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THE BIOLOGICAL ASPECTS OF THE PREDACIOUS MITE, *CHEYLETUS ERUDITUS* (SCHRANK) (ACARI: CHEYLETIDAE) REARED ON THREE PREY SPECIES AT VARIOUS CONSTANT TEMPERATURES

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ABSTRACT: *The cheyletid mites were the commonest predators amongst the mite species attracted attention as biological control agents attacking the acarid mites eggs and immature stages and also the eggs of different beetles infesting different stored product seeds and grains. Cheyletus eruditus (Schrank) was reared on eggs and immatures of the acarid mite, Rhizoglyphus robini Claparede, eggs of the lepidopterous insect Plodia interpunctella (Hubner) and eggs of the coleopterous insect Callosobruchus maculatus (Fabricius) at 20, 25 and 30 ºC and 70 % R.H.. Obtained data showed that the type of prey and temperature affected significantly on C. eruditus (male and female) biology. As it prolonged C. eruditus life stages (life cycle, longevity and life span) when fed on eggs of R. robini at 20 ºC., while it was significantly decreased when fed on eggs of C. maculatus at 30 ºC, as the periods decreased. On the other hand, there was a significant effect on the predator's fecundity when fed on different prey and temperature, as C. eruditus female deposited 49.92 eggs at 30 ºC when fed on R. robini eggs, while it was 33.0 eggs at 20 ºC when fed on C. maculates eggs. C. eruditus female and male consumed (during the life cycle) an average of 30.30 and 22.4 eggs, respectively when fed on R. robini eggs at 25 ºC. In addition to the previous findings, C. eruditus females through its life span consumed the highest number of R. robini eggs with an average of 100.03 eggs, while the male's consumption was 50.22 eggs. It is worth to note that cannibalism was noticed among the tested predator in the absence or shortage of food.*

Key words: *Cheyletus eruditus, Biological aspects, acarid mite, Indian meal moth, seed beetle, prey, predation.*

INTRODUCTION

Production of grain-crops at the farm level is a value added agricultural process that includes both field planting and storage of grain. The economical outcome of this process is influenced by many biotic and abiotic factors and their mutual interactions. Infestation of grain by arthropods belongs among the most economically important biotic factors; since these pests cause enormous losses of stored products each season worldwide (Harein and Meronuck 1995). Insects and mites cause direct and indirect damage to stored grains and their products by raising their moisture contents, generating sufficient heat for the growth of infectious bacteria and fungi and cause injury to grains and contaminate grains agro-products by allergens and toxins (Stejskal *et al.,* 2002). The Indian meal moth *Plodia interpunctella* (Hubner) (Lepidoptera) and the bean weevils or seed beetles, *Callosobruchus maculatus* (Fabricius) (Coleoptera) are the most common stored product insect pests damaging stored products by their larvae which attack a wide range of products including cereal and cereal products, coarse flour and cornmeal, rice, dried fruit, dehydrated vegetables, nuts, chocolate, dried dog and cat food, bird seed, and dried herb and flower arrangements, (Na and Ryoo, 2000).The acarid mite, *Rhizoglyphus robini* (Acari: Acaridae) (bulb mite) is important pest attacking bulbs, corms and tubers of a variety of crops (e.g. onion, garlic and other vegetables) and

ornamentals and cause damage to these crops, in greenhouses and in the field, directly by feeding, and indirectly by spreading plant pathogens, Fan and Zhang (2003). There is ample evidence that predators and parasitoids can play a significant role in the decline of moth populations in storages. Graham (1970) described the buildup and decline of *Cadra cautella* (Walker) (Lepidoptera: Pyralidae) (infesting bagged maize in Kenya, and concluded that predation by the mite *Blattisocius tarsalis* Berlese (Acarina: Ascidae) was the major cause of decline. Several mite predators have been documented to be associated with or even considered to be biological control agents against certain species of these pests. The cheyletid mites were the most important predacous mites amongst the mite species used as biological control agents attacking the different mites eggs and immature stages and also the eggs of different beetles infesting different stored products. This research was conducted to study the impact of the *lepidopterous insect* (*Plodia interpunctella)* eggs and *coleopterous insect (Callosobruchus maculatus*) eggs and the acarid mite, *Rhizoglyphus robini* eggs and immature stages at 20, 25 and 30 ºC and 70% R.H. on the biology of the predacious mite, *Cheyletus eruditus*.

MATERIALS AND METHODS

Females and males of the cheyletid mite, *Cheyletus eruditus* were isolated from a standing culture and transferred individually into small plastic cell (5 cm in diameter, 4 cm in depth).The bottom of the cell was filled with a mixture of plaster of Paris and charcoal (9 : 1) to provide humidity and tightly covered by a glass slide as mentioned by Rakha *et al.*, (1991) and Salem *et al.*, (2005). Newly hatched predatory nymphs (protonymphs and deutonymphs) were confined singly in other cells and supplied with a known number of the acarid mite, *Rhizoglyphus robini* (eggs and immature stages), two-day old eggs of both *Plodia interpunctella* and *Callosobruchus maculatus*. Numbers of consumed or punctured eggs and immatures were counted and replaced daily. Drops of water were added to maintain suitable humidity inside the rearing cells. Biological studies were conducted at 20, 25 and 30 °C and 70 % R.H. The efficacy of the predatory mite *Cheyletus eruditus* when fed on different types of prey was calculated. Ten replicates per each experiment were tested, all 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

Incubation period: Results in Tables (1,2,3 and 4) showed that the incubation period of *Cheyletus eruditus* significantly differed when the individuals (males and females) fed on the four types of prey at different temperature. The longest incubation period was noticed (5.9 days) when the mite female fed on *Rhizoglyphus robini* eggs at 30 ºC, Table (1) while the shortest incubation was noticed (3.56 days) when the male fed on eggs of *Callosobruchus maculatus* at 30 ºC, Table (4). Generally, the incubation period of *C. eruditus* significantly differed through the research and has been varied between the male and female fed on different prey and further more between the different temperature degrees, Table (5).

Life cycle: The prey and temperature suitability clearly affected the life cycle of the cheyletid mite, *C. eruditus*. The statistical analysis of the obtained data, Tables (1, 2, 3 and 4) showed that 20 ºC and eggs of *R. robini* obviously significantly increased the developmental duration of the predator life cycle for both male and female of *C. eruditus.* Thus. the adult female of *C. eruditus* took the highest life cycle period 22.8 days when fed on *R. robini* eggs at 20 ºC, Table (1), while it consequently decreased with male individuals to (13.7 days) when fed on *C. maculatus* eggs at 30 ºC, Table (4). Statistical analysis of Table (5) indicated that the life cycle was affected significantly by temperature degrees and prey types.

Table (1): Duration in days of the developmental stages and fecundity of *Cheyletus eruditus* when fed on eggs of *Rhizoglyphus robini* at different temperature

Biological aspect	Male			Female		
	20 ºC	25 ºC	30 ºC	20 ºC	25 ºC	30 ºC
Incubation period	5.5±0.35	5.0±0.08	4.76±0.11	5.9±0.07	5.58±0.1	5.18±0.08
Life cycle	20.84±0.17	19.0.0±0.24	17.12±0.13	22.8±0.1	21.48±0.5	19.2±0.1
Longevity	15.0±0.14	13.4±0.07	12.48±0.11	18.5±0.35	15.58±0.11	14.60±0.11
Life span	35.88±0.08	32.46±0.36	29.98±0.20	41.12±0.18	37.0±0.14	33.78±0.18
Fecundity	-	-	-	40.0±0.14	45.0±0.71	49.92±0.31

Table (2): Duration in days of the developmental stages and fecundity of *Cheyletus eruditus* when fed on immatures of *Rhizoglyphus robini* at different temperature

Biological aspect	Male			Female		
	20 ºC	25 ºC	30 ºC	20 ºC	25 ºC	30 ºC
Incubation period	4.8±0.08	4.5±0.07	4.2±0.07	5.5±0.08	5.2±0.1	5.0±0.1
Life cycle	19.0±0.14	17.5±0.14	15.54±0.11	21.06±0.09	19.48±0.08	17.9±0.07
Longevity	14.48±0.1	12.04±0.17	11.5±0.14	17.84±0.13	14.5±0.1	13.6±0.1
Life span	33.5±0.07	29.5±0.1	27.16±0.26	39.0±0.14	33.92±0.04	31.48±0.32
Fecundity	-	-	-	38.0±0.71	42.6±1.1	47.0±0.71

Table (3): Duration in days of the developmental stages and fecundity of *Cheyletus eruditus* when fed on eggs of *Plodia interpunctella* at different temperature

Biological aspect	Male			Female		
	20 ºC	25 ºC	30 ºC	20 ºC	25 ºC	30 ºC
Incubation period	4.48±0.11	4.2±0.1	4.0±0.14	5.2±0.04	5.02±0.04	4.8±0.07
Life cycle	17.9±0.07	16.5±0.14	14.76±0.11	19.96±0.11	18.7±0.68	16.66±0.11
Longevity	13.98±0.11	12.5±0.14	11.14±0.1	17.6±0.07	14.3±0.1	13.1±0.07
Life span	31.96±0.05	30.0±0.14	25.98±0.18	37.5±0.07	32.7±0.14	29.92±0.11
Fecundity	-	-	-	35.0±0.71	38.0±0.7	41.2±0.44

Table (4): Duration in days of the developmental stages and fecundity of *Cheyletus eruditus* when fed on eggs of *Callosobruchus maculates* at different temperature

Biological aspect	Male			Female		
	20 ºC	25 ºC	30 ºC	20 ºC	25 ºC	30 ºC
Incubation period	4.08±0.19	3.84±0.17	3.56±0.15	5.0±0.14	4.44±0.09	4.0±0.14
Life cycle	16.6±0.14	15.0±0.14	13.7±0.1	19.02±0.11	16.58±0.1	15.02±0.15
Longevity	13.48±0.11	11.98±0.11	10.98±0.11	17.0±0.14	14.02±0.18	12.98±0.11
Life span	30.06±0.09	26.98±0.11	24.7±0.07	36.0±0.14	30.6±0.14	37.98±0.11
Fecundity	-	-	-	33.0±0.71	35.0±0.7	40.0±0.71

Table (5). Effect of different prey species and temperature on the incubation period and life cycle of the cheyletid mite, *C. eruditus*

Biological aspect	Source	F.	P.
Incubation period	Temp.	246.307	0.0000***
	Sex	830.53	0.0000***
	Prey	451.64	0.0000***
	Int. Temp. x sex	0.9805	0.3788 ns
	Int. Temp. x prey	3.461	0.0039**
	Int. Sex x prey	9.281	0.0000***
	Int. Temp. sex. Prey.	3.600	0.0029**
L.S.D. at 0.05 level	Temp.= 0.0557	Sex =0.0454	
Life cycle	Temp.	2598.32	0.0000***
	Sex	2769.116	0.0000***
	Prey	1978.947	0.0000***
	Int. Temp. x sex	2.58015	0.0810 ns
	Int. Temp. x prey	7.2726	0.0000***
	Int. Sex x prey	5.4474	0.0017 **
	Int. Temp. sex. Prey.	7.8344	0.0000***
L.S.D. at 0.05 level	Temp.= 0.0939	Sex =0.0766	

* significant ** high significant *** very highly significant

Longevity: Statistical analysis of the data in Tables (1, 2, 3 and 4), using L.S.D. at 0.05 level values pointed out that the type of prey was significantly affected the adult male and female longevity of the cheyletid mite, *C. eruditus*. This duration registered the longest period 18.5 days when adult females fed on *R. robini* eggs at 20 ºC, Table (1), on the other hand it recorded the shortest time as 10.98 days for C. *eruditus* males reared on *C. maculatus* eggs at 30ºC., Table (4). Statistical analysis of obtained data in Table (6) indicated that longevity of both males and females of *C. eruditus* was highly significant when exposed to the tested treatments of temperature degrees and different prey. Cannibalism was common in the adult stage males and females of *C. eruditus* in the absence or scare of the prey.

Life span: Accordingly, the life span of *C. eruditus* was significantly differed according to the type of prey at different temperature degrees, Table (6). Also, data in Tables (1,2,3 and 4) showed that the highest life span period of this predatory mite was noticed when the *C. eruditus* female individuals was reared on *R. robini* eggs 41.12 days at 20 ºC., Table (1) and was decreased significantly reaching 24.7 days when the male individuals were fed on *C. maculatus* eggs at 30 ºC., Table (4).

Table (6). Effect of different prey species and temperature on the longevity and life span of the cheyletid mite, *C. eruditus*.

Biological aspect	Source	F.	P.
Longevity	Temp.	7120.18	0.0000***
	Sex	11137.86	0.0000***
	Prey	717.363	0.0000***
	Int. Temp. x sex	381.71	0.0000***
	Int. Temp. x prey	19.0789	0.0000***
	Int. Sex x prey	2.7725	0.0456*
	Int. Temp. sex. Prey.	5.2559	0.0000***
L.S.D. at 0.05 level	Temp. = 0.0589	Sex = 0.0481	
Life span	Temp.	12274.26	0.0000***
	Sex	31241.02	0.0000***
	Prey	3746.535	0.0000***
	Int. Temp. x sex	629.357	0.0000***
	Int. Temp. x prey	904.30	0.0000***
	Int. Sex x prey	738.350	0.0000***
	Int. Temp. sex. Prey.	689.036	0.0000***
L.S.D. at 0.05 level	Temp. =0.072	Sex =0.0588	

* significant ** high significant *** very highly significant

Fecundity: Mating is essential for egg deposition of *C. eruditus*. Eggs production in *C. eruditus* was influenced by the type of consumed food, Tables (1, 2, 3 and 4). Fecundity was significantly high when the adult female fed on eggs of the acarid mite *R. robini*, where it deposited 49.92 eggs at 30 ºC., Table (1) while the number of eggs reached the lowest level 33.0 eggs at 20 ºC., Table (4) when *C. eruditus* fed on eggs of *C. maculatus*. However, it was noticed from the obtained data that the number of deposited eggs by *C. eruditus* female increased by raising temperature degree from 20 to 30 ºC. Several researchers have studied the biological aspects of this predator, and different results were obtained, e.g., regarding developmental stages duration, fecundity, reproduction mode, and prey consumption (Zaher and Soliman 1971; Rizk *et al*., 1981; Yousef *et al.,* 1982; Saleh *et al.*, 1986; Nangia *et al*., 1995; Pekar and Hubert 2008). Those differences may be attributed to the occurrence of various biotypes in different regions of the world (Palyvos and Emmanouel 2011). Other sources of variation would be the ambient temperature (s) or the prey types. Filipponi (1964) indicated that some species may even have different reproductive patterns in different geographic regions. The effect of temperature on the development of immature stages of the predator *C. eruditus*, produced by either fertilized or virgin females, was studied at 17.5, 20, 25, 30, 32.5, and 35 °C, & 80 ± 5% relative humidity, in complete darkness, while fed on *Tyrophagus putrescentiae* (Schrank), Nickolas *et al.,* (2009). Based on total produced developmental time, males developed more quickly than females, at all temperatures.

Predation capacity of *C. eruditus* on eggs of *R. robini*:

During their life cycle, *C. eruditus* females and males preyed on *R. robini* eggs with an average of 30.30 and 22.4 eggs, respectively at 25 ºC. Considering the adult *C. eruditus* longevity, the average of consumed number of *R. robini* eggs during this period, was 70.40 and 27.50 for female and male individuals, respectively. On the other hand, *C. eruditus* females during the whole duration period preyed on *R. robini* eggs with an average of 100.03 eggs, while males consumed an average of 50.22 eggs, Table (7).

Table (7): Efficiency of *C. eruditus* of consumed different prey at 25 ºC and 70% R. H.

Type of prey	Developmental stages of *C. malccensis*	Mean numbers ± S. E. of prey consumed by one cheyletid mite	
		Female	Male
Eggs of *Rhizoglyphus robini*	Life cycle	30.30±0.45	22.4 ±0.54
	Longevity	70.40±0.55	27.50±0.35
	Life span	100.03±0.1	50.22±0.1
Immatures of *Rhizoglyphus robini*	Life cycle	23.9±0.74	16.7 ±0.57
	Longevity	52.8±0.84	23.60±0.08
	Life span	80.50±0.50	40.50±0.07
Plodia interpunctella eggs	Life cycle	17.60±0.11	14.50±0.35
	Longevity	47.60±0.08	22.48±0.08
	Life span	66.50±0.35	38.58±0.15
Callosobruchus maculatus eggs	Life cycle	15.60±0.41	13.55±0.03
	Longevity	42.46±0.3	18.58±0.08
	Life span	60.32±0.41	33.30±0.07

Predation capacity of *C. eruditus* on immatures of *R. robini*:

During the life cycle of females and males of *C. eruditus* when fed on immature of *R. robini*, the consumed prey was averaged as 23.9 and 16.7 individuals, respectively, Table (7). On the other hand the average of consumed numbers of *R. robini* immatures during the adult longevity of females and males were 52.8 and 23.6 individuals, respectively. However, during the whole life span of the predator females and males, consumed on *R. robini* immatures with an average of 80.50 and 40.5 preys, successively.

Predation capacity of *C. eruditus* on eggs of *P. interpunctella*:

The obtained data in Table (7) showed that females and males of *C. eruditus* during their life cycles when fed on *P.interpunctella* eggs, recorded an average of 17.60 and 14.5 prey eggs, consecutively. However, during longevity of the adult females consumed an average of 47.60 eggs / female, but the predation capacity of adult males averaged 22.48 eggs / male. Also, it is obvious from the same table that, *C. eruditus* females during its life span devoured eggs of *P.interpunctella* with average of 66.5 eggs / female, but males fed on eggs with an average of 38.58 eggs/ male.

Predation capacity of *C. eruditus* when fed on eggs of *C. maculatus*:

Data in Table (7) showed that, *C. eruditus* when fed on eggs of *C. maculatus*, consumed averages of 15.60, 13.55 eggs; 42.46, 18.58 eggs, and 60.32, 30.3 eggs of *C. maculatus* at the life cycle, longevity and life span of *C. eruditus* females and males, respectively. Generally, this study indicated that eggs of the acarid mite, *R. robini* as diet was the most favorable food for the reproduction of the predator *C. eruditus* while the eggs of coleopterous insect *C. maculatus* were the lowest diet. Similar results were obtained by Zaher and Soliman (1971) when reared *C. eruditus* in the laboratory on *Caloglyphus* sp. and noticed that the egg stage was averaged as 6.6 days at 19.5 ºC and the larval, protonymphal and deutonymphal stages together averaged 19.4 days for females and 16.5 for males at 22 ºC. Females laid 9-18 (average 12.6) eggs each. At 21.7 ºC, the females lived for an average of 17 days and the males for 11.5. Similar results were also obtained by Rakha *et al.,* (1991) who carried out biological studies on *C. malaccensis* in laboratory at 27 ºC & 70 % R.H., and showed that eggs of *Lasioderma serricorne* L. seem to be a very adequate prey for this predaceous mite, furthermore, longevities of females and males lasted 60.3 and 29.6 days, respectively, in addition, larval, protonymphal and adult stages of the male consumed 2.0, 4.2 and 2.6 eggs, while the female consumed 2.3, 3.6 and 106.4 eggs, respectively. The efficacy of the cheyletid mite *Acaropsis sollers* (Rohd.) as a biological control agent on eggs of the southern cowpea beetle, *C maculatus* (Fabricius) and the cowpea beetle, *Callosobruchus chinensis* (L.) was studied under laboratory conditions, by Salem *et al.,* (2005) and noticed that *A. sollers* predation capacity during longevity of adult females when fed on eggs of the first prey averaged 64.0 eggs /female / 15.3 days, while the mite males attacked prey eggs with an average of 17.8 eggs / male / 6.3 days, however, when the second prey with introduced to the predator, it devoured 56.0 eggs / female/14.3 days, changed to 15.8 eggs / male / 6.0 days. On the other hand, Nangia *et al.*, (1995) studied the biology of *C. malaccensis* in the laboratory, using eggs of *Corcyra cephalonica* as prey, and noticed that the predator egg, larval, protonymphal and deutonymphal stages lasted 6.0, 3.0, 4.0 and 4.0 days, respectively, while the average fecundity was 58.6 eggs /female, and cannibalism was common in the adult stage. Also a study was carried out on the life history of *C. malaccensis* when fed on *Lepidoglyphus destructor* by Zhang *et al.*, (1997), and found that the whole life history required 48-50 days, including 5 stages (eggs, larvae, protonymphal and deutonymphal stage, and adults), where each mite consumed approximately 10-12 prey items / day and a total of 500 prey items during its life time. The predatory

capacity decreased (with an unchanged number of prey) when the density of the predator increased. Recently, Yassin *et al.,* (2008) reared the cheyletid mite, *Cheletomorpha lepidopterorum* on different astigmatid mites and mentioned that *Tyrophagus putrescentiae* was the most favorable prey than *Lepidoglyphus destructor, Rhizoglyphus echinopus* and *Caloglyphus betae* and this might be due to that *T. putrescentiae* contained high contents of total sugar and high relative concentration of glucose. Further studies should be contribute to improve the rearing methods of this predator. Obtained data provide fundamental information for understanding the effect of different stored product pests and temperatures on development of the cheyletid mite, *C. eruditus* and this will increase its ability as a biological control agent.

REFERENCES

Duncan, D. B. (1955). Multiple range and multiple F.test. Biometrics, 11: 1 - 42.

Fan, Q. and Z. Zhang (2003). *Rhizoglyphus echinopus* and *Rhizoglyphus robini* (Acari: Acaridae) from Australia and New Zealand: identification, host plants and geographical distribution. Systematic & Applied Acarology. Special Publications: 16: 1-16.

Filipponi, A. (1964). The feasibility of mass producing macrochelid mites for field trials against house flies. Bull. W.H.O., 31:499-501.

Graham, W. M. (1970). Warehouse ecology studies of bagged maize in Kenya—II. Ecological observations of an infestation of *Ephestia* (*Cadra*) *cautella* (Walker) (Lepidoptera, Phycitidae). Journal of Stored Products Research, 6: 157–167

Harein, P. and R. Meronuck (1995). Stored grain losses due to insects and molds and the importance of proper grain management, *In* V. Krischik, G. Cuperus & D. Galliart, pp 29-31. E-912.CES. Div.Agric. Sci. Nat. Res. Osu .USDA. Fgis. ES. Aphis.242 pp.

Na, J.H. and M. I. Ryoo (2000). The influence of temperature on development of *Plodia interpunctella* (Lepidoptera: Pyralidae) on dried vegetable commodities. Journal of Stored Products Research 36, 125–129.

Nangia, N., G. P. ChannaBasavanna and P. S. Jagadish (1995). The biology of *Cheyletus malaccensis* (Acari: Prostigmata) a predator of primary acariforms in storage. Current Research University of Agricultural Sciences Bangalore. 24 (1): 13-15

Nickolas, E. P., G.E. Nickolas and J. S. Costas (2009). Mites associated with stored products in Greece. Experimental & Applied Acarology, 44 (3): 213-214.

Palyvos, N. E. and N. G. Emmanouel (2011). Reproduction, survival, and life table parameters of the predatory mite *Cheyletus malaccensis* (Acari: Cheyletidae) at various constant temperatures. Exp Appl. Acarol.; 54(2):139-50.

Pekar, S. and J. Hubert (2008). Assessing biological control of *Acarus siro* by *Cheyletus malaccensis* under laboratory conditions: Effect of temperatures and prey density. Stored Prod. Res., 44 (4):335-340.

Rakha, M. A., M. E. E. EL-Naggar and I. I. El-Sebbay (1991). Biological studies on the predacious mite *Cheyletus malaccensis* (Oudemans) (Acari: Cheyletidae) when fed on eggs of *Lasioderma serricorne* L. Egyptian Society for Biological Control of pests.77-83.

Rizk, G. N., E. El-Badry and S. M. Hafez (1981). The effectiveness of predacious and parasitic mites in controlling *Tribolium confusum* Duv. Mesopotamia Journal of Agriculture. 14 (2): 167-182.

Saleh, S., M. S. El-Helaly and F. H. El-Gayar (1986). Life history of the predatory mite *Cheyletus malaccensis* (Oudemans).Acarologia, 27(1): 37-40.

Salem, S. E., E. T. E. Darwish, A. M. Zaki and M. A. M. Abou-Tayesh (2005). Efficacy of *Acaropsis sollers* (Actinedida, Cheyletidae) in the biological control of two Cowpea beetle species. J. Pest Cont. & Environ. Sci., 13 (1): 51-60.

Stejskal,V., J. Hubert, A. Kubatova, V. Taborsky, J. Polak, A. Lebeda and V. Kudela (2002). Associated food- hazards: storage fungi and mites in poppy,

mustard, lettuce and wheat. Pl. Protect. Sci., 38 (2): 673-680.

Yassin, E. M. A., G. M. Sallam and S. A. Ibrahim (2008). Studies on the feeding, reproduction and development of *Cheletomorpha lepidopterorum* (Schaw) (Prostigmata: Cheyletidae) on various food sources. IOBC/WPRS Bulletin, Vol. 40: 33-52.

Yousef, A. A., M.A. Zaher and M. M. Kandil (1982). Effect of prey and temperature on the development and biology of *Cheyletus malaccensis* Oudemans (Acari: Cheyletidae). Zeitschrift fur Anagewandate-Entomol., 93 (1): 39-42.

Zaher. A. and Z. R. Soliman (1971). Life-history of the predatory mite *Cheyletus malaccensis* Oudemans (Acarina: Cheyletidae). Bulletin de la Societe Entomologique d' Egypte. 1971; 55: 49-53.

Zhang, Y. X., L. J. Zheng and H. A. Pin (1997). Studies on the relationship between *Cheyletus malaccensis* Oudemans (Acarina: Cheyletidae) and *Lepidoglyphus destructor*. Journal of Fujian Academy of Agricultural Sciences, 12 (1): 44-47 .

المظاهر البيولوجية للمفترس الاكاروسى *Cheyletus eruditus* (Schrank) (أكارى : كليتيدى) المربى على ثلاثة انواع من الفرائس تحت درجات حرارة مختلفة

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الملخص العربى

تعتبر الأكاروسات المنتمية لعائلة Cheyletidae من المفترسات الأكاروسية التى تحتل مكانة كعامل من عوامل المكافحة الحيوية للآفات وخصوصا الأكاروسات والحشرات. ولقد أجريت هذه الدراسة على الأكاروس *Cheyletus eruditus* والمنتمى لهذه العائلة وذلك عند تغذيته على البيض والأطوار الغير كاملة للاكاروس الاكاريدى *Rhizoglyphus robini* وبيض كلا من الحشرات *Plodia interpunctella* و *Callosobruchus maculates* وذلك عند 20 و 25 و 30 م° ورطوبة نسبية مقدارها 70 %. ولقد أوضحت النتائج المتحصل عليها أن نوع الغذاء ودرجات الحرارة أثرت بصورة معنوية على المظاهر البيولوجية للأكاروس *C. eruditus* (ذكورا وإناثا) حيث طالت فترات الحياة للأكاروس المفترس (دورة الحياة – فترة حياة الأفراد البالغة – الفترة الكلية لحياة الأكاروس) عند التغذية على بيض الأكاروس الاكاريدى *R. robini* عند 20 م° بينما قلت هذه الفترات إلى أقل معدل وبصورة معنوية عند التغذية على بيض الحشرة *C. maculatus* عند 30م°. من ناحية أخرى كان هناك تأثيرا معنويا واضحا لنوع الغذاء ودرجة الحرارة المستخدمة على خصوبة الإناث (عدد البيض) للمفترس الأكاروسى حيث سجل أعلى معدل من البيض (49.92 بيضة) عند 30 م° عند تغذية

الإناث على بيض الأكاروس الاكاريدى *R. robini* و أقل عدد من البيض لوحظ عند تغذية الأفراد على بيض الحشرة *C. maculates* (33.0 بيضة) وذلك عند 20 م°. ولقد استهلكت الإناث والذكور للمفترس الأكاروسى أثناء دورة الحياة Life cycle عددا مقداره 30.30 و 22.4 بيضة من الأكاروس *R. robini* على الترتيب كما استهلكت أفراد المفترس أثناء الفترة الكلية للأكاروس Life span أعلى معدل ومقداره 100.03و 50.22 من بيض الأكاروس الاكاريدى على الترتيب عند 25 م°.ولقد لوحظ أثناء الدراسة وجود ظاهرة الافتراس الذاتي Cannibalism بين أفراد هذا المفترس الأكاروسى وذلك عند غياب أو نقص أعداد الفريسة المقدمة له.