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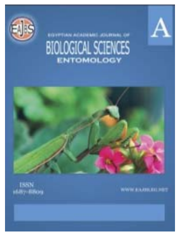

Laboratory Studies on the Mesostigmatid Mites *Androlaelaps aegypticus* (Laelapidae) and *Proctolaelaps gizanensis* (Ascidae) on Three Mite Pests at Different Conditions

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ABSTRACT

This work was conducted to determine the effect of three astigmatid stored product mites (immature stages) *Tyrophagus putrescentiae, Rhizoglyphus echinopus* (Acaridae) and *Lepidoglyphus destructor* (Glycyphagidae) as food sources on the biology of the two predatory mites, *Androlaelaps aegypticus* (Laelapidae) and *Proctolaelaps gizanensis* (Ascidae). The incubation period, life cycle, longevity and life span of both females and males and the female fecundity (number of laid eggs) of the two mite individuals were significantly differed according to the different experiment conditions. The developmental period of both *A. aegypticus* and *P. gizanensis* was faster for the male members than females and the immature stages of *L. destructor* decreased these periods, than other introduced prey. Also, the duration periods were increased at 20ºC than 25 and 30ºC. The number of deposited eggs by females of the two tested predatory mites increased when the adult females fed on the immature stages of *T. putrescentiae* than other preys, and 30ºC increased this number than other temperature.

INTRODUCTION

Mites are a major cause of qualitative and quantitative losses to several stored products. The pest importance of stored product mites has been reviewed and three pest risks are suggested; (i) direct consumption on human food, animal feed or other products changing the quality of infested products, they can penetrate the hard grains and feed directly on the grain kernels, therefore they destroy their germination power, change the moisture contents of medius, initiating growth and spread mould (Sinha and Wallace, 1977; Taha, 1985; Gulati and Mathur, 1995); (ii) interaction to microorganisms leading to the transfer of mycotoxins production fungi (Sinha, 1964) or pathogenic bacteria; (iii) production of hazardous compounds among them the allergens are of the highest importance. Mites in the family Acaridae are among the most important acarine pests attacking agricultural and stored product systems. Within this family, mites of the genus *Rhizoglyphus* are economically important pests of plants with bulbs, corms, and tubers. Many *Rhizoglyphus* spp. are reported as pests of crops or have been described from agricultural settings, usually in close association with cultivated plants (Diaz *et al*., 2000).

However, only *R. echinopus and R. robini* are traditionally known as severe pests of economic plants. *Tyrophagus putrescentiae* (Schrank) and *Lepidoglyphus destructor* (Schrank) are of the commonest species of stored product mites and are frequently found in association with other mites (Hughes, 1976), in soil samples (Sheals, 1956), stacks of grain, straw, and hay standing in the open field or in a permanent stackyard (Griffith, 1960), linseed, rice, dried fruits, sugar beet seed (Chmielewski, 1969), dried calves stomachs, dead insects, dried mammal skins, rodent and bumble bee nests (Hughes, 1976) and post-harvest sweepings (hay, straw) from barn (Chmielewski, 2001). The families Ascidae and Laelapidae comprise large groups of free-living mites (Evans, 1961). Some species are fungivorous while others are probably pollen feeders or predators on young saprophytic mites, insects and nematodes. Concerning the genus *Proctolaelaps*, Lindquist (1971) found it in association with insect pests of pine forests or with bark beetles. In Egypt, Shereef *et al.* (1980) reared *Proctolaelaps pygmaeus* (Muller) on fungi *Pencillium virida*, *Fusarium oxysporium* and *Aspergillus flavus* and Afifi *et al*. (1984) reared *P. striatus* on fungi *F. oxysporium*, *A. flavus*. Also**,** Nasr *et al.* (1990) studied the different biological aspects of *P. bickleyi* Bram on three soil fungi in Egypt. Sinha (1968) was unsuccessful in attempts to rear *Androlaelaps casalis* on any of 21 species of microorganisms associated with stored food. The present work aimed to throw some lights on the biological aspects of the two mesostigmatid mites, *Androlaelaps aegypticus* Hafez, Elbadry & Naser (Family Laelapidae) and *Proctolaelaps gizanensis* Abou Shnaf and Moraes (Ascidae) on three stored product mite pests, *Tyrophagus putrescentiae, Rhizoglyphus echinopus* and *Lepidoglyphus destructor* already infesting date palm fruits at different Laboratory Conditions**.**

MATERIALS AND METHODS

Pure culture of mite pests.

The different astigmatid mites, *T. putrescentiae, R. echinopus* and *L. destructor* were extracted from the fallen date palm fruits at El-Sadat region, El-Menofia Governorate by means of a Berlese funnel. For preparing pure culture of tested mites, plastic cups of (1.5 cm high x 2.5 cm in diameter) were filled up to 0.5 cm with plaster of Paris and activated charcoal in the rate of 8 : 2, respectively. One adult female and male of *R. Echinopus, T. putrescentiae* and *L. destructor* were supplied with dry yeast as food and drops of water added to maintain suitable relative humidity and kept in an incubator at 25ºC. For individual rearing, ten newly deposited eggs of three mite pests and predator, were transferred from the mother culture singly one to every rearing plastic cell (1.5 cm high x 2.5 cm in diameter). Each newly hatched larva was supplied with food kept till reaching maturity. Mites were examined twice daily.

Predatory mites:

The two mesostigmatid mites, *A. aegypticus* and *P. gizanensis* were extracted also from the fallen date palm fruits at El-Sadat region, El-Menofia Governorate by means of a Berlese funnel and reared on movable stages of the astigmatid mites, *T. putrescentiae, R. echinopus* and *L. destructor*. For culturing *A. aegypticus* and *P. gizanensis*, adult females and males were placed in separated plastic cells (5.5 cm. diam. x 1.5 cm high), which were filled up to 0.5 cm. with mix of plaster of Paris and activated charcoal in ratio of 8 : 2, respectively. One adult female and male were placed individually in the plastic cells (1.5 cm high x 2.5 cm diam.), supplied with immature stages of the prey mites and a few drops of water. The cultures were observed daily and kept in incubator supplied with the prey singly, and kept at 25ºC and 70 ±5 % R.H.

Biological aspects.

Newly deposited eggs of *A. aegypticus* and *P. gizanensis* were transferred singly using 0.3 mm camel hair brush to twenty plastic cells (1.5 cm high x 2.5 cm diam.). Newly hatched larvae were supplied with known numbers of larvae of prey and examined twice daily till reaching maturity. Daily observations were made to record the periods of incubation, life cycle, longevity of adult females and males. Also, fecundity of *A. aegypticus* and *P. gizanensis* to all introduced pests were recorded. The experiments were conducted at 20, 25 and 30 ± 2ºC and 75±5 % R.H.

Statistical analysis: All obtained data were subjected to one-way analysis of variance (ANOVA) and means were separated by Duncan's multiple range test (Duncan, 1955).

RESULTS AND DISCUSSION

The present study aimed to study the possible effects of different diets mainly *T. putrescentiae, R. echinopus* (Acaridae) and *L. destructor* (Glycyphagidae) as preys on the biological aspects of the mesostigmatid mites *A. aegypticus* (Laelapidae) and *P. gizanensis* (Ascidae) at different laboratory conditions.

Habitat and behavior:

A. aegypticus and *P. gizanensis* are very active predators which move here and there, searching for their prey individuals. Members of these species preferred moderate humidity and rearing cages had to be supplied frequently with water droplets and the females of these tested mites preferred to deposit there eggs singly into protected or unprotected places.

Hatchin. Eggs of these mite species are whitish in color, then become creamy before hatching. Hatching occurs through a longitudinal median slit.

Molting: Immatures of these species when full grown entered a semiquiescent period during which individuals stopped feeding. This period lasted about (1-2 hours), after which individuals kept quiet, extended its chelicerae, palps and four legs anterioly and hind legs posteriorly. Before molting individual made some successive movement beginning from propodosoma and ending in opisthosoma. The mite tried to free itself from the old exuvium by twisting movement and subsequently withdrew the forelegs and anterior part of the body outside. Newly emerged individuals kept quiet near their old skin for a short period, then started to move activity searching for their preys.

Mating. Both males and females of *A. aegypticus* and *P. gizanensis* accepted copulation immediately after emergence. Male approached female anteriorly and both vibrated their palps and touched it with forelegs. The male then moved around the female to reach her dorsum. Female could move carrying male over her back. This process lasted about 6-8 minutes for the former and 8-12 minutes for the second one. After this, male crawled underneath the female and clasped its body with the third and fourth legs, while male and female ventral surfaces were facing each other, nearly half body of the male projected behind the female. After copulation process, both sexes separated and female accepted mating more than once in the two species.

A-Androlaelaps aegypticus

Incubation period: It was clearly obvious from Table (1) that there were obviously differences of incubation period which give rise to females and males in case of *A. aegyptiacus* when fed on different diets at different temperature. This period lasted the longest period (3.2 days) when female of the mite fed on the immature stages of *T. putrescentiae* at 20ºC changed to recorded the shortest time when the male members fed on immatures of *L. destructor* at 30 (1.61 days). The statistical analysis of obtained data showed that (L.S.D. at 0.05 level = 0.0.33 and 0.041 for the effect of sex and preys, respectively.

Life cycle: The effect of temperature and prey on life cycle of *A. aegyptiacus* was shown in Table (1). As temperature increased from 20 to 30ºC, the mite females and males life cycle decreased, as the longest period was obtained when the female individuals reared on *T. putrescentiae* immature stages at 20ºC. recorded 8.99 days, which highly decreased to recorded 5.5 days for male mites when fed on *L. destructor* immatures at 30ºC. L.S.D. at 0.05 level = 0.088 and 0.108 for effect of sex of mites and introduced food, respectively.

Table 1: Duration of the developmental stages of the predacious mite, *Androlaelaps aegypticus* when fed on different diets at different temperature.

Biological aspect		20 °C			25°C			30 °C			L.S.D. at 0.05	
		A	B	C	A	B	C	A	B	C	Sex	Diets
Incubation period	♀	3.2±0.06 (3.1-3.3)	3.19±0.09 (3.0-3.3)	2.8±0.1 (2.6-3.0)	3.0+0.17 (2.7-3.3)	2.8±0.0 (2.6-3.0)	2.44±0.1 (2.2-2.7)	2.5±0.1 (2.3-2.7)	2.5±0.11 (2.3-2.7)	2.01±0.13 (1.8-2.3)	0.033	0.041
	♂	2.68±0.11 (2.4-2.8)	2.3±0.1 (2.0.-2.5)	2.0±0.1 (1.8-2.2)	2.5±0.11 (2.3-2.7)	2.03±0.1 (1.9-2.2)	1.8±0.13 (1.6-2.0)	2.06±0.08 (2-2.2)	1.8±0.09 (1.6-1.9)	1.61±0.11 (1.4-1.8)		
Life cycle	♀	8.99±0.72 (7.9-10.0)	8.45±0.44 (7.5-9.0)	7.99+0.31 (7.5-8.5)	8.0±0.26 (7.5-8.5)	7.51±0.17 (7.2-7.9)	7.01±0.1 (6.8-7.2)	7.01±0.17 (6.7-7.3)	6.49±0.27 (5.9-6.9)	6.5±0.21 (6.1-6.8)	0.088	0.108
	♂	8.0±0.47 (7.0-9.0)	7.0±0.26 (6.5-7.5)	7.19±0.21 (6.8-7.5)	7.01±0.17 (6.7-7.3)	6.51±0.14 (6.3-6.8)	6.0±0.17 (5.7-6.3)	6.01±0.19 (5.7-6.4)	6.01±0.17 (5.7-6.3)	5.5±0.24 (5.0-6.0)		
Longevity	♀	65.0±0.52 (64.0-66.0)	60.1±1.1 (58.0-62.0)	50.0±0.94 (48-51)	60.0±1.08 (58.0-62.0)	55.15±0.71 (54-56.5)	44.95±1.04 (43.0-46.5)	55.0±0.71 (54.0-56.0)	49.8±0.82 (48-51)	40.0+1.05 (38.0-42.0)	0.292	0.358
	♂	59.9±1.59 (57.0-62.0)	50.2±1.47 (48.0-53.0)	43.4±0.84 (42-44)	52.0±0.82 (51.0-53.0)	43.8±1.06 (42-46)	38.0±1.05 (36.0-40.0)	48.15±0.71 (47-49.5)	40.14±0.76 (38.9-41)	32.8±0.94 (31.0-34.0)		
Life span	♀	74.0±1.15 (72.0-76.0)	68.45±0.59 (67.5-69.5)	58.05±0.68 (57.0-59.0)	68.0±0.71 (67.0-69.0)	62.39+0.6 (61-63)	52.2±0.6 (51.0-53.0)	62.1±0.6 (61-3)	56.32±.63 (54.9-57.0)	46.47+0.4 (45.9-47)	0.215	0260
	♂	68.1±0.87 (67.0-70.0)	56.5±1.2 (54.0-58.0)	51.48+0.35 (51.0-52.0)	59.1±0.71 (58.0-60.0)	49.24±0.59 (48-50)	44.24±0.69 (43.0-45.5)	54.14±0.79 (53.0-56.0)	45.98±0.64 (45.0-47.0)	38.45±0.58 (37.0-39.0)		

A= *Tyrophagus putrescentiae* immature stages
B= *Rhizoglyphus echinopus* immature stages
C= *Lepidoglyphus destructor* immature stages

Longevity: Concerning the longevity, Tables (1) and statistical analysis using L.S.D. at 0.05 level pointed out that the resulted adults of *A. aegypticus* (females and males) were significantly differed according to the different experiment conditions. The longevity period durated 65.0, 60.1, 50.1 days when females fed at 20ºC on immatures of *T. putrescentiae*, *R.echinopus* and *L. destructor*, respectively, changed to 60.0, 55.15 and 44.95 days at 25ºC & 55.0, 49.8 and 40.0 days at 30ºC, when fed on the same trend of introduced prey, respectively. On the other hand, the adult male took the longest period (59.9 days) when fed on immatures of *T. putrescentiae* at 20ºC, which in turn decreased to recorded the shortest time (32.8 days) on *L. destructor* immatures at 30ºC, Table (1). The statistical analysis of obtained data showed the L.S.D. at 0.05 level = 0.292 for effect of different mite sexes and 0.260 for effect of different introduced prey.

Preoviposition, oviposition and postoviposition periods: It can be pointed out form Table (2) that the preoviposition, oviposition and postoviposition periods of adult female of the mesostigmatid mite, *A. aegypticus* increased when fed on *T. putrescentiae* immatures than those fed on *R. echinopus* and *L. destructor* immatures.

The longest oviposition period of the mite obtained when the individuals fed on immatures of *T. putrescentiae* (58.99 days), but the shortest period recorded on *L. destructor* at 30ºC (34.86 days), L.S.D. at 0.05 = 0.39.

Fecundity: The obtained results in Table (2) show the influence of different diets and temperatures on the fecundity of *A. aegypticus* adult female. Data clearly indicated that the feeding on immatures of *T. putrescentiae* significantly prolonged the number of eggs deposited by the mite, as the highest number was 59.7 eggs / female at 30ºC., L.S.D. at 0.05 = 0.55.

Life span: Accordingly, the life span of *A. aegypticus* (females and males) differed on differently diets, as it prolonged when females fed on *T. putrescentiae* immature stages at 25ºC, (74.0 days) (Table 1), and this period took the shortest period when the male individuals fed on *L. destructor* at 30ºC, and recorded (38.45 days), L.S.D. at 0.05 = 0.215 and 0.260 for effect of sexes and foods, respectively.

Table 2: Duration of the developmental stages of the predacious mite, *Androlaelaps aegypticus* female fed on different diets at different temperature.

Biological aspect	20 °C			25°C			30 °C			L.S.D. at 0.05
	A	B	C	A	B	C	A	B	C	
Preoviposition period	2.99±0.14 (2.8-3.2)	2.8±0.06 (2.7-2.9)	2.6±0.06 (2.5-2.7)	2.72±0.1 (2.6-2.9)	2.59±0.08 (2.4-2.7)	2.45±0.1 (2.3-2.6)	2.46±0.1 (2.3-2.6)	2.4+0.06 (2.3-2.5)	2.2±0.08 (2.1-2.3)	0.48
Oviposition period	58.99±0.67 (58.0-60.0)	55.41±0.66 (54.0-56.0)	44.99±0.53 (44.0-46.0)	54.9±0.73 (54.0-56.0	49.9±0.87 (48.0-51.0)	40.04±0.7 (38.9-41.0)	49.85±1.2 (48.0-52.0)	45.0±0.53 (44.0-46.0)	34.86±0.56 (34.0-36.0)	0.39
Postoviposition period	2.97±0.22 (2.6-3.4)	2.79±0.1 (2.6-2.9)	2.6±0.1 (2.4-2.7)	2.48±0.1 (2.3-2.6)	2.4±0.1 (2.2-2.6)	2.27±0.1 (2.1-2.4)	2.21±0.1 (2.1-2.3)	2.24±0.2 (2-2.6)	2.0±0.1 (1.8-2.2)	0.06
Fecundity	49.7±1.25 (48.0-52.0)	40.4±1.34 (38.0-43.0)	35.0±0.67 (34.0-36.0)	55.0±1.15 (53.0-57.0	44.8±1.03 (43.0-46.0)	40.0±0.94 (38.0-41.0)	59.7±1.16 (57.0-61.0)	49.1±0.88 (48.0-50.0)	43.8±1.05 (42.0-46.0)	0.55

A= *Tyrophagus putrescentiae* immature stages
B= *Rhizoglyphus echinopus* immature stages
C= *Lepidoglyphus destructor* immature stages

B-Proctolaelaps gizanensis:

As shown in Tables (3 and 4) the different biological aspects of the ascid mite *P. gizanensis* were obviously affected when fed on different preys at different temperature.

Incubation period: The influence of preys and temperature on the incubation period of the ascid mite *P. gizanensis* female and males can be summarized in Table (3) which revealed that the highest mean period was recorded when the female fed on the immatures of *T. putrescentiae* (2.4 days) at 20ºC, but the lowest recorded incubation period was obtained when the male individuals fed on the immatures of *L. destructor* at 30ºC (1.52 days), with L.S.D. at 0.05 level = 0.05 and 0.06 for females and male, respectively.

Life cycle: The development from egg to adult of *P. gizanensis* was faster for the male members when fed on *Lepidoglyphus destructor* immature at 30ºC, recording 10.79 days but this period was longed to the highest level (15.59 days) when the female individuals of the predatory mite reared at 20ºC, during the feeding on the immature stages of *T. putrescentiae* (Table 3).

Longevity: Statistical analysis of data presented in Table (3) indicated that the mean longevity period of adult female *P. gizanensis* when fed on *T. putrescentiae* at 20˚C took the longest time (20.95 days) before the death of the individuals. On the other hand, the rest of diets and temperature decreased this period, as, the shortest longevity period lasted 12.51 days for the mite males when fed on *L. destructor* immature stages at 30ºC. The statistical analysis of obtained data indicated that L.S.D. was at 0.05 = 0.28.

Table 3: Duration of the developmental stages of the predacious mite, *Proctolaelaps gizanensis* when fed on different diets at different temperature.

Biological aspect		20 °C			25°C			30 °C			L.S.D. at 0.05
		A	B	C	A	B	C	A	B	C	
Incubation period	♀	2.4±0.12 (2.2-2.6)	2.2±0.11 (2.0-2.4)	2.01±0.1 (1.8-2.2)	2.21±0.1 (2-2.4)	2.0±0.1 (1.8-2.2)	1.76±0.1 (1.6-1.9)	2.01±0.1 (1.8-2.2)	1.8±0.1 (1.6-1.9)	1.6±0.1 (1.5-1.7)	0.05
	♂	2.04±0.2 (1.8-2.5)	1.97±0.16 (1.7-2.3)	1.99±0.1 (1.9-2.2)	1.8±0.1 (1.6-1.9)	1.7±0.1 (1.5-1.9)	1.6±0.1 (1.4-1.7)	1.79±0.1 (1.6-2.0)	1.69±0.1 (1.5-1.8)	1.52±0.1 (2.3-1.7)	0.06
Life cycle	♀	15.59±0.74 (14-16.5)	14.99±0.75 (14-16)	14.61±0.74 (13.5-16.5)	14.5±0.35 (14-15)	13.62±0.29 (13-14)	13.13±0.28 (12.5-13.5)	13.18±0.24 (12.8-13.6)	12.49±0.53 (11.5-13.5)	12.11±0.3 (11.7-12.8)	0.26
	♂	14.66±0.38 (14.0-15.5)	13.86±0.39 (13.-14.5)	13.02±0.43 (12.2-13.6)	13.6±0.5 (12.6-14.5)	12.8±0.35 (12.0-13.4)	11.75±0.79 (11.0-13.0)	12.49±0.48 (11.5-13.5)	11.5±0.34 (11.0-12.0)	10.79±0.38 (10.0-11.6)	0.24
Longevity	♀	20.95±0.6 (20.0-22.0)	20.17±0.71 (19.0-21.5)	18.0±0.58 (17.0-19.0)	19.1±0.41 (18.5-20.0)	18.0±0.54 (17-19.0	16.0±0.54 (15.0-17.0)	16.98±0.53 (16.0-18.0)	16.02±0.53 (15.0-17..0)	14.03±0.44 (13.15-15.0)	0.28
	♂	18.85±0.97 (17.0-20.0)	17.0±0.71 (16.0-18.0)	15.92±1.03 (14.0-18.0)	16.04±0.56 (15.0-17.0)	15.07±0.5 (14.0-16.0)	14.01+0.57 (13.0-15.0)	13.82±0.57 (13.0-14.6)	13.17±0.34 (12.7-14.0)	12.51±0.36 (12.0-13.0)	0.34
Life span	♀	36.54±1.02 (34.0-37.0)	35.14±1.16 (33.0-37.0)	32.6±1.0 (31.0-34.5)	33.7±0.38 (33.1-34.5)	31.62±0.7 (30.0-32.5)	29.13±0.63 (28.0-30.2)	30.16±0.46 (29.4-31.0)	28.51±0.56 (27.6-29.5)	26.14±0.54 (25.15-27.0)	0.39
	♂	33.81±1.26 (31.0-35.0)	30.86±0.65 (29.6-31.7)	28.94±1.23 (26.2-31.0)	26.64±0.85 (27.6-30.8)	27.87±0.58 (26.9-28.8)	25.76±1.05 (24.0-27.1)	26.31±0.93 (24.5-27.7)	24.67±0.59 (23.7-25.6)	23.3±0.41 (22.6-23.9)	0.45

A= *Tyrophagus putrescentiae* immature stages
B= *Rhizoglyphus echinopus* immature stages
C= *Lepidoglyphus destructor* immature stages

Preoviposition, oviposition and postoviposition periods: The tabulated data in Table (4) showed that no significant differences occurred between preoviposition periods of *P. gizanensis* on the different diets at different temperature, while oviposition periods varied according to the introduced prey. This difference was significantly longer when the female of *P. gizanensis* fed on *T. putrescentiae* at 25ºC. than other two astigmatid mites.

Table 4: Duration of the developmental stages of the predacious mite, *Proctolaelaps gizanensis* female fed on different diets at different temperature.

Biological aspect	20 °C			25°C			30 °C			L.S.D. at 0.05
	A	B	C	A	B	C	A	B	C	
Preoviposition period	1.99±0.1 (1.8-2.2)	1.81±0.07 (1.7-1.9)	1.6±0.07 (1.5-1.7)	1.81+0.1 (1.7-1.9)	1.6±0.1 (1.5-1.7)	1.51±0.1 (1.4-1.7)	1.6± 0.1 (1.5-1.7)	1.5±0.1 (1.4-1.6)	1.39±0.1 (1.3-1.5)	0.04
Oviposition period	14.5±0.5 (13.5-15.5)	14.22±0.45 (13.5-15.0)	12.91±0.52 (12.0-13.6)	13.14±0.23 (12.8-13.6)	13.27±0.84 (12.0-15.0)	11.49±0.4 (10.5-12.5	11.97±0.55 (11.0-13.0)	11.49±0.48 (105-12.5)	10.03±0.48 (9.0-11.0)	0.27
Postoviposition period	4.35±0.53 (3.5-5.0)	4.02±0.22 (3.6-4.4)	3.5±0.25 (3.0-4.0)	4.02±0.2 (3.7-4.5)	3.51±0.24 (3.0-4.0)	3.0±0.2 (2.6-3.4)	3.48±0.14 (3.2-3.7)	3.02±0.14 (2.8-3.2)	2.5±0.24 (2.0-3.0)	0.14
Fecundity	19.9±0.74 (19.0-21.0)	18.1±0.74 (17.0-19.0)	16.0±0.66 (15.0-17.0)	22.0±0.94 (21.0-24.0)	20.0±0.67 (19.0-21.0)	17.9±0.73 (17.0-19.0	25.9±0.88 (24.0-27.0)	22.9±0.88 (21.0-24.0)	20.7±0.67 (20.0-22.0	0.40

A= *Tyrophagus putrescentiae* immature stages
B= *Rhizoglyphus echinopus* immature stages
C= *Lepidoglyphus destructor* immature stages

The oviposition periods were, 14.5, 13.14 and 11.97 days when the females fed on *T. putrescentiae* immature stages at 20, 25 and 30ºC, respectively, changed to

14.22, 13.27 and 11.49 days on immatures of *R. echinopus*, respectively, while recorded 12.91, 11.49 and 10.03 days on immatures of *L. destructor*, respectively.

Fecundity: The prey suitability clearly affects the number of eggs deposited by the adult female of *P. gizanensis* (Table 4). The obtained results revealed that the highest number of deposited eggs was observed for the female fed on *T. putrescentiae* immature stages at 30ºC, while the lowest number was recorded on immatures of *L. destructor* at 20ºC, (16.0 eggs).

Life span: Accordingly, the life span also affected by feeding of the predatory mite *P. gizanensis* on different preys as in Table (3). The female life span of *P. gizanensis* resulted from feeding on immature stages of *T. putrescentiae* recorded the highest period (36.54 day), which remarkably decreased to its lowest level during the feeding of male individuals on the immatures of *L. destructor* at 30ºC and recorded (23.3 days). L.S.D. at 0.05 = 0.39 and 0.45 for females and males, respectively. Similar results were obtained by Barker (1968) mentioned that the life cycle of *Androlaelaps casalis* mite durated five days at 32.6ºC and 95 to 100%R.H., and eight days at 25ºC and 75-100% R.H. with *Glycyphagus domesticus* as food. Kheir (1991) reared *A. aegyptiacus* and *A. reticulatus* Hafez, El-Badry and Nasr on immatures and eggs of the two acarid mites, *T. putrescentiae* and *R. robini*. The female of *A. aegyptiacus* deposited an average of 48.6, 39.0, 44.1 and 33.8 eggs, while that of *A. reticulatus* was 75.6, 44.2, 62.9, 37.2 eggs when fed on the same previous mentioned prey types, respectively. Galvão *et al.* (2011) studied the effect of different food sources included the mites *Aceria guerreronis*, *Steneotarsonemus concavuscutum* Lofego and Gondim Jr., and *T. putrescentiae*, the fungus *Rhizopus* aff. *stolonifer* (Ehrenb.) Vuill and coconut pollen and the mite *Tetranychus urticae* Koch for mass production and laboratory rearing of predatory mite, *Proctolaelaps bulbous* and noticed that this ascid mite was able to develop up to adulthood when fed on *A. guerreronis,R.* aff. *stolonifer* and *T. putrescentiae* as predatory and fungivorous mite. Also, Nawar (1992) regarded the ascid mite, *Proctolaelaps deleoni* Nawar, Childers and Abou-Setta as fungivorous mite.

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ARABIC SUMMARY

دراسات معملية على الأكاروسات ذات الثغر المتوسط *Androlaelaps aegypticus* المنتمى لعائلة Laelapidae و *Proctolaelaps gizanensis* المنتمى لعائلة Ascidae على ثلاث آفات أكاروسية تحت ظروف مختلفة

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أجريت هذه الدراسة لتحديد تأثير ثلاث آفات أكاروسية مختلفة (الأطوار غير البالغة) وهى *Tyrophagus putrescentiae* و *echinopus Rhyizoglyphus* والمنتميان لعائلة Acaridae والأكاروس *Lepidoglyphus destructor* والمنتمى لعائلة Glycyphagidae كمصادر غذائية على المظاهر البيولوجية لاثنين من الأكاروسات المفترسة وهى *Androlaelaps aegypticus* المنتمى لعائلة Laelapidae و *Proctolaelaps gizanensis* المنتمى لعائلة Ascidae.

ولوحظ من النتائج المتحصل عليها أن الأطوار المختلفة مثل فترة حضانة البيض Incubation period و دورة الحياة Life cycle وفترة الحياة للطور البالغ Longevity والفترة الكلية لحياة الأكاروس Life span والخصوبة (عدد البيض الموضوع للأنثى) لكلا الاكاروسين المفترسين قد اختلفت اختلافاً معنوياً فيما بينها حسب ظروف التجربة واتضح أيضا ان الفترات التى استغرقتها الأفراد الذكور كانت أسرع وأقل فى المدة من مثيلاتها للأفراد الإناث لكلا النوعين وأن الأطوار غير البالغة للفريسة الأكاروسية *L. destructor* قللت من طول هذه الفترات أكثر من فريسة أخرى وأن درجة الحرارة ٢٠ م° قد زادت من طول هذه الفترات المذكورة أكثر من أى درجة حرارة أخرى. كما أشارت النتائج المتحصل عليها أن عدد البيض الذى تم وضعه بواسطة إناث الأكاروسات المفترسة تحت الدراسة قد زاد عند التغذية على الأطوار غير البالغة للأكاروس *T. putrescentiae* عن باقى الفرائس المستخدمة وأن درجة الحرارة ٣٠ م° قد قامت بنفس الدور فى زيادة عدد البيض الموضوع.