Minufiya J. Agric. Res. Vol. 33 No.2: 537 - 545 (2008)

BIOLOGY OF *TYDEUS AEGYPTIACA* (RASMY *AND* EL-BAGOURY) (ACARI : PROSTIGMATA : TYDEIDAE) REARED ON DIFFERENT DIETS

E.M.A. Yassin, H. M.A. El-Nenaey, E.M. Bakr and S.A. Allam
Plant Protection Research Institute, Dokki, Giza, Egypt.

(Received: Jan. 10 , 2008)

ABSTRACT: The tydeid mite, *Tydeus aegyptiaca* (Rasmy *and* El-Bagoury) (Tydeidae) was reared individually on the fungi, *Aspergillus niger, Alternaria alternata and Fusarium* sp. and its developmental period, the longevity of females, males and also female fecundity were recorded under various temperatures 15, 25 and 35 ºC. and about 75 % R.H. The mite developed faster when they were reared at higher temperature 35 ºC, whereas the mites developed fast on *Aspergillus niger*. and they showed higher longevity and fecundity on *Fusarium* sp. Also, the longevity was higher at 15 C than 25 and 35 ºC. The present study indecated that *T. aegyptiaca* fed as fungivorous mites and not as predator when the different tested fungi and the mite *Tyrophagus putrescentiae* were introduced to it as foods.

Key wards: Fungi, Fungivorous mites.

INTRODUCTION

The tydeid mites are worldwide in distribution, Baker and Wharton, 1952. They are encountered on plants, stored products, moss, litter, straw, humus, soil, higher fungi and nests of birds, Marshall,1970. Feeding habits of this family differ according to species. Some are predaceous and have gained their importance for controlling small plant pests, Oatman 1963; Meyer and Rodrigue 1966; Samarosinghe and LeRoux, 1966; Marshal 1970 and Hessein and Perring, 1986. Others are considered plant feeders, Dubinin 1954 or fungivorous, Wahba 1976 and Yassin 2004, while food of some species is still debatable. Gerson 1986 considered most tydeid to be scavengers. Temperature and humidity affect on mite population and behavior in nature since these two factors act simultaneously. Several biological studies had been conducted to determine the feeding habits of some tydeid mites, Brickhill, 1958; Wahab *et al*., 1974; Wahba 1976 and Rasmy *et al*., 1978 and Yassin, 2004. A few contributions have been made to evaluate the effect of temperature and or relative humidity on tydeid mites, genus *Tydeus* biology under controlled conditions in the laboratory, Schruft 1972; Soliman *et al*., 1974; El-Bagoury 1978; Bayan 1984; El-Duweini *et al.,* 1989. Rasmy and El-Bagoury 1979 described the female of *Paralorryia aegyptiaca* as new species from specimens found in soil of mango orchard of El-Beheira Governorate, Egypt. According to Andre's 1980 definition, *Paralorryia aegyptiaca* should be placed in the genus *Tydeus,* In this study, the trials were undertaken in

laboratory at (15, 25 and 35 ± 2 ºC and of about 75 ± 2 % R.H.) to study the different biological aspects of the tydeid mite *Tydeus aegyptiaca* when fed on different fungi.

MATERIALS AND METHODS

***Tydeus aegyptiaca* (Rasmy et El-Bagoury) was collected from cotton plants soil and debris at El-Menofia Governorate and maintained at 25 ºC on *Aspergillus niger, Alternaria alternata and Fusarium* sp., which had been cultured on potato dextrose agar (PDA) medium at temperature of 25 ºC in Plant Pathology Institute, A. R. C. The media with such grown hyphae according to El-Duweini *et al*., (1989) were then divided into small pieces placesd each inside a Petri-dish and surrounded with a ring of tangle-foot. A small piece of wet cotton wool was also placed inside the dish to maintain suitable humidity. The Petri dishes were placed in incubators which were set up at various temperatures 15, 25 and 35 ºC and 75% ± 2 ºC. For the developmental test, tritonymphs of the mite were reared individually on each colony at each temperature and corresponding observations were conducted. As soon as females emerged on the colonies, males were introduced for mating. Eggs that have been oviposited within 12 hrs were used for experiments at 15 and 25 ºC, whereas eggs oviposited within 6 hrs were selectively used for experiments at 35 ºC to minimize the relative effects of variance to shorten egg periods at high temperature. The eggs were individually placed into a glass ring using a hair brush (000).Twenty-five eggs were initially used for each temperature and their development was observed every 12 hrs. until the mites reached maturity or died. Mortality in the results was expressed as that throughout all immature stages. The colony of fungus was never exhausted and was kept clean throughout the experiment. Trials were also conducted to study the suitability of non-prey food substance. This substance was immature stages of the acrid mite, *Tyrophagus putrescentiae* (Schrank) at the same conditions mentioned before. The 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 developmental stages of *T. aegyptiaca* were found to include five moving stages; larva, protonymph, deutonymph, tritonymph and adult (male and female). Eggs were laid singly and observed scattered under mycelium of the fungus. Duration of the different mite stages of *T. aegyptiaca* differed according to sex and the type of fungus used. Results of the Duncan's multiple range test showed that the total developmental period decreased significantly when the temperature increased to 35 ºC. Comparison of the total developmental period on different diets revealed that mites reached adulthood faster on *Aspergillus niger* at 35 ºC but that at 15 and 25 ºC, the

relationship became reversed. From obtained results, the male individuals emerged early before females.

Life cycle:

Data concerning the aspects of the immature stages of *T. aegyptiaca* to different feeding fungi are tabulated in Tables (1 & 2). The mean periods of the life cycle of the mite females were 18.6, 16.5 and 14.54; 22.7, 19.7 and 16.2; 24.2, 21.9 and 17.0 days when the mite fed on *A. niger*, *A. alternata* and *Fusarium* sp., at 15, 25 and 35 ºC, respectively (Table 1). On the other hand, these periods lasted 17.09, 14.79, 13.21; 20.5, 18.9, 14.51; 22.2, 20.51 and 15.85 days at the same conditions in case of *T. aegyptiaca* male (Table 2).From the obtained results also, the mortality ratio was high when the mites fed on *A. niger* at 15 ºC, (8.2 %) and low on *A. alternata* at 35 ºC (2.5% only). However, the significance differences occurred between all mites fed on the different diets (L.S.D. at 0.05 = 1.1821 for females and 1.1492 for males).

Adult longevity:

As shown in Table (3), the total life time of adult stage of *T. aegyptiaca* male and female seems to be considerably highly affected by the different fungi. Under the present experimental conditions, longevity of adult females and males was maximal at 15 ºC and diminished at 35 ºC. Average duration of this period took the highest record when the female fed on *Fusarium* sp. At 15 ºC (16.24 days), while the lowest period was observed for male individuals (7.0 days) at 35 ºC on *Aspergillus niger*.(L.S.D. at 0.05 level = 0.7201 for males and 0.5432 for females).

Fecundity (Number of deposited eggs):

The number of deposited eggs per female *T. aegyptiaca* varied according to the type of the tested fungus, Table (4). However, feeding on *Fusarium* sp. showed highly significance than any other fungi, L.S.D. at 0.05 level = 2.052. The highest number of deposited eggs was showed when the mite female fed on *Fusarium* sp. at 35 ºC (34.38 eggs), while the lowest number observed on *Aspergillus niger* at 15 ºC (17.12 eggs).

However, no highly significance was observed for eggs hatchability percentages when the mites fed on different fungi at different temperatures.

During the course of investigations, immature stages of acarid mite, *T. putrescentiae* were offered to the tydeid mite, *T. aegyptiaca* movable stages as a main source of food. Observations showed that this tydeid species did not fed on *T. putrescentiae* and most larvae and all protonymphs died before reaching the post stages. From the previous results, it was noticed that the feeding behavior of *T. aegyptiaca* at the tested conditions is fungivores. These observations agreed with results obtained by El- Duweini *et al*., 1989

Table 1

Table 2

Table 3 , 4

and Yassin 2004, where the tydeid mite, *Orthotydeus californicus* fed as fungivorous and not as predaceous mite. Also, Rasmy *et al.,* 1978 concluded that the tydeid soil mites, *Paralorryia woolleyi* Baker, *Tydeus kochi* Oudemans and *Paratriophtydeus plumeri* Baker appear to have similar biological characters as they are usually found in soil, feeding only on fungus and not attacking or preying on the phytophagus mites. Also The observations were similar to those obtained by Lister 1984; Walter *et al*., 1988 and Mueller *et al.,* 1990, where they regarding the feeding behavior of the soil mites into fungivores.

Finally, more field and laboratory observations of the feeding behavior of the tydeids and careful evaluation of complexes of mites in different Egyptian fauna are needed to understand the role of them as fungivorous mites.

REFERENCES

Andre, H. M. (1980). A generic revision of the family Tydeidae (Acari : Actinedida).IV. Generic description, key and conclusion. Bull. Soc. R. Belge. Entomol.,116 : 103 – 168.

Baker, E. W and G. W. Wharton (1952). An Introduction of Acarology, MacMillan Co., New York, 465 pp.

Bayan, A. (1984). Morphological variation and feeding habits of *Tydeus californicus* (Banks) (Tydeidae : Actinedida: Acari) on apple in Lebanon. Arab J. Plant Protection, 2 (2) : 87 – 94.

Brickhill, C. D. (1958). Biological studies of two species of tydeid mites from California. Hilgardia, 27 (20) : 601 – 620.

Dubinin, U. B. (1954). A new classification of mites of superfamily Analgesoidea and their position in the system of the order Acariformes. A. Zachv., 1952.Iz. Akad. Nauk USSR, ser. Biolog., 4 : 59 – 75.

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

El-Bagoury, M. E. (1978). Ecological and biological studies on mites of family Tydeidae. Ph. D. Thesis, Fac. Agric., Cairo Univ., 111 pp.

El-Duweini, F. K., Z. R. Sawires and S. M. Ibrahim (1989). Biological studies on *Tydeus (Tydeus) californicus* (Banks) to evaluate its feeding habit.3rd Nat. Conf. of Pests & Dis. of Vegetables and Fruits in Egypt and Arab Countries, Egypt: 1018 – 1026.

Gerson, E. (1986). Five tydeid mites from Israel (Acarina : Prostigmata). Israel J. Zool ., 17 : 191 – 198.

Hessein, N. A. and T. M. Perring (1986). Feeding habits of the Tydeidae with evidence of *Homeopronematus anconai* (Acari : Tydeidae). Ann. Entomol. Soc. Amer., 81 (3) : 488 – 492.

Lister, A. (1984). Predation in an Antarctic micro-arthropod community soil mites. *In* Acarology, IV, (2): pp. 886 – 892.

Marshall, V. C. (1970). Tydeid mites (Acarina : Prostigmata) from Canada: I-New and redescribed species of *Lorryia*. Ann. Soc. Ent. Quebec, 15:17–52.

Meyer, M. K. and M. C. Rodriguez (1966). Acari associated with cotton in Southern Africa (with reference to other plants). Garcia De Orta, Rev. Junta Invest. Ultramar, 13 (2) : 1 – 33.

Mueller, R., M. H. Bear and D. A. Crossley (1990). Soil mites in detrial food webs of conventional and non-tillage agro ecosystems. Pedobiologia, 34 : 389 – 401.

Oatman, E. R. (1963). Mite species on apple foliage in Wisconsin. P: 21 – 24 *In* J. A. Naegele (ed) Advances in Acarology. Cornell Univ. Press, 480 pp.Ithaca, N. Y.

Rasmy, A. H. and M. E. El-Bagoury (1979). A new species of genus *Paralorryia* from Egypt (Acari : Tydeidae). Acarologia, 21 (2) : 194 – 196.

Rasmy, A. H., Z. R. Soliman, M. A. Zaher and M. E. El-Bagoury (1978). Biological studies on three mite species of family Tydeidae. 4th Conf. Pest Control, NRC, Egypt, (1978) : 812 -814.

Samarosinghe, S. and E. J. LeRoux (1966). The biology and dynamics of the Oystershell scale, *Lepidosaphes ulmi* (L.) (Homoptera : Coccidae) on apple in Quebec. Ann Entomol. Soc. Quebec, 11 (3) : 206 – 259.

Schruft, G. (1972). The tydeids (Acari) on vines. Bull. Org. Europpeene et Miditerraneen pour la protection des plantes,3:15–25. (C.F. R. A. E. series A., 1973, 61(4) : 311).

Soliman, Z. R., M. A. Zaher and G. S. El-Safi (1974). An attempt for rearing *Tydeus californicus* (Banks) on sweet potato leaves in Egypt.58 : 217 – 226.

Wahab, A. E., A. A. Yousef and H. M. Hemeda (1974). Biological studies on the tydeid mite, *Tydeus californicus* (Banks). Bull. Soc. Entomol. Egypt, 58:349 – 353.

Wahba, M. L. (1976). Studies on the tydeid mites (Family : Tydeidae), especially as related to mango and citrus trees. Ph. D. Thesis, Fac. Sci., Ain Shams Univ., Egypt. 119 pp.

Walter, D. E., H. W. Hunt and E. T. Elliot (1988). Guilds or functional groups ? An analysis of predatory arthropods from a short grass steppe soil. Pedobiologia, 31 : 247 – 260.

Yassin, E. M. (2004). Studies on some tydeid mites in Egypt. Ph. D. Thesis, Fac. Sci., Cairo Univ., 319 pp.

بيولوجى الاكاروس *Tydeus aegyptiaca* (Rasmy and El-Bagoury) والمنتمى لفصيلة Tydeidae بتغذيته على عدة أغذية مختلفة

عصام محمد عبد السلام ياسين ، حسن محمد احمد النعناعى ،
إيهاب مصطفى بكر، سعيد عبد العظيم علام
معهد بحوث وقاية النباتات – مركز البحوث الزراعية -الدقي –جيزة –مصر

الملخص العربي

تم تربية الاكاروس *Tydeus aegyptiaca* والمنتمى لعائلة Tydeidae على عدة أنواع من الفطريات وهى *Aspergillus niger* و *Alternaria alternata* و *Fusarium* sp. وملاحظة تطورها وإنتاجها عند درجات الحرارة 15و 25و 35درجة مئوية ورطوبة نسبية 75 % حيث وجد أن الاكاروس يتطور بسرعة عند درجات الحرارة العليا وعلى الفطر *Aspergillus niger*أكثر من اى درجة حرارة واى فطر أخر . ووجد أيضا أن الاكاروس يضع اكبر عدد من البيض عند التغذية على الفطر *Fusarium* sp. ووجد أيضا أن هذا الاكاروس سلك في تغذيته كاكاروس فطرى التغذية وليس مفترسا وذلك عند تقديم الاكاروس *Tyrophagus putrescentiae* له كغذاء.

, E.M. Bakr

Table (1): Mean ± SD of developmental periods (in days) of *Tydeus aegyptiaca* female reared on different fungi.

Diet	Temp.	Egg	Larva	Protonymph	Deutonumph	Tritonymph	Life cycle
Aspergillus niger	15 ºC	4.1 ± 0.34	4.2 ± 0.36	3.8 ± 0.24	3.5 ± 0.22	3.0 ± 0.18	18.6 ± 1.21[a]
	25 ºC	3.8 ± 0.22	3.7 ± 0.25	3.2 ± 0.35	3.0 ± 0.19	2.8 ± 0.11	16.50 ±1.11 [b]
	35 ºC	3.22± 0.19	3.20 ± 0.19	3.02 +0 .24	2.61 ± 0.17	2.5 ± 0.26	14.54 ± 1.00 [c]
Alternaria alternate	15 ºC	4.6 ± 0.21	4.8 ± 0.22	4.6 ± 0.26	4.3 ± 0.36	4.4 ± 0.27	22.7 ± 1.68 [a]
	25 ºC	4.01± 0.32	4.4 ± 0.36	4.1 ± 0.33	4.0 ± 0.24	4.0 ± 0.21	19.7 ± 1.66 [b]
	35 ºC	3.51± 0.21	3.6 ± 0.19	3.2 ± 0.41	2.9 +0.20	3.0 ± 0.23	16.2 ± 1.59 [c]
Fusarium sp.	15 ºC	4.63± 0.26	5.1 ± 0.22	4.9 ± 0.19	4.6 ± 0.18	4.8 ± 0.31	24.2 ± 1.22 [a]
	25 ºC	4.25± 0.34	4.6 ± 0.16	4.5 ± 0 .30	4.2 ± 0.31	4.4 ± 0.33	21.9 ± 1.34 [b]
	35 ºC	3.71± 0.24	3.8± 0.19	3.3 ± 0.36	3.0 + 0.21	3.2 ± 0.34	17.0 ± 1.19 [c]

± SD =Standerd diviation.
L. S. D. at 0.05 level for life cycle = 1.1821
Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan's multiple range test.

Table (2): Mean ± SD developmental periods (in days) of *Tydeus aegyptiaca* male reared on different fungi.

Diet	Temperature	Egg	Larva	Protonymph	Deutonumph	Tritonymph	Life cycle
Aspergillus niger	20 ºC	3.81 ± 0.34	3.88± 0.36	3.5 ± 0.24	3.2 ± 0.22	2.7 ± 0.18	17.09 ± 1.15[a]
	25 ºC	3.45 ± 0.22	3.34 ± 0.25	3.0 ± 0.35	2.6 ± 0.19	2.4 ± 0.11	14.79 ±1.40 [b]
	30 ºC	3.0± 0.19	3.0 ± 0.19	2.8 +0 .24	2.21 ± 0.17	2.2 ± 0.26	13.21 ± 1.11[c]
Alternaria alternate	20 ºC	4.1 ± 0.21	4.2 ± 0.22	4.2 ± 0.26	4.0 ± 0.36	4.0 ± 0.27	20.5 ± 1.55 [a]
	25 ºC	4.0± 0.32	4.1 ± 0.36	3.6 ± 0.33	3.7 ± 0.24	3.5 ± 0.21	18.9 ± 1.42 [b]
	30 ºC	3.21± 0.21	3.0 ± 0.19	3.0 ± 0.41	2.6 +0.20	2.7 ± 0.23	14.51 ± 1.59[c]
Fusarium sp.	20 ºC	4.4± 0.26	4.6 ± 0.22	4.5 ± 0.19	4.2 ± 0.18	4.5 ± 0.31	22.2 ± 1.33 [a]
	25 ºC	4.21± 0.34	4.2 ± 0.16	4.1 ± 0 .30	4.0 + 0.31	4.0 ± 0.33	20.51 ±1.31 [b]
	30 ºC	3..65± 0.24	3.4± 0.19	3.0 ± 0.36	2.8 ± 0.21	3.0 ± 0.34	15.85 ± 1.26 [c]

± SD

L. S. D. at 0.05 level for life cycle = 1.1492

Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan 's multiple range test.

Table (3) : Average adult longevity ± SD of *Tydeus aegyptiaca* (in days) reared on different fungi.

Sex	Diets	Temperature (ºC)		
		15	25	35
♂	*Aspergillus Niger*	10.2 ± 0.89 [a]	8.2 ± 0.68 [b]	7.0 ± 0.67 [c]
	Alternaria alternata	11.0 ± 0.57 [a]	9.6 ± 0.68 [b]	8.0 ± 0.81 [c]
	Fusarium sp.	11.6 ± 0.66 [a]	9.21 ± 0.46 [b]	8.2 ± 0.88 [c]
♀	*Aspergillus flavus*	13.62 ± 0.49 [a]	11.8 ± 0.99 [b]	10.1 ± 0.69 [c]
	Alternaria alternata	15.02 ± 0.60 [a]	13.12 ± 1.02 [b]	12.0 ± 0.87 [c]
	Fusarium sp.	16.24 ±1.21 [a]	14.52 ± 1.35 [b]	12.5 ± 0.79 [c]

± SD L.S.D. at 0.05 level for male longevity = 0.7201 and 0.5432 for female

Means with the same superscript in the same stage are not significant (p>0.05) by Duncan's) multiple range test.

Table (4) : Egg numbers ± SD laid by *Tydeus aegyptiaca* and hatchability percentages on differen fungi.

Diets	*Aspergillus niger*			*Alternaria alternata*			*Fusarium* sp.		
	15 ºC	25 ºC	35 ºC	15 ºC	25 ºC	35 ºC	15 ºC	25 ºC	35 ºC
No. of eggs	17.12±2.19[c]	20.35±0.94[b]	22.00±1.69[a]	21.18±1.33[c]	24.02±0.96[b]	26.36±2.34[a]	22.18±1.29[c]	30.01±2.31[b]	34.38±2.18[a]
Hatchability%	90.67 ±2.3	95.7 ± 3.3	96.81 ±1.67	92.17 ± 2.5	95.66 ± 2.4	97.42±1.65	94.0 ± 1.88	96.3 ± 3.0	97.12±1.9

± SD L.S. D at 0.05 level for fecundity = 2.052

Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan 's multiple range test.

Table (2): Mean ± SD developmental periods (in days) of *Tydeus aegyptiaca* male reared on different fungi

Life cycle	Tritonymph	Deutonumph	Protonymph	Larva	Egg	Temperature	Diet
17.09 ± 1.15 [a]	2.7 ± 0.18	3.2 ± 0.22	3.5 ± 0.24	3.88±	3.81 ±	20 ºC	

				0.36	0.34		
14.79 ±1.40 [b]	2.4 ± 0.11	2.6 ± 0.19	3.0 ± 0.35	3.34 ± 0.25	3.45 ± 0.22	25 ºC	
13.21 ± 1.11 [c]	2.2 ± 0.26	2.21 ± 0.17	2.8 +0 .24	3.0 ± 0.19	3.0± 0.19	30 ºC	
20.5 ± 1.55 [a]	4.0 ± 0.27	4.0 ± 0.36	4.2 ± 0.26	4.2 ± 0.22	4.1 ± 0.21	20 ºC	
18.9 ± 1.42 [b]	3.5 ± 0.21	3.7 ± 0.24	3.6 ± 0.33	4.1 ± 0.36	4.0± 0.32	25 ºC	
14.51 ± 1.59 [c]	2.7 ± 0.23	2.6 +0.20	3.0 ± 0.41	3.0 ± 0.19	3.21± 0.21	30 ºC	
22.2 ± 1.33 [a]	4.5 ± 0.31	4.2 ± 0.18	4.5 ± 0.19	4.6 ± 0.22	4.4± 0.26	20 ºC	
20.51 ± 1.31 [b]	4.0 ± 0.33	4.0 + 0.31	4.1 ± 0 .30	4.2 ± 0.16	4.21± 0.34	25 ºC	
15.85 ±	3.0 ± 0.34	2.8 ± 0.21	3.0 ± 0.36	3.4±	3..65±	30 ºC	

1.26 [c]				0.19	0.24		

± SD

L. S. D. at 0.05 level for life cycle = 1.1492

Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan ’s multiple range test.

Table (3) : Average adult longevity ± SD of *Tydeus aegyptiaca* (in days) reared on different fungi

Temperature (ºC)			Diets	
35	25	15		
7.0 ± 0.67 [c]	8.2 ± 0.68 [b]	10.2 ± 0.89 [a]	*Aspergillus Niger*	♂
8.0 ± 0.81 [c]	9.6 ± 0.68 [b]	11.0 ± 0.57 [a]	*Alternaria alternata*	
8.2 ± 0.88 [c]	9.21 ± 0.46 [b]	11.6 ± 0.66 [a]	*Fusarium* sp.	
10.1 ± 0.69 [c]	11.8 ± 0.99 [b]	13.62 ± 0.49 [a]	*Aspergillus flavus*	♀
12.0 ± 0.87	13.12 ± 1.02	15.02 ± 0.60 [a]	*Alternaria alternata*	

c	b			
12.5 ± 0.79 c	14.52 ± 1.35 b	16.24 ±1.21 a	*Fusarium* sp.	

± SD L.S.D. at 0.05 level for male longevity = 0.7201 and 0.5432 for female

Means with the same superscript in the same stage are not significant (p>0.05) by Duncan's) multiple range test.

Table (4) : Egg numbers ± SD laid by *Tydeus aegyptiaca* and hatchability percentages on differen fungi

Fusarium sp.			*Alternaria alternata*			*Aspergillus niger*			
35 ºC	25 ºC	15 ºC	35 ºC	25 ºC	15 ºC	35 ºC	25 ºC	15 ºC	
34.38 ±2.18 [a]	30.01± 2.31[b]	22.18 ± 1.29[c]	26.36 ±2.34[a]	24.02 ±0.96[b]	21.18±1.33[c]	22.00±1.69 [a]	20.35± 0.94 [b]	17.12± 2.19 [c]	No. of eggs
97.12± 1.9	96.3 ± 3.0	94.0 ± 1.88	97.42 ± 1.65	95.66 ± 2.4	92.17 ± 2.5	96.81 ±1.67	95.7 ± 3.3	90.67 ± 2.3	Hatchability %

± SD L.S. D at 0.05 level for fecundity = 2.052

Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan 's multiple range test.

Table (1): Mean ± SD of developmental periods (in days) of *Tydeus aegyptiaca* female reared on different fungi

Life cycle	Tritonymph	Deutonumph	Protonymph	Larva	Egg	Temp.	Diet
18.6 ± 1.21[a]	3.0 ± 0.18	3.5 ± 0.22	3.8 ± 0.24	4.2 ± 0.36	4.1 ± 0.34	15 ºC	
16.50 ±1.11 [b]	2.8 ± 0.11	3.0 ± 0.19	3.2 ± 0.35	3.7 ± 0.25	3.8 ± 0.22	25 ºC	
14.54 ± 1.00 [c]	2.5 ± 0.26	2.61 ± 0.17	3.02 +0 .24	3.20 ± 0.19	3.22± 0.19	35 ºC	
22.7 ± 1.68 [a]	4.4 ± 0.27	4.3 ± 0.36	4.6 ± 0.26	4.8 ± 0.22	4.6 ± 0.21	15 ºC	
19.7 ± 1.66 [b]	4.0 ± 0.21	4.0 ± 0.24	4.1 ± 0.33	4.4 ± 0.36	4.01± 0.32	25 ºC	
16.2 ±	3.0 ± 0.23	2.9 +0.20	3.2 ± 0.41	3.6 ±	3.51±	35 ºC	

1.59 [c]				0.19	0.21		
24.2 ± 1.22 [a]	4.8 ± 0.31	4.6 ± 0.18	4.9 ± 0.19	5.1 ± 0.22	4.63± 0.26	15 ºC	
21.9 ± 1.34 [b]	4.4 ± 0.33	4.2 ± 0.31	4.5 ± 0 .30	4.6 ± 0.16	4.25± 0.34	25 ºC	
17.0 ± 1.19 [c]	3.2 ± 0.34	3.0 + 0.21	3.3 ± 0.36	3.8± 0.19	3.71± 0.24	35 ºC	

± SD =Standerd diviation.

L. S. D. at 0.05 level for life cycle = 1.1821

Means with the same superscript in the same stage are not significant (p > 0.05) by Duncan's multiple range test.