

BIOLOGICAL ASPECTS OF PREDACIOUS MITE, *NEOSEIULUS CUCUMERIS* OUDEMAN, WHEN FED ON POSTEMBRYONIC STAGES OF *TETRANYCHUS URTICAE* KOCH

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Abstract

The biology of the predacious mite, *Neoseiulus cucumeris* Oudemans, was studied when fed on movable stages of two spotted spider mite, *Tetranychus urticae* Koch in Egypt for the first time. At 25 and 30°C and 65%±5% RH the incubation period lasted 3.7±0.1, 2.5±0.15, 3.2±0.1 and 2.4±0.13 days for female and male, respectively. The male emerged 0.5 day earlier than the female at 25°C, while at 30°C the male emerged 0.1 day earlier than the female. The female predator devoured 19.4±0.1 individuals of *T. urticae* during the oviposition period (17.9 ± 1.39 days) and deposited 14.3±1.6 eggs at 25°C, while at 30° the female predator devoured 20.2±0.2 individuals of *T. urticae* during the oviposition period (18.5±0.2) and deposited 16.2±1.3 eggs.

INTRODUCTION

The predacious mite, *Neoseiulus cucumeris* is important biocontrol agents for suppressing mites population (Bordas *et al.* 1985; Ramakers 1987; Marsia and Sauro 1990; Iraola *et al.* 1997; Blaeser *et al.* 2002 and Tuvovinen *et al.* 2002). It feeds not only on tetranychid mites but also on pollen grains and thrips species (Linddahlen and Nedstam 1988; Rijn *et al.* 1990 and Matsus *et al.* 2003). The predator mite *N. cucumeris* was introduced from Holland and studied for the first time in Egypt and we aim to try to acclimated this species to introduce it as a biocontrol agent in a large scale on different crops and vegetables, and orchard trees, it reared in laboratory on *Thrips tabaci* and *Tetranychus urticae* as stock culture (Bieri *et al.* 1989; Castagnoli 1989 and Ravensberg and Altena 1990). The present study aim to throw some light on the biological aspects and food capacity of this predator when fed on moving stages of *T. urticae* at 25 and 30°C and 65±5% RH.

Many trials have been done on this species in different localities by many authors such as Bordas, *et al.* 1985; Ramakers, 1987; Castagnoli, 1989 and Marisa and Sauro, 1990.

MATERIALS AND METHODS

The predator mite, *Neuseiulus cucumeris* Oudemans was reared on sweet potato leaf discs of about 3 cm diameters. These discs were put on cotton wool in Petri dishes, water was daily added to maintain suitable moisture for the predator development. The pure culture of the predator was imported from the bottle of the predator, which was imported from Holland. Individuals of *N. cucumeris* were fed singly during their life span on the movable stages of *T. urticae* at 25 and 30°C and 65±5% RH the duration and food consumption were recorded.

Many trials will be made for this predator species under semi-field and field conditions to acclimatize this species under Egyptian environmental factors to maximize the role of this predator for using it on different orchard and field crops against different pests because of this species is a polyphagous mite it could consume different mite species and small insects such as whitefly immatures and thrips.

RESULTS AND DISCUSSION

Duration of development stages of *N. cucumeris* as shown in Table (1) egg incubation period of female and male lasted 3.7 ± 0.1 and 3.2 ± 0.1 days at 25°C, while at 30°C the incubation period was 2.5 ± 0.15 and 2.4 ± 0.13 days for female and male, respectively. The duration of female and male larvae at 25 and 30°C lasted 1.4 ± 0.1 , 1.3 ± 0.65 and 0.7 ± 0.16 and 0.7 ± 0.2 days, respectively. The protonymphal stage lasted 2.5 ± 0.1 , 2.4 ± 0.1 , 2.1 ± 0.1 and 2.1 ± 0.15 days for female and male at 25 and 30°C, respectively, while the deutonymphal stage lasted 2.7 ± 0.1 ; 2.5 ± 0.15 , 2.3 ± 0.1 and 2.2 ± 0.1 days for female and male at 25 and 30°C, respectively, also data in Table (1) showed that the total predator immatures when fed on movable stages of *T. urticae*. The female and male lasted 6.62 ± 0.22 ; 6.18 ± 0.2 and 5.1 ± 0.2 and 5 ± 0.26 days at 25 and 30°C, respectively.

Data in Table (1) demonstrated that the life cycle averaged 10.3 ± 0.26 and 10 ± 0.2 days for female and male at 25°C, while it lasted 7.6 ± 0.28 and 7.4 ± 0.3 , respectively at 30°C. The pre-oviposition period averaged 1.4 ± 0.1 and 1.1 ± 0.1 days at 25 and 30°C, respectively. The female predator lasted 17.9 ± 1.39 and 18.5 ± 0.2 days at 25 and 30°C, for oviposition period, while the post-oviposition period lasted 1.32 ± 0.15 and 1.48 ± 0.1 days at 25 and 30°C, respectively. Females deposited 14.3 ± 1.6 and 16.2 ± 1.3 eggs during the oviposition period at 25 and 30°C, respectively.

The female longevity was longer than that male, this period averaged 20.6 ± 1.4 ; 17 ± 0.9 days at 25°C and 21.1 ± 0.3 ; 17.6 ± 0.7 days at 30°C . The female and male life span lasted 30.9 ± 1.5 ; 27 ± 1.2 days at 25°C but lasted 28.7 ± 0.35 ; 25 ± 1.3 days at 30°C , also the data cleared that the predator life span period at 25°C was longer than that at 30°C (Liojiamin *et al.* 2003 and Urbaneja *et al.* 2003) (Table 2).

Table 1. Average duration (in days) of the immature stages of *Neoseiulus cucumeris* Oudemans when fed on movable stages of *Tetranychus urticae* Koch.

Developmental stages	Duration (in days)			
	Mean \pm SD at 25°C		Mean \pm SD at 30°C	
	Female	Male	Female	Male
Egg	3.7 ± 0.1	3.2 ± 0.1	2.5 ± 0.15	2.4 ± 0.13
Larva	1.4 ± 0.1	1.3 ± 0.65	0.7 ± 0.16	0.7 ± 0.2
Protonymph	2.5 ± 0.1	2.4 ± 0.1	2.1 ± 0.1	2.1 ± 0.15
Deutonymph	2.7 ± 0.1	2.5 ± 0.15	2.3 ± 0.1	2.2 ± 0.1
Total immatuers	6.62 ± 0.22	6.18 ± 0.2	5.1 ± 0.2	5 ± 0.26
Life cycle	10.3 ± 0.26	10 ± 0.2	7.6 ± 0.28	7.4 ± 0.3
% Surviving	100	100	100	100
No. of replicates	15	14	15	13

Table 2. Average duration (in days) of various adult period of *Neoseiulus cucumeris* Oudemans and number of eggs laid by the adult females at 25 and 30°C .

Developmental stages	Duration (in days)					
	Mean \pm SD at 25°C			Mean \pm SD at 30°C		
	Female	Male	Egg/ female	Female	Male	Egg/ female
Pre-oviposition	1.4 ± 0.1	-		1.1 ± 0.15	-	
Generation	11.7 ± 0.3	-		8.7 ± 0.3	-	
Oviposition	17.9 ± 1.39	-		18.5 ± 0.2	-	
Post-oviposition	1.32 ± 0.15	-	14.3 ± 1.6	1.48 ± 0.1	-	16.2 ± 1.3
Longevity	20.6 ± 1.4	17 ± 0.9		21.1 ± 0.3	17.6 ± 0.7	
Life span	30.9 ± 1.5	27 ± 1.2		28.7 ± 0.35	25 ± 1.3	

*** Prey consumption of different stages of *N. cucumeris* when fed on different stages of *T. urticae*:**

As demonstrated in Table (3), with the advance of the developmental stages the average number of consumption of movable stages of *T. urticae* increased with the development of the predator stages. This means that the deutonymph consumed more prey than protonymph. The average number of consumed prey by *N. cucumeris* female and male larvae, protonymph and deutonymph at 25°C were 1.6±0.1 and 1.0±0.1; 3.2±0.2 and 2.6±0.1 and 4.6±0.1 and 3.6±0.3 individuals, respectively.

Total immature of females fed more than males. The average number of consumed prey was 9.4±0.6 and 7.2±0.1 individuals for females and males, respectively. On the other hand, the average number of consumed prey by *N. cucumeris* female and male larvae, protonymph and deutonymph at 30°C were 1.2±0.1 and 0.9±0.1; 3.0±0.1 and 2.8±0.1 and 4.2±0.1 and 4.0±0.2 individuals, respectively.

The average number of consumed prey was 8.2±0.3 and 7.9±0.1 individuals for females and males, respectively during the total immatuer.

During the pre-oviposition, oviposition and post-oviposition period, the predator attacked 9.3±0.1; 19.4±0.1 and 17.8±0.8 individuals at 25°C, while these results were 8.6±0.6; 20.2±0.2 and 19.1±0.5 individuals, respectively at 30°C.

The average number of consumed prey by adult females and males was averaged 46.5±0.1 and 36.0±0.4 at 25°C, while this number was averaged 47.9±0.3 and 37.1±0.6 individuals at 30°C.

The predator mite could consume 55.9±0.7 and 48.2±0.5 for females and males at 25°C, 56.1±0.9 and 45.0±0.8 individuals at 30°C during life span. These results showed that the predator fed on *T. urticae* at 30°C more than that 25°C.

On the basis of the present data it can be concluded that *N. cucumeris* is a useful agent against tetranychid mite, *T. urticae* on different plants and will be gave a good result because of this predator species is facultative predator could survive on different prey species.

Table 3. Number of prey consumed by different postembryonic stages of *Neoseiulus cucumeris* at 25 and 30°C.

Stages	Average No. of prey consumed			
	Mean \pm SD at 25°C		Mean \pm SD at 30°C	
	Female	Male	Female	Male
Larva	1.6 \pm 0.1	1.0 \pm 0.1	1.2 \pm 0.1	0.9 \pm 0.1
Protonymph	3.2 \pm 0.2	2.6 \pm 0.1	3.0 \pm 0.1	2.8 \pm 0.1
Deutonymph	4.6 \pm 0.1	3.6 \pm 0.3	4.2 \pm 0.1	4.0 \pm 0.2
Total immatuers	9.4 \pm 0.6	7.2 \pm 0.1	8.2 \pm 0.3	7.9 \pm 0.1
Pre-oviposition	9.3 \pm 0.1	-	8.6 \pm 0.6	-
Oviposition	19.4 \pm 0.1	-	20.2 \pm 0.2	-
Post-oviposition	17.8 \pm 0.8	-	19.1 \pm 0.5	-
Longevity	46.5 \pm 0.1	36.0 \pm 0.4	47.9 \pm 0.3	37.1 \pm 0.6
Life span	55.9 \pm 0.7	43.2 \pm 0.5	56.1 \pm 0.9	45.0 \pm 0.8

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دراسات بيولوجية للمفترس الأكاروسي نيوسيولس كيوكوميرس عند تغذيته علي الأطوار المتحركة للعنكبوت الأحمر العادي

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تعتبر الآفات الأكاروسية خاصةً العنكبوت الأحمر العادي من الآفات الهامة التي تهاجم الكثير من المحاصيل البستانية والحقلية ونظراً للمشاكل التي قد تحدث من الاستخدام المكثف للمبيدات لمكافحة هذه الآفة فقد قمنا بإستجلاب أحد المفترسات الأكاروسية نيوسيولس كيوكوميرس من هولندا وذلك لتعظيم دور المفترسات الأكاروسية والمكافحة الحيوية ضد الآفات الأكاروسية وقد تم دراسة طول دورة الحياة والكفاءة الإفتراضية لهذا المفترس للعنكبوت الأحمر العادي بهدف استخدام هذا المفترس في مكافحة هذه الآفة الخطيرة علي العديد من المحاصيل البستانية والحقلية. فقد تم تربية هذا المفترس علي العنكبوت الأحمر العادي تحت الظروف المعملية علي درجتى حرارة ٢٥، ٣٠م^٣ ورطوبة نسبية ٦٥±٥%.

وتشير للنتائج المتحصل عليها بأن المفترس بلغ الي الطور الكامل بعد مضي ٣، ١٠، ٦، ٧ يوماً في المتوسط في حالة الأنثى علي درجتى الحرارة ٢٥، ٣٠م^٣ علي التوالي وإستطاعت الأنثى أن تستهلك ٤، ١٩، ٢، ٢٠ فرداً في المتوسط ووضعت ٣، ١٤، ٢، ١٦ بيضة في المتوسط علي درجة حرارة ٢٥، ٣٠م^٣ علي التوالي.

مما سبق يتبين لنا أن هذا المفترس يستطيع أن يكمل دورة حياته علي هذه الآفة ويستطيع أن يستهلك أعداد منها وبذلك يمكن أستخدامه كأحد العناصر الحيوية في مكافحة هذه الآفة وسوف نستمر في أقامة هذا النوع تحت الظروف المصرية حيث أنه يمتاز بالكفاءة الإفتراضية العالية وكذلك أنه غير متخصص بل أنه متعدد الفرائس وهذا ما سوف يساعد في التوطين الناجح في مصر .