

## EFFECT OF TEMPERATURE ON THE BIOLOGY AND LIFE TABLE PARAMETERS OF *Cenopalpus lanceolatisetae* (ATTIAH) (ACARI : TENUIPALPIDAE)

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### ABSTRACT

Biology and life table parameters of the tenuipalpid mite *Cenopalpus lanceolatisetae* (Attiah) were studied on leaves of apricot at different temperatures (15, 20, 25, 30, 35°C) and relative humidity 85% in the laboratory.

Temperature had a highly negative effect on the duration of life cycle, female longevity, life span and generation period of *C. lanceolatisetae pulcher* which decreased with increased temperature. On the other hand temperature positively affected female fecundity, net reproduction rate ( $R_0$ ), intrinsic rate of increase ( $R_m$ ), finite rate of increase ( $e^{rm}$ ) and sex ratio increased with increased temperature until 30°C. Thus 30°C is the optimum degree for *C. lanceolatisetae* (Attiah) development and reproduction.

### INTRODUCTION

The tenuipalpid mites infested several fruit trees, ornamental and vegetables all over the world. In Egypt the two species *Cenopalpus lanceolatisetae* (Attiah) and *C. pulcher* (C.&F.) are of great economic importance infested leaves, buds and fruits of deciduous fruit trees, in addition to host preference is found in both species as the former species was found to infest peach, apricot, plum and pear, while the latter attacked apple and quince, Yousef 1967 and Zaher 1984 this phenomenon may be attributed to the length of cheliceral stylet which living longer in *C. lanceolatisetae* than in *C. pulcher*. Meanwhile, the trees were considered an economic importance in Lebanon which infested with *C. lanceolatisetae* (Bayan, 1988). Therefore this work was conducted to study the effect of temperatures biology of *C. lanceolatisetae* together with its life table parameters.

In Iran the phytophagous mites *C. irani* and *Brevipalpus* sp., were found infested leaves and twigs of the pistachio trees (Mehrnejad *et al.*, 2002).

In an European countries a part from Italy, France and Greece the tenuipalpid mites *Aegyptobia altes*, *A. karystensis*, *A. aliartensis*, *A. leiahensis*, *Oligomerismus taxi*, *O. oregonensis*, *Cenopalpus lineola*, *C. pulcher*, *C. brachypalus*, *C. taygeticus*, *C. naupkticus*, *C. viniferous*, *C. eriobotryi*, *Pentamerismus coronatus*, *P. juniperi*, *P. oregonensis*, *Phytoptipalpus paradoxus*, *Brevipalpus recki*, *Pseudoleptus zelihae*, *Dolichotetranychus floridanus*, *Raoiella macforianeii* and *Obdulia tamaricis* were distributed on most economic importance plants. (Hatzinikolis, 1987, Gutierrez *et al.*, 1989 and Hatzinikolis *et al.*, 1999 & 2001).

## **MATERIAL AND METHODS**

A pure culture of *Cenopalpus lanceolatisetae* (Attiah) was collected from apricot twigs. Leaf disks of Apricot about one inch in diameter were used and surrounded by tangle foot, which acts as a barrier and prevent the mite individuals from escaping. These leaf discs were placed upside down on pieces was infested moistened cotton wool in Petri dishes of 10 cm diameter and each with a male and a female of rested mite. Observations were undertaken daily, with stereo microscope. The moisture was kept by adding few drops of water to the cotton wool, and adding Sawdust to make a hiding places for mite individuals. Hatched larvae were transferred singly each to a disk and left to continue their life span. Individual development, survival and egg production were observed where life table parameters were calculated according to Brich (1948) Laing (1968) and using the Basic computer program of Abou-settae & Childers (1986). Different statistical procedures were carried out using Costat 3.03 Cohort software.

## **RESULTS AND DISCUSSION**

Data presented in Table (1) revealed that *Cenopalpus lanceolatisetae* fed and developed on leaves of Apricot at different temperatures (15 , 20 , 25 , 30 and 35 °C) and passed through egg, larval, protonymph, deutonymph and adult stages Temperature had a highly negative effect on the duration of female life cycle, longevity and life span averaging (68.7, 54.8 , 37.8 , 23.6 and 22.4 days) , (31.8 , 22.6 , 15.0, 11.3 and 11.0 days), (100.5, 77.4, 52.8, 34.9 and 33.4 days) at the aforementioned temperature degrees respectively. On the other hand temperature degrees had positive affect on female fecundity which increased as temperature increased until 30°C. Statistical analysis proved that there is a significant differences between temperature degrees and the biology and life table parameters of mite *C.lanceolatisetae*.

Who found that this species 8 generations per year averaging from 77 days in winter at 15°C and 27 days in summer at 31°C. Average female deposited 10 & 33 eggs in winter and summer respectively obtained data revealed that 30°C proved to be the optimal temperature for development and reproduction of *Cenopalpus lanceolatisetae* whereas life cycle (23.6 days) and female longevity (11.3 days) with an average lasted of deposited (14.3 eggs) and daily rate 2.9 egg/day. Also the multiplication per generation (Ro) was highest (5.44) in generation time (T) of 9.27 days and highest rm value 0.28. ind./female/day and had a finite rate of increase (exp rm) 1.34 times/female/day., compared with values at other temperature degrees while 25°C is the second suitable temperature followed by 35°C. On the other hand 15°C is the less suitable temperature for development and reproduction (Table 2). It was concluded that the temperature greatly affected the biology of *C. lanceolatisetae*. These results agree with (Zaher *et al*, 1969) who found that 31°C daily average temperature of summer was optimum for *C. lanceolatisetae* development and reproduction.

Table (1): Duration of developmental stages, life span, and female fecundity of *Cenopalpus lanceolatisetae* (Attiah) on apricot leaves at different temperatures and R. H (85%) :

Stages	15°C	20°C	25°	30°C	35°C
Incubation period	17.2±3.1	15.4±2.4	8.3±1.6	5.6±0.63	5.4±0.12
Active larva	14.3±2.2	10.5±2.2	8.7±1.3	4.1±0.26	4.0±0.14
Q. larva	4.8±0.82	3.6±0.51	2.8±0.62	2.2±0.13	2.0±0.11
A. Protonymph	11.7±2.4	8.8±1.6	6.4±1.2	3.8±0.46	3.5±0.21
Q. Protonymph	4.3±0.66	3.6±0.42	2.8±0.33	2.2±0.2	2.0±0.13
A. Deutonymph	12.4±2.2	9.6±1.3	6.1±0.91	3.6±0.42	3.4±0.26
Q. Deutonymph	3.9±0.73	3.2±0.7	2.6±0.64	2.1±0.32	2.1±0.10
Immature stages	51.5±3.1	39.4±3.1	29.5±2.8	18.0±2.4	17.0±2.24
Life cycle	68.7±3.6	54.8±3.5	37.8±3.6	23.6±2.7	22.4±3.12
Pre-ovi position	9.2±2.7	5.8±0.76	3.4±0.62	2.6±0.54	3.6±0.18
Generation period	78.0±4.1	60.6±4.2	41.2±3.5	26.2±2.9	26.0±2.13
Oviposition	6.4±0.62	6.1±1.2	5.4±1.21	5.0±0.42	4.5±1.10
Post-ovi position	16.2±3.3	10.7±2.6	6.2±1.3	3.7±0.81	2.9±1.16
Longevity	31.8±2.8	22.6±2.1	15.0±2.7	11.3±2.2	11.0±2.4
Life span	100.5±6.4	77.4±3.9	52.8±3.3	34.9±3.4	33.4±3.12
Female Fecundity	3.3±0.62	7.2±1.3	12.2±2.1	14.3±2.6	7.4±1.6
Daily rate	0.52±0.21	1.1±0.61	2.3±0.92	2.9±0.83	1.6±0.24

L.S.D at 5% for :

life cycle	8.73	ovi position period	0.82	longevity	4.63
fecundity	2.05	life span	13.26	at different degrees.....	

Table (2): Effect of temperature on life table parameters of *C. lanceolatisetae* (Attiah) fed on apricot leaves.

Parameters	Temperature (°C)				
	15	20	25	30	35
Net reproductive rate (Ro)	1.17	3.21	4.36	5.44	3.64
Generation time (days) (T)	13.09	11.72	10.37	9.27	10.62
Intrinsic rate of increase (rm)	0.003	0.009	0.148	0.28	0.123
Finite rate of increase (exp rm)	1.012	1.04	1.16	1.34	1.12
Sex ratio (females / total)	0.5	0.60	0.68	0.70	0.66
Fraction of eggs reaching maturity	0.45	0.70	0.75	0.80	0.75

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### **تأثير درجات الحرارة المختلفة على بيولوجى وجداول الحياة للحلم الكاذب *Cenopalpus Tenuipalpidae lanceolatisetae* (Attiah) (Acari).**

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يعتبر الحلم الكاذب *C. lanceolatisetae* من الآفات الرئيسية على العديد من المحاصيل البستانية خاصة المشمش من حيث كثرة انتشاره فى جميع أنحاء العالم لذلك تم تربيته على أوراق المشمش وعلى درجات حرارة مختلفة (١٥ , ٢٠ , ٢٥ , ٣٠ , ٣٥ م°) وعلى رطوبة نسبية ٨٥٪ معمليا لمعرفة تأثيرها على سرعة النمو ومعدل حياة الأنثى وخصوبتها.

\* وأتضح من الدراسة أن :

زيادة درجات الحرارة تتناسب تناسبا عكسيا مع زيادة سرعة الأفراد إلى الطور الكامل ولكن تتناسب تناسبا طرديا مع كفائه خصوبة الأنثى فى وضع البيض وعلى معدل الزيادة الحقيقى للأنثى (rm) حتى درجة حرارة ٣٠ م°. ولذلك تعتبر درجة ٣٠ م° هى أفضل درجة حرارة حيث زادت من كفائه الأنثى فى وضع البيض وأسرت النمو إلى الطور الكامل وزادت معدل الزيادة الحقيقى للأفراد. ووجد أن درجة حرارة ٢٥ م° تلى درجة ٣٠ م° من حيث الأفضلية أما درجة ١٥ م° جاءت فى المرتبة الأخيرة.