

LABORATORY TRIALS TO EVALUATE THE PREDATORY MITE *Neoseiulus cucumeris* (OUDEMAN) WHEN FED ON EUROPEAN RED MITE *Panonychus ulmi* (KOCH) UNDER DIFFERENT DEGREES OF TEMPERATURES

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ABSTRACT

Biological aspects of the predatory mite *Neoseiulus cucumeris* (Oud.) was investigated in the Laboratory at 20 , 25 and 30 C° and 65 ±5% R. H To evaluate the efficiency of the predatory mite, when fed on movable stages of european red mite, *Panonychus ulmi* (Koch) in Egypt. The incubation period lasted (4.31&4.0), (3.6&3.2) and (2.6&2.3) days for female and male at 20,25 and 30 C., respectively. Total immature stages for female averaged 8.85 ± 0.29 ; 5.7± 0.42 and ; 4.6 ± 0.51 days while for male averaged 8.15 ± 0.49 ; 5.25 ± 0.34 and 4.1 ± 0.64 days at 20, 25 and 30 C° respectively . Female longevity was longer than male, this period averaged (26.65 & 18.2), (20.15 & 14.7) and (18.8 & 13.1) days at 20 , 25 and 30 respectively . Trials on predation showed that , female fed on greater number of prey individuals than male . During life span , female consumed 59.23 ± 2.03 , 92.27 ± 2.14 and 74.73 ± 1.58 prey of *P. ulmi* , respectively at the previous temperature while male consumed 39.78 ±1.82, 65.23 ±2.50 and 47.69±1.94 prey respectively at 20 25 and 30 C°

INTRODUCTION

Mites of the family phytoseiidae are receiving more attention because of their role as predators of phytophagous mites and other small insect. The predacious mite, *Neoseiulus cucumeris* (Oud.) used as abiocontrol agent for suppressing mites and thrips population by Bieri *et al.* (1989), Marisa and Saure (1990), Tuovinen *et al.* (2002), Li *et al.* (2003), and Ibrahim *et al.* (2005).

The predatory mite *N. cucumeris* import from Holland to use in biological control .

The present study aims to throw some light on the biological aspects of predatory mite *N. cucumeris* when fed on the european red mite *P. ulmi* at 20, 25 and 30C° and 65 ± 5 R H.

MATERIALS AND METHODS

The predatory mite *Neoseiulus cucumeris* (Oud.) was reared on apple leaf discs of about 3 cm in diameters . These discs were placed on soaked cotton wool in Petri–dishes , water was daily added to maintain suitable moisture for the predator development . Individuals of *N. cucumeris* were fed singly during their life span on the movable stages of *Panonychus ulmi* (Koch).

The biological aspects of the predatory mite were noticed and recorded the number of devoured individuals of the prey were counted and then replaced by another alive one until the end of life span . Experiments were carried out under laboratory conditions of 20, 25 & 30 C° and 65 ± 5 % R. H .

RESULTS AND DISCUSSION

Duration of development stages of *N. cucumeris* as shown in table (1), the incubation period of female and male averaged (4.31 & 4.0), (3.6 & 3.2) and 2.6 & 2.3) days at 20, 25 and 30 C° respectively. Female larva stayed 1.95, 1.1 and 0.8 days, while the male larva dratted 1.84, 0.92 and 0.7 days at 20, 25 and 30 Co respectively. The protonymphal stages lasted 3.12 ± 0.20; 2.2 ± 0.42 and 1.8 ± 0.37 days and 2.81 ± 0.23; 2.1 ± 0.49 and 1.5 ± 0.43 days for female and male at 20, 25 and 30 C°, respectively, while the deutonymphal stage durated 3.78 ± .55; 2.4 ± 0.27 and 2.00 ± 0.33 days and 3.5 ± 0.36; 2.2 ± 0.26 and 1.8 ± 0.25 days for female and male at 20, 25 and 30 C°, respectively.

Also data in table (1) showed that the female total immature stages lasted 8.89 ±; 5.8 ± 0.42 and 4.6 ± 0.51 days while that for male lasted 8.15 ± 0.49; 5.25 ± 0.34 and 4.1 ± 0.64 days at the perevious temperature, respectively. The life cycle of female and male durated (13.61 & 12.15), (9.3 & 8.42) and (7.2 & 6.3) days at the same trend. Female life cycle was longer than male. Male adulthood was shorter than female longevity, this period averaged (18.2 & 26.65), (14.7 & 20.15 and (13.1 & 18.8) days at the same pottern. The female and male life span averaged 39.89 ± 0.46; 30.4 ± 1.05 days at 20 C° while at 25 C° averaged 29.5 ± 1.65; 23.5 ± 1.48 days, but lasted 26.2 ± 1.96; 19.6 ± 1.68 days at 30 C°.,.

Table (1): Influence of temperature on life cycle and longevity of *Neoseiulus cucumeris* (Oud.) when fed on movable stages of *Panonychus ulmi* (Koch) at 20, 25 & 30 C° and 65 ± 5 R.H.

Developmental stages	Duration (in days)					
	Mean± S D at 20 C°		Mean± S D at 25 C°		Mean± S D at 30 C°	
	Female	Male	Female	Male	Female	Male
Egg	4.31± 0.64	4.00± 0.22	3.6± 0.76	3.2± 0.26	2.6± 0.39	2.3 ± 0.26
Larva	1.95± 0.28	1.84± 0.24	1.1± 0.41	0.92± 0.12	0.8 ± 0.19	0.7 ± 0.19
Protonymph	3.12± 0.20	2.81± 0.23	2.2± 0.42	2.1± 0.49	1.8 ± 0.37	1.5± 0.43
Deutonymph	3.78± 0.55	3.5± 0.36	2.4± 0.27	2.2 ± 2.26	2.00 ± 0.33	1.8± 0.25
Total immature	8.85 ± 0.29	8.15± 0.49	5.7± 0.42	5.22± 0.34	4.6± 0.51	4.0± 0.64
Lifer cycle	13.16± 0.34	12.15± 0.35	9.3± 0.44	8.42 ± 0.47	7.2± 0.71	6.3± 0.64
Longevity	26.65± 0.45	18.2± 1.79	20.15± 1.49	14.7± 1.43	18.8± 2.11	13.1± 1.51
Life span	39.8± 0.46	30.3± 1.05	29.5± 1.65	23.1± 1.48	26.3± 1.96	19.4± 1.68

The data showed that the predator life span period at 20 C° was longest than 25 and 30 C°, the duration of male was shoter than female Abd El-Wahed. (2007)

Data in table (2) demonstrated that the pre-ovoposition period lasted 2.5 ± 0.41; 1.5 ± 0.43 and 1.6 ± 0.40 days at 20; 25 and 30 C° respectively. the oviposition period of female predator dratted 21.53 ± 0.43; 16.3 ± 1.56 and 15.00 ± 2.12 days at the previous temperature, respectively, while the post-oviposition period averaged 2.62 ± 0.34; 2.35 ± 0.46 and 2.1 ± 0.35 days at the same trend. Females deposited an average of 23.6, 24.0 and 18.0 eggs with a daily rate of 1.1± 08; 1.5 ± 0.22 and 1.2 ± 0.21 eggs at 20; 25 and 30 C° respectively.

Table (2): Effect of temperatures on the fecundity and longevity *N. Cucumeris* females when fed on movable stages of *P. ulmi*.

Temperature	Average Period in days				No. of eggs / female	
	Pre oviposition	Oviposition	Post - oviposition	Longevity	Total	Daily rate
20 C °	2.5 ± 0.41	21.53 ± 0.43	2.62 ± 0.34	26.65 ± 0.54	23.6 ± 1.36	1.1 ± 0.8
25 C °	1.5 ± 0.43	16.3 ± 1.56	2.35 ± 0.46	20.15 ± 1.49	24.0 ± 2.46	1.5 ± 0.22
30 C °	1.6 ± 0.40	15.00 ± 2.12	2.1 ± 0.35	18.8 ± 2.11	18.0 ± 2.22	1.2 ± 0.21

prey consumed by different stages of *N. cucumeris* when fed on different stages of *P. ulmi* at 20, 25 & 30 C ° and 65 ± 5% R.H.

Data in table (3) demonstrated that the developmental stages of predatory mite *N. cucumeris* consumed different movable stages of *P. ulmi* as prey. The average number of consumption of movable stages of *P. ulmi* increased as development of the predator stages.

The average number of prey Consumed prey by *N. Cucumeris* during larvae, protonymph and deutonymph stages were (0.7, 2.4 & 4.9), (1.1, 4.6 & 9.5) and (0.9, 2.9 & 5.8) while male efficiency was less than female, he destroyed (0.6, 2.2 & 4.5), (1.0, 4.3 & 8.7) and (0.7, 2.5 & 4.9) mite individuals at different degrees of temperature. During total immature stages females fed more than males, the average number of prey consumed were (8.1 ± 0.89; 7.4 ± 0.73), (15.25 ± 0.85; 14.14 ± 0.49) and (9.7 ± 0.47; 8.27 ± 0.66) mite individuals for female and male at 20; 25 and 30 C ° respectively.

During the pre-oviposition, oviposition and post-oviposition period, the average number of consumed prey were 6.2 ± 2.29; 38.87 ± 2.22 and 5.6 ± 1.09 individuals at 20 C °; while it average 9.6 ± 0.47; 58.8 ± 1.89 and 8.6 ± 0.69 individuals at 25 C °; but at 30 C ° it averaged 8.9 ± 0.41; 49.09 ± 1.48 and 7.06 ± 0.66 individuals, respectively.

The average number of consumed prey by adult females and males were 51.12 ± 2.03; 32.44 ± 2.06 and 77.02 ± 1.93; 48.08 ± 2.77 and 65.02 ± 1.61; 39.43 ± 1.60 individuals at 20, 25 and 30 C ° respectively.

Table (3): Efficiency of *Neaseiulus cucumeris* (Oud.) in predated on movable stages of *P. ulmi* at different degrees of temperatures.

Developmental stages	Average No. of Consumed prey (<i>P. ulmi</i>)					
	Mean ± S D at 20 C °		Mean ± S D at 25 C °		Mean ± S D at 30 C °	
	Female	Male	Female	Male	Female	Male
larva	0.7 ± 0.14	0.6 ± 0.20	1.1 ± 0.23	1.00 ± 0.25	0.9 ± 0.29	0.7 ± 0.33
protonymph	2.4 ± 0.37	2.2 ± 0.26	4.6 ± 0.48	4.3 ± 0.38	2.9 ± 0.31	2.5 ± 0.41
Deutonymph	4.9 ± 0.85	4.5 ± 0.49	9.5 ± 0.46	8.7 ± 0.98	5.8 ± 0.41	4.9 ± 0.41
Total immatures	8.1 ± 0.89	7.4 ± 0.73	15.25 ± 0.85	14.14 ± 0.49	9.7 ± 0.47	8.27 ± 0.66
Pre- oviposition	6.2 ± 2.29	_____	9.6 ± 0.47	_____	8.9 ± 0.41	_____
Oviposition	38.87 ± 2.22	_____	58.8 ± 1.89	_____	49.09 ± 1.48	_____
Post - oviposition	5.6 ± 1.09	_____	8.6 ± 0.69	_____	7.06 ± 0.66	_____
Longevity	51.2 ± 2.03	32.44 ± 2.06	77.02 ± 1.93	48.08 ± 2.27	65.02 ± 1.61	39.43 ± 1.60
Life span	59.23 ± 2.03	39.78 ± 1.82	92.27 ± 2.14	65.23 ± 2.50	74.73 ± 1.58	47.69 ± 1.94

The predator mite *N. Cucumeris* could consume 59.33 ± 2.03; 39.78 ± 1.82 for females and males at 20 C °; 92.27 ± 2.14; 62.23 ± 2.50 individuals

at 25 C ° ; while it consumed 74.73 ± 1.58 ; 47.69 ± 1.94 individual at 30 C ° during life span .

Female was more efficiency of destroying prey at 25 C ° than other temperature degrees , she consumed 58.8 prey during ovi positions period with a daily rate 3.6 prey and deposited high number of eggs (24) with a daily rate 1.5 eggs. From the previous results, the predatory mite *N. Cucumeris* may be considered one of the biological control agents of the european red mite *P. ulmi* on different crops. These results are in agreement with Zhang *et al.* (2000), Zhang *et al.* (2001), Blaeser *et al.* (2002), lin and Huang (2003) , Zhang *et al.* (2003 a) , Zhang *et al.* (2003 b) , Ibrahim *et al.*(2005) , Ibrahim *et al.* (2006) and Abd El–Wahed (2007).

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دراسات بيولوجية للمفترس الإكاروسي نيوسيلولس كيوكوميرس عند تغذيته علي الأطوار المتحركة للأكاروس الأحمر الأوربي .

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يعتبر الأكاروس الأحمر الأوربي من أهم الآفات الأكاروسية التي تصيب أشجار التفاح في مصر ويؤثر سلبياً علي الإنتاج كما ونوعاً وفي هذه الدراسة تم تربية المفترس الأكاروسي نيوسيلولس كيوكوميرس عند تغذيته علي الأطوار المتحركة للأكاروس الأحمر الأوربي وقد تمت هذه التربية تحت الظروف المعملية علي درجات حرارة ٢٠ ، ٢٥ ، ٣٠ م[°] ورطوبة نسبية ٦٥ ± ٥ % . وتشير النتائج المتحصل عليها من الدراسة بأن المفترس الأكاروسي بلغ الطور الكامل بعد مضي ١٦، ١٣ ، ٩، ٣ ، ٧، ٢ يوماً في المتوسط في حالة الأنثى أما في حالة الذكر فكانت أقل من ذلك حيث بلغت ١٥، ١٢ ، ٨، ٤ ، ٦، ٣، ٤٣ يوماً في المتوسط علي درجات حرارة ٢٠ ، ٢٥ ، ٣٠ م[°] وكان لدرجة الحرارة تأثير علي فترة وضع البيض وكذلك علي نشاط وخصوبة الإناث في وضع البيض حيث كانت درجة الحرارة ٢٥ م[°] هي الأنسب حيث استطاعت الأنثى أن تضع ٢٣ ، ٢٤، ٥ ، ١٨، ١ بيضة في المتوسط علي درجة حرارة ٢٠ ، ٢٥ ، ٣٠ م[°] علي التوالي وبمعدل يومي ١، ١، ٢ ، ١، ٥، ١ بيضة علي نفس الترتيب وقد استطاعت الأنثى أن تستهلك ٢٣، ٥٩ ، ٩٢، ٢٧ ، ٧٤، ٧٣ فرداً في المتوسط علي درجة حرارة ٢٠ ، ٢٥ ، ٣٠ م[°] علي التوالي خلال فترة حياتها .

ومن خلال هذه الدراسة يمكن استخدام هذا المفترس الإكاروسي ضمن برامج مكافحة المتكاملة للحد من خطورة الأكاروس الأحمر الأوربي الذي يصيب معظم بساتين التفاح .