. and H.L. chada. 1968. Biology of the crab spider, *Misumenops celer.* Ann. Entomol. Soc. Amer., 63 (6) : 1718-1722.

8. Rahil, A.A.H. 1988. Ecological and biological studies on the spiders at Fayoum. M. Sc. Thesis, Fac. Agrc., Cairo Univ., 133pp.

النواحى البيولوجية للعنكبوت *Plexippus paykulli* (Araneida: Salticidae)

جابر مهران شريف ١ محمد عبد الوهاب رخا ٢ جيهان محمد السيد سلام ٢

١- كلية الزراعة ، جامعة القاهرة ، الجيزة ، مصر .

٢ معهد بحوث وقاية النباتات - مركز البحوث الزراعية، الدقى ، الجيزه.

تم دراسة النواحي إلبيولوجيةلنوع العنكبوت الحقيقى *Plexippus paykulli* فى المعمل على درجة حرارة ٢٥ ه م ورطوبة نسبية ٦٠-٧٠ ٪ والتغذية على يرقات دودة ورق القطن *Spodoptera littor-alis* في الأعمار من الأول حتي الرابع. وجد أن أنثي العنكبوت المخصبة تضع حافظة واحدة للبيض egg sac تحتوي علي ٣٠ - ٤٠ بيضة. وإستغرقت فترة حضانة البيض ٢٨,٤٦ ± ٥,٧٣ يوما. وتمر الإناث خلال ١٠ - ١١ من الأطوار غير الكاملة Spiderlings وذلك قبل وصولها إلي الطور الكامل ، في حين أن الذكر يحتاج الي ٧ - ٨ أطوار. وتبلغ متوسط فترة التطور قبل الوصول الي الطور الكامل ٣١٧,٢٥ ± ٢٤,٦٧ و ٢٣٩,٧٧ ± ١٧,٥٨ يوما في كل من الأنثي والذكر علي الترتيب. كما يعيش الذكر لفترة تبلغ ٣٥ ± ٥ يوما، بينما تعيش الأنثي لفترة ٧٥ ± ٥ يوما علي الترتيب .