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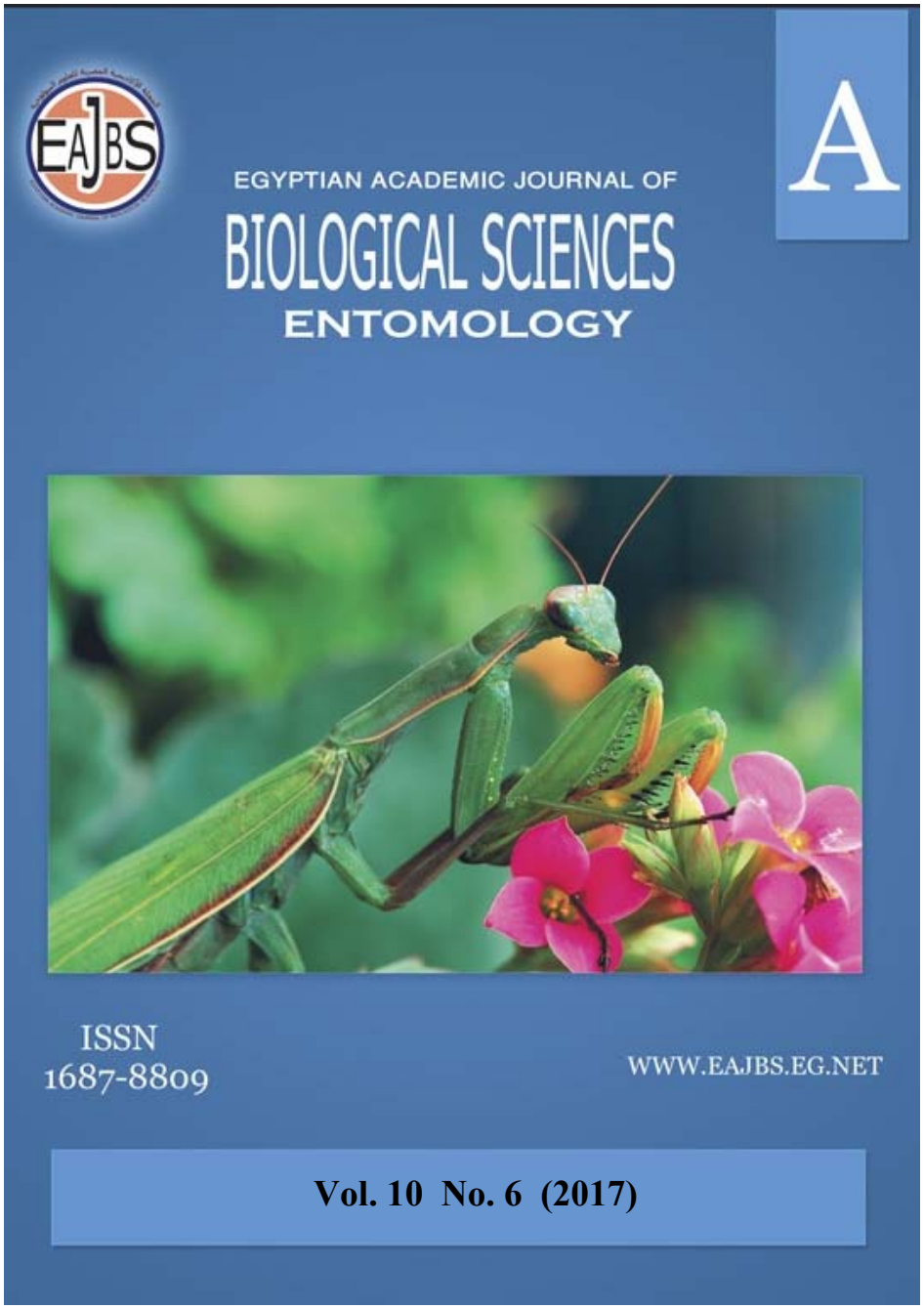

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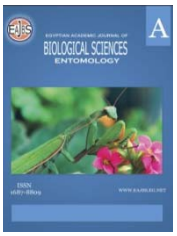

Notes on biology of *Cheletominus congensis* (Cunliffe) when feed on different dites at different tempreatures

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ABSTRACT

This work is conducted to study the effect the acarid mite, *Tyrophagu putrescentiae* (Schrank) and the free living nematodes, *Rhabditi scanica* Allegan as food at 25 and 35°C, an relative humidity 70% R.H on the biological aspects of the predatory cheyletid mite *Cheletominu congensis* (Cunliffe). Egg, life cycle, longevity and life span of *C congensis* that fed on free living nematodes had faster developmen compared to those fed on the acarid mite and the temperature 35°C induced a shorter periods, where 25°C resulted the longest periods. Th longest incubation period took 6.2 days at 25°C, when the female fe on free living nematodes, but averaged 3.14 days (the shortest period for male individuals when fed on the same diet at 35°C. Also, the foo kind significantly influenced the predator life cycle as it averaged 19.8 and 19.71; 11.75 and 10.63 days when both females and males fed on *T putrescentiae* at 25 and 35°C, respectively. This period lasted 20.0 an 19.17; 13.66 and 12.0 days when the mites fed on nematodes under th same conditions, respectively. The longevity of *C. congensi* significantly differed according to the mite sex, where it took 41.43 an 31.21; 28.82 and 21.64 days when the female and male fed at 25 an 35°C on *T. putrescentiae*, respectively, and averaged 43.33, 33.29 31.26 and 23.88 days when the individuals fed on nematodes respectively. Fecundity of *C. congensis* was the highest (96.8 eggs o free living nematodes at 25°C, while the lowest number was observe when the females fed on the acarid mite at 35°C (67.6 eggs). Th predation capacity of *C. congensis* females and males was differe according to the temperature and stage of the introduced prey. Durin adulthood, female of *C. congensis* consumed greater numbers of *T putrescentiae* than male. The numbers of prey consumed by th predator was significantly decreased by increasing the temperature fo both sexes.

INTRODUCTION

Mites of the family Cheyletidae have a worldwide distribution (Bochkov, 2005; Fungarworm and Lekprayoon, 2010). They can be found in a great variety of habitats (Fan and Bochkov, 2010). In list of cheyletid mites published by Gerson *et al.* (1999) the genus Hemicheyletia is reduced to a subgenus of *Cheletominus* with three subgenera, *Cheletominus*, *Hemicheyletia* and *Philippicheyla*. *Cheletominus congensis* (Cunliffe) was described from Congo by Cunliffe (1962). At the present time it is

known from Pakistan as *H. lacinia* (Rasool and Chauhri, 1979) and also from Philippines (Rasool and Choudhri, 1979; Corpus-raros, 1998). Cheyletid mites are mainly free-living predators that feed on various micro-arthropds, particularly on herbivorous, fungivorous, and saprophagous acaroid mites (Zdarkova, 1979). The predatory forms are usually collected from plants, soil-litter, stored products, nests of vertebrates, and colonies and galleries of insects and have the ability to keep free living nematodes and mite pests under the threshold level (Hughes, 1976); Zaher, 1986; Fuangarworm and Lekprayoon, 2010). A few cheyletids are considered to be biological control agents, and one of them, *Cheyletus eruditus* (Schrank), has being used in commerce (Gerson and smiley, 1990). The literature on cheyletid mite pests-predators interaction in/on soil is scarce. Therefore, the aim of the present investigation was to study the effect of the different diets on the biology of the cheyletid mite, *Cheletominus congensis* in the laboratory.

MATERIALS AND METHODS

Rearing procedures: To rear the predaceous mite, *Cheletominus congensis* (obtained from soybean and wheat soil, Qaluobia Governorate), two types of cages were used. The first for culturing mites (large glass Petri dishes filled up to 0.5 cm with a mixture of plaster of Paris and charcoal (9:1) and the second for individual rearing (plastic ring 2.5 cm in diameter and 1.5 cm in depth) filled up to 0.5 cm with a mixture of plaster of Paris and Charcoal (7:3) according to Metwally *et al*. (1983). For culturing of mites, several adult females and males of *C. congensis* were placed in petri-dishes and supplied with small glass slide to prevent mites escaping and kept in incubator at 25±2°C and 70±5% R.H.; the bottom of the dish was kept moist, thus the relative humidity was suitable by adding one or two drops of water every two days. A camel hair brush was used to transfer newly deposited eggs to the plastic rings. After hatching each larva was supplied with free living nematodes and the acrid mite *Tyrophagus putrescentiae* as prey. Observations were made twice daily using stereomicroscope to determine different biological aspects. Copulated females were kept for determining pre-oviposition, oviposition and post-oviposition periods, sex ratio, hatchability. Observations were taken under 25 and 35°C at70±5 % R.H.

Source of food:

A-Free-living nematodes: Soybean and wheat soil samples were put in Barman funnel for 24 hours for extracting nematodes (Abou-El-Sood, 1992). The extraction of free living nematode *Rhabditis scanica* was cultured in petri-dishes that contain slices of potatoes. Petri-dishes were kept at 25°C. Camel hair brushes were used to add drops of food in rearing cells of the predatory mite as the main source of food.

B-Acarid mite: The culture of acarid mite, *T. putrescentiae* was maintained and already obtained from Acarology Dept., Plant Protection Research Institute, A.R.C. The collected predator and prey species were transferred to a cover glass petri-dishes filled with a layer of Plaster of Paris and charcoal mixture at the bottom. Moisture was adjusted by adding drops of water every two days.

Statistical analysis: The statistical analysis (ANOVA) of the obtained results were performed using SAS program (**SAS** Institute, 1988).

RESULTS AND DISCUSSION

Behaviour: Observation showed that the predator *C. congensis* was usually found around its prey. When touching the prey, it quickly moved backward and returns to attack it. The predator seized firmly the prey with the aid of its raptorial palps and

inserted its chelicerae in any part of the body and sucked its contents. The life history of the predator passes through one larval and two nymphal stages for females and males before reaching adulthood. The young larvae are colorless; the orange colour beings to appear at the end of the larval period, becoming more intense at each succeeding stage. Before proceeding to the following stage, active immature mites usually enters a resting or quiescent stage.

Mating: The mating process is necessary for *C. congensis* individual's production. Laboratory observation showed that the adult tended to mate immediately after emergence. Just before mating, the male becomes more active by running around the female, and then it manipulates itself underneath the female, bending the opithsosomal region upward and forward to meet that of female, copulation lasted 5-8 minutes.

Hatching: As incubation proceeds, the embryo of mite grows and limits itself to any end of the egg, then a longitudinal slit occurs medially and hatching larva crawls from the egg shell.

Moulting: Prior to moulting, the immature stage of *C. congensis* enters into a quiescent period during which it stops feeding and movement. It stretches its chelicerae and palps backwardly along the sides of the body. Immediately before moulting, a dorsal transverse rapture occurs between the propodosoma and hysteroposoma. The mite tries to disengages itself from the old skin by twisting movements and subsequently withdraws the forelegs and anterior parts of the body from the old skin. Afterwards, it crawls forward trying to withdraw the posterior part from the exuvia. The colour of the crawly emerged individuals is usually orange, then following feeding, gradually becomes darker.

1-Biological aspects:

Incubating period: The temperature showed a noticeable effect on the embryonic development of *C. congensis* as shown in Tables (1 and 2). A temperature of 35°C induced a shorter incubation period, while 25°C resulted in longer period for the predator eggs development giving rise to females and males. The predator incubation period took the longest time when the mite females fed on *T. putrescentiae* at 25°C (5.44 days) (Table 1), while it took 3.14 day (the shortest time) for male individuals when fed on free living nematodes at 35°C (Table 2). Statistical analysis of the data showed that L.S.D. at 0.05 level was 0.0498 when this period was affected by the temperature (Table 4).

Life cycle: From the obtained data, it was observed that he food substances significantly influenced the life cycle of the predatory mite, *C. congensis* (Tables 1 and 2). The longest period of female and male life cycle was recorded when the predator fed on *T. putrescentiae*, where it lasted 19.85 and 19.71; 11.75 and 10.63 days when both females and males fed on *T. putrescentiae* at 25 and 35°C, respectively (Table 1), while, these periods recorded 20.03, and 19.17; 13.66 and 12.18 days when the same mite fed at the same conditions but on free living nematodes, respectively (Table 2). Statistical analysis of the data showed that the L.S.D. at 0.05 was 0.066 when this period was affected by temperature (Table 4).

Longevity: Concerning the adult longevity, Tables (1 and 2), statistical analysis using L.S. D. at 0.05 pointed out that the longevity of *C. congensis* as significantly differed according to food type and temperature. Longevity period took 41.43 and 31.21; 28.82 and 21.64 days when the predatory mite females and males fed at 25 and 35°C on *T. putrescentiae*, respectively, Table (1) had averaged 43.33 and 32.29; 31.36 and 28.88 days when the mites fed on free living nematodes, respectively (Table 2). These results showed that the higher temperature shortened the predator longevity. Statistical

analysis of obtained data in Table (4) showed that this period was highly significantly affected with the all tested factors, L.S.D. at 0.05= 0.3866.

Pre-oviposition, oviposition and post-oviposition periods: Data tabulated in Table (3) showed that there were significant differences between the *C. congensis* female individuals fed on both *T. putrescentiae* and free nematode at different temperatures in case of pre-oviposition, oviposition, and post-oviposition periods. The longest pre-oviposition period was observed when the female fed on the acarid mite (4.51 days) a 25°C, but the shortest time was recorded when the individuals fed on the same diets at 35°C (2.14 days). On the other hand, the oviposition period was 32.21 and 23.75; 35.36 and 26.1 days when the female fed on both acarid mite and free living nematodes at 25 and 35°C., respectively. However, the post-oviposition period of *C. congensis* averaged the longest period when fed on the acarid mite at 25°C (4.87 days), but the shortest period was noticed when the mite fed on free living nematodes at 35°C (2.79 days).

Fecundity: the eggs of *C. congensis* are laid in isolated clusters. The female makes no attempts to protect the eggs. Under the conditions used in these experiments, the number of *C. congensis* eggs differed depending on whether the mites fed on *T. putrescentiae* or on free living nematodes. As shown in Table (3) the highest number of deposited eggs by the predatory females of *C. congensis* was reared on free nematodes at 25°C (96.8 eggs), but the lowest number was recorded on the acarid mite at 35°C (67.6 eggs).

2-Predation capacity:

Predation capacity of *C. congensis* on eggs and immature stages of *T. putrescentiae* at 25 and 35°C. The predation capacity of the females and males predatory mite *C. congensis* in their life was differed according to the temperature and stage of the introduced prey (Table 5). The predation capacity during the life cycle averaged 38.86 and 33.58 eggs of *T. putrescentiae* for females and males at 25°C, respectively compared to 23.26 and 19.45 individuals in case of feeding on the immature stages of the prey. In case of predator feeding on *T. putrescentiae* during longevity of the adult female and males, the predator fed on 95.52 and 79.24 at 25°C and 64.37 and 30.25 immature stages respectively. Generally, the number of consumed *T. putrescentiae* during the life span of the predator averaged 133.76 and 112.29 on eggs of *T. putrescentiae* and 87.26 and 49.64 immature stages of the prey at 25°C, respectively. On the other hand, at 35°C, during the life cycle, longevity and life span of *C. congensis*, the number of consumed *T. putrescentiae* eggs averaged 31.86, 85.52 and 117.7 during the feeding of females changed to 27.47, 70.5 and 10.2.3 eggs in case of males. However the number of *T. putrescentiae*, different immatures devoured by the predatory mite averaged 18.25, 55.45 and 73.68 prey for females and 19.45, 22.58 and 40.75 immatures for male during the life cycle, longevity and life span of the predator, respectively. Similar results were obtained when the cheyletid mites fed on the acarid mites by Taha *et al.* (1988) where they studied the biology of the cheyletid predatory mites *Cheyletus malyensis* and *Cheletomorpha lepidopterorum* on immatures and eggs of the acarid mite *Caloglyphus rhizoglyphoides* at 25°C and 70 % R.H. Development, reproduction and predacious efficiency of the predators were studied and the females of the predators tended to live longer than males. The results obtained by El-Naggar *et al.* (2006) and Yass*in* et *al.* (2008) demonstrated that the temperature induced a considerable effect on the predator *C. lepidopterorum* fecundity, since the female fed on the acarid mite *T. putrescentiae*. The latter authors noticed also that the predator mite developed faster when reared at 30 than 20°C. But El-Enany *et al.* (1992) noted that feeding of *C. lepidopterorum* on immature *T. putrescentiae* did not show an

obvious response with change of temperature from 24 to 30°C. The effect of temperature on the development of immature stages of the predator *Cheyletus eruditus* Oudemans, produced by either fertilized or virgin females, was studied at 17.5, 20, 25, 30, 32.5, and 35°C, 80±5% R.H.; in total produced developmental time, males developed more quickly than females, at all temperatures. Also, several species of family Uropodidae were recorded feeding on vermiform nematodes (Willis and Axtell, 1968 and Ito, 1971). The most definite association between mites and nematodes came from the work of Rodriguez *et al*. (1972) who cultured *Macrocheles muscaedomesticae* on *Rhabditis* sp., and found it to prefer house fly eggs over nematodes. Its proto- and deutonymph under same conditions, however, preferred nematodes. In culture, increased population of mite resulted in a significant decline of *Aphelenchus avenae*. Observation of Bilgrami (1994) on *T. putrescentiae* revealed that these mites are predacious on many species of plant and soil nematodes belonging to three trophic categories viz., saprophagous, plant parasitic and predacious nematodes.

Table 1. Biological aspects of the cheyletid mite *Cheletominus congensis* when fed on the acarid mite *Tyrophagus putrescentiae* at different temperatures.

Biological aspect	25 °C		35 °C	
	♀	♂	♀	♂
Incubation period	5.44±0.05 (5.35-5.5)	5.2±0.4 (5.14-5.25)	3.37+0.16 (3.2-3.8)	3.18±0.02 (3.15-3.21)
Active larva	4.45±0.29 (3.5-5.52)	30.15±0.03 (3.1-3.18)	1.74±0.18 (1.25-1.88)	1.56±0.03 (1.51-1.6)
Quiescent larva	0.49±0.03 (0.4-0.5)	0.42±0.01 (0.39-0.44)	0.37±0.02 (0.34-0.90	0.33±0.02 (0.3-0.36)
Active protonymph	3.9±0.07 (3.32-4.50	3.2±0.11 (3.1-3.4)	1.72±0.13 (1.4-1.86)	1.49±0.05 (.4-1.55)
Quiescent protonymphs	0.45±0.03 (0.38-0.480	0.42±0.03 (0.36-0.44)	0.35+0.02 (0.32-0.390	0.33±0.02 (0.3-0.35)
Active deutonymph	4.70±0.05 (3.25-5.4)	3.06±0.03 (3.02-3.11)	1.68±0.04 (1.3-1.78)	1.54±0.08 (1.4-1.67)
Quiescent deutonymph	0.42±0.03 90.350.46)	0.41±0.0 (0.39-0.43)	0.34±0.02 (0.32-0.37)	0.34+0.02 (0.32-0.38)
Total immatures	14.41±0.35 (13.55-15.27)	1.5±0.18 (14.0614.68)	8.64±0.13 98.32-8.75)	7.45±0.13 (7.1-.57)
Life cycle	19.85±0.16 (18.97-21.49)	179.71+0.20 (19.24-19.930	11.75±0.08 (11.58-11.85)	10.63±0.14 (10.28-10.78)
Longevity	41.43±1.4 (39.24-44.13)	31.21±0.9 929.04-32.5)	28.82±0.69 (27.97-30.14)	21.64±0.71 (20.5-22.4)
Life span	61.28±2.45 960.32-63.7)	50.91±1.03 (49.04-52.21)	40.58±0.68 (39.74-1.96)	32.26±0.7 (31.12-33.03)

±S.T. Standard deviation

Table 2. Biological aspects off the cheyletid mite *Cheletominus congensis* when fed on free living nematodes at different temperatures

Biological aspect	25 °C		35 °C	
	♀	♂	♀	♂
Incubation period	6.2±0.33 (5.36-6.94)	5.25+0.19 (5.-5.810	3.32±0.46 (3.232-3.37)	3.14±0.04 (3.1-3.18)
Active larva	4.25±0.07 (3.25-3.44)	3.19±0.19 93.07-3.67)	2.2±0.07 92.02-2.27)	1.94±0.2 (1.39-2.04)
Quiescent larva	0.48±0.05 (0.4-0.55)	0.43±0.02 (0.4-0.46)	0.37±0.02 (0.34-0.0)	0.3±0.03 0.28-0.38)
Active protonymph	3.96±0.04 (3.16-4.3)	3.1±0.3 (3.04-3.15)	3.3±0.18 (3.1-3.6)	1.9±0.03 (1.92-2.02)
Quiescent protonymphs	0.48±0.03 90.4-00.5)	0.42±0.02 (0.38-0.45)	0.36±0.02 (0.34-0.40)	0.34±0.01 (0.32-0.36)
Active deutonymph	4.22+0.09 94.1-4.32)	3.03±0.02 (3.01-3.06)	2.16±0.01 (2.14+2.180	1.93±0.07 (1.73-1.98)
Quiescent deutonymph	0.44±0.06 (0.41-0.55)	0.43±0.01 (0.41-0.45)	0.38±0.02 (0.35-0.410	0.34±0.01 (0.32-0.36)
Total immatures	13.83±0.10 (13.78-15.73)	13.92±0.06 (13.82-14.02)	10.34±0.08 (10.2-10.47)	9.03±0.12 (8.91-9.27)
Life cycle	20.0±0.16 (20.24-20.73)	19.17±0.19 (18.99-19.68)	13.66±0.08 (13.5-13.79)	12.18±0.12 (12.03-12.4)
Longevity	43.33±0.89 (42.4-44.97)	33.29±0.66 (32.4-34.6)	31.36±0.91 930.05-32.82)	23.88±0.45 (23.4-24.5)
Life span	63.4±1.05 (62.55-65.48)	52.46±0.71 951.56-53.78)	44.4±0.92 (43.75-44.6)	35.74±1.18 (32.56-36.65)

±S.D. Standard deviation

Table 3. Longevity (in days) and fecundity of the cheyletid mite, *Cheletominus congensis* female when fed on different diets at different temperatures.

Biological aspect	Diet	25 °C	35 °C
Pre-oviposition period	Acarid mite	4.51±0.21 (4.2-4.81)	2.14±0.02 (2.1-2.17)
	Free living nematodes	4.14±0.1 (4.03-4.41)	2.47±0.06 (2.4-2.55)
Oviposition period	Acarid mite	32.21±0.93 (30.4-33.4)	23.75±0.59 922.5-24.5)
	Free living nematodes	35.36±1.7 (33.5-39.5)	26.1±0.79 (25.1-17.3)
Post-oviposition period	Acarid mite	4.87±0.57 (4.22-5.84)	3.03±0.5 (2.39-3.51)
	Free living nematodes	4.35±0.43 (4.1-5.17)	2.79±0.43 (2.15-3.21)
Fecundity (number of eggs)	Acarid mite	86.5±2.6 (82.0-90.2)	67.6±0.84 (66.0-69.0)
	Free living nematodes	9.8±2.29 (93.0-100.0)	73.9±2.13 (70.0-7.0)

±S.D. Standard deviation

Table 4. Effect of *Tyrophagus putrescentiae* and free living nematodes on the biological aspects of the cheyletid mite, *Cheletominus congensis* at 25 and 35 °C.

Biological aspect	Source	F.	P.	L.S.D. at 0.05
Incubation period	Sex	77.42	0.0008***	0.0498
	Diet	0.096	0.7574 ns	
	Temp.	7041.59	0.000***	
	Int. sex x diet x temp.	0.1512	0.6977 ns	
Life cycle	Sex	1665.79	0.000***	0.066
	Diet	30.4.677	0.000***	
	Temp.	59946.35	0.000***	
	Int. sex x diet x temp.	10.693	0.0017**	
Longevity	Sex	20.2629	0.000***	0.3866
	Diet	127.799	0.000***	
	Temp.	3152.85	0.000***	
	Int. sex x diet x temp.	0.3845	0.532 ns	
Life span	Sex	2280.37	0.000***	0.419
	Diet	160.48	0.000***	
	Temp.	8194.61	0.000***	
	Int. sex x diet x temp.	1.179	0.2811 ns	

Table 5. Effect of *Cheletominus congensis* as fed on different stages of the acarid mite, *Tyrophagus putrescentiae*

Temp.	Type of prey	Biological aspect of C. congensis	Mean number ± S.E. of prey consumed by one cheyletid mite	
			Female	Male
25 °C	Eggs of *T. putrescentiae*	Life cycle	38.86±4.1	33.58±3.24
		Longevity	95.52±6.4	79.24±4.16
		Life span	133.76±9.45	112.29±5.69
	Immatures of *T. putrescentiae*	Life cycle	23.26±3.33	19.45±2.4
		Longevity	64.37±5.24	30.25=3.27
		Life span	87.26±4.6	49.64+3.68
35 °C	Eggs of *T. putrescentiae*	Life cycle	31.86±3.6	27.47±2.29
		Longevity	85.52±5.65	70.5±3.67
		Life span	117.7±8.6	102.3±4.1
	Immatures of *T. putrescentiae*	Life cycle	18.25±2.66	18.0±2.0
		Longevity	5.45±5.41	22.58±2.88
		Life span	3.68±5.11	40.75±3.12

REFERENCES

Abou-El-Sood, A.B., 1992. Ecological and taxonomical studies on nematodes in certain governorates of Egypt. Ph.D. thesis, Fac. Agric. Al-Azhar Univ., 252 pp.

Bilgrami, A.L. 1994. Predatory Behaviour of a nematode feeding mite, *Tyrophagus*

putrescentiae (Sarcoptiformes: Acaridae). Fundam. Appl., Nematol. 17 (4): 293-297.

Bochkov, A. 2005. Synopsis of described Actinedida of the world, subfamily Cheyeltidinae. In Synopsis of Described Arachnida of World (ed. J. Halian), http://insects.yamu.edu/research/collection/hallen/acari/fmaily/Actinedida.htm.

Corpuz-raros, L.A. 1998. Twelve new species and one new record of Cheyletidae (Acari) from the Philippines. Int. J. of Acarology, 24:259-290.

Cunliffe, F. 1962. New species of Cheyletidae (Acarina). Proceedings of the Entomological Society of Washington, 64:209-2018.

El-Enany, M.A.; Youdef, A.A. and Abd El-Rahman, S.I. 1992. Effect of temperature on the biology of *Cheletomorpha lepidopterorum* (Schaw) (Acari: Cheyletidae). Egypt. J. Agric. Res., 70 (3): 741-750.

El-Naggar, M.E.; Abd El-Aal, Z.E.; El-Bashir, Z.M. and Mesbah, A. E 2006. Effect of temperature on the biology of the predatory mite, *Cheletomorpha lepidopterorum* (Schaw) (Acari: Cheyletidae). Egypt. J. Agric. Res., 82 (2):421-426.

Fain, A. and Bochkov, A.V. 2010. A review of some cheyletid genera (Acari: Prostigmata) with description of new species. Acarina, 9:47-95.

Fuangarworm, M. and Lekprayoon, C. 2010. Two new species of cheyletid mites (Acari: Prostigmata) from Thailand. Zootaxa, 2494:59-68.

Gerson, U. and Smiley, R. L. 1990. Acarine Biocontrol Agents. An illustrated Key and manual. Chapman Hall, pp.174.

Gerson, U.; Fain, A. and Smiley, R.L. 1999.Further observations on the Cheyletidae (Acari), with a key to different genera of the Cheyltinae and a list of all known species in the family, Bulletin do I Institut. Rival des Science naturelles Belgigque (Entomology), 69: 35-68.

Hughes, A.M. 1976. The mites of stored food and houses. Ministry of Agriculture, Fishers and Food Technical Bulletin, 9, London, UK.

Ito, Y. 1971.Predation by manure-mesostigmatids (Acarina: Mesostigmata) in some free-living nematodes, Appl. Ent. Zool., 6:51-56.

Metwally, A.M.; Abou-El-Nagaa, M. and Ibrahim. G. A. 1983. Biological studies on *Hypoaspis miles* (B.) (Acarina: Laelapidae). Proc. 5th Arab. Pesticides Conf., Tanta Univ., Egypt. 3:336-346.

Nickolas, E.P.; Nickolas, G.E. and Costas, J,. S. 2009. Mites association with stored products in Greece. Exp. &Appl. Acarol., 44 (3): 213-214.

Rasool, A. and Choudhri, W.M. 1979. Two new species of the genus *Hemicheyletia* Volgin (Acarina: Cheyletidae) from Pakistan. Pakistan. Entomologist, 1:1-6.

Rodriguez, T.G.; wade, C.F. and Wells, C.N. 1972. Nematodes as natural food for fly egg. Ann. Ent. Soc. Amer., 55: 507-511.

SAS institute, 1988. SAS/Stat users guide, 6.03, ed. SAS Institute, Cary, NC.

Taha, H.A.; El-Naggar, M.E. , Ibrahim, G.A. and Soliman, M.S. 1988. Biological studies on two acarine predators of the grain mite, Caloglyphus rhizoglyphoides Zachvatkin, Agric. Res. Rev., Cairo, 66:137-144.

Willis, R.R. and Axtell, R.C. 1968. Mite's predators of housefly: A comparison of *Fuscuropoda vegelans* and *Macrocheles muscaedomesticae*. J. Econ. Entomol. 61:1669-1674.

Yassin, E.M.A.; Sallam, G.E. and Ibrahin, S. A.2008. Studies on the feeding, reproduction and development of *Cheletomorpha lepidopterorum* (Schaw) (Prostigmata: Cheyletidae) on various food sources. Integ. Proc. Of St. Prod.

IOBAC/wprs Bulletin, 40: 53-62.
Zaher, M.A. 1986. Survey and ecological studies on phytophagous, predaceous and soil mites in Egypt. Pl. 480 programme, USA, Project No. EG-ARS.
Zdarkova, E. 1979. Cheyletid fauna association with stored products in Czechoslovakia. J. Stored Prod. Res., 15:11-16.

ARABIC SUMMARY

ملاحظات علي بيولوجيا الاكاروس Cheletominus congensis Cunliffe كليتيدي ذات الثغر الامامي عند تغذيتة علي اغذية مختلفة علي درجات حرارة مختلفة

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اجريت هذه الدراسة لدراسة تاثير الاكاروس الاكاريدى *Tyrophagus putrescentiae* والنيماتودا الحرة المعيشة *Rhabditis scanica* على حياة الاكاروس المفترس *Cheletominus congensis* المنتمى لعائلة Cheyletidae عند درجتى الحرارة ٢٥ و ٣٥ م° ورطوبة نسبية ٧٠±٥% حيث اتضح من الدراسة ان المظاهر البيولوجية (البيضة- دورة الحياة- طول فترة حياة الفرد البالغ- والفترة الكلية للاكاروس المفترس) قد ذادت بالتغذية على النيماتودا الحرة المعيشة اكثر منها على الاكاروس الاكاريدى وان الحرارة ٣٥ م° قللت من طول هذه الفترات بينما ٢٥ م° قامت بزيادتها وكانت اعلى فترة حضانة بيض مسجلة (٥.٤٤ يوما) للاناث على الاكاروس الاكاريدى واقلها (٣.١٤ يوما) عند تغذية الذكور على النيماتودا الحرة عند ٣٥ م° اما بالنسبة لفترة دورة الحياة life cycle فقد استغرق المفترس اطول فترة مسجلا ٢٠.٠ يوما للاناث عند ٢٥ م° على النيماتودا واقلها ١٠.٦٣ يوما للذكور على الاكاروس الاكاريدى عند ٣٥ م° واتضح ايضا ان فترة الحياة للافراد البالغة longevity قد تاثرت اثناء الدراسة بصورة معنوية خيث سجلت اعلى زمنا ممكنا للافراد الاناث على النيماتودا الحرة المعيشة مسجلة ٤٣.٣٣ يوما عند ٢٥ م° واقلها على الاكاروس الاكاريدى مسجلة زمنا مقداره ٢١.٦٤ يوما عند ٣٥م°. للافراد الذكور. اما بالنسبة لطول الفترة الكلية لحياة الاكاروس Life span فقد تاثرت بصورة معنوية باختلاف نوع الغذاء ودرجات الحرارة مسجلة اعلى فترة للاناث عند ٢٥ م° (٦٣.٤٠ يوما) على النيماتودا الحرارة واقلها على الاكاروس الاكاريدى عند ٣٥ م° للافراد الذكور مسجلة زمنا مقداره ٣٢.٢٦ يوما . واوضحت الدراسة ان عدد البيض الموضوع بواسطة اناث المفترس *C.congensis* قد ذاد لاعلى معدل له عند تغذية الاناث على النيماتودا الحرارة عند ٢٥ م° (٩٦.٨ بيضة) واقلها عند التغذية على الاكاروس الاكاريدى عند ٣٥م° مسجلة عددا مقداره ٦٧.٦ بيضة وان الكفاءة الافتراسية للمفترس قد اختلفت حسب طور الفريسة *T. putrescentiae* ودرجة الحرارة حيث قام المفترس الانثى اثناء مدة الحياة الكلية بافتراس اكبر عدد من الفريسة ١٣٣.٧٦ بيضة من الاكاروس الاكاريدى عند ٢٥ م° واقلها استهلاكا عند تغذية الافراد الذكور على الاطوار الغير بالغة للاكاروس الاكاريدى عند ٣٥ م° (٤٠.٧٥ طور غير بالغ).