BIOLOGICAL STUDIES OF PREDACIOUS MITE, *NEOSEIULUS CUCUMERIS* (OUDEMANS) WHEN FEEDING ON CITRUS RED MITE, *PANONYCHUS CITRI* (McGREGOR)

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(Manuscript received 11 October 2006)

Abstract

This work was carried out under laboratory conditions to study the biological aspects of predacious mite, *Neoseiulus cucumeris* (Oudemans). This study was investigated under two constant temperatures at 25 and 30°C and 65±5% RH to clarify its response when fed on movable stages of citrus red mite, *Panonychus citri*(McGregor). The incubation period averaged 3.8±0.06, 2.57±0.07, 3.2±0.09 and 2.37±0.1 days at 25°C and 30°C for female and male, respectively. The life cycle periods lasted 10.2±0.11, 7.6±0.1, 9.1±0.07 and 6.7±0.2 days for female and male, respectively at the previous temperature. The food consumption of the predator mite *N. cucumeris* averaged 78.8±0.9, 49.0±0.6 , 95.1±0.53 and 58.5±0.5 prey of *P. citri* during their life span for female and male ,respectively .

INTRODUCTION

This mite species was recored recently on citrus trees in Egypt. The citrus red mite, *Panonychus citri* (McGregor) is one of the serious mite pest infesting citrus trees cussing severe damage for leaves and fruits resulting reduction of the quality and quantity of the production. The predatory mite, *Neoseiulus cucumeris* (Oudemans) used as a biocontrol agent this mite pest in different localities in the work (Zhang *et al.,* 2001, Lin *et al.,* 2003 and Zhang *et al.,* 2003a), this predatory mite is polyphagas, it could feed on individuals of *Tetranychus urticae* Koch and *Thrips tabaci* (Ramakers 1987, Ravensberg and Altena 1987, Bieri *et al.,* 1989, Castagnoli 1989, Marisa and Sauro 1990, Zhang *et al.,* 2000, Blaeser *et al.,* 2002, Zhang *et al.,* 2003 b and Ibrahim *et al.,* 2005).

The present study aim to test the biological aspects of predacious mite, *Neoseiulus cucumeris* when fed on the citrus red mite, *Panonychus citri.* This predatory mite species was brought from Holland we aim to use and adaptable to Egyptian conditions as biological control agent.

MATERIALS AND METHODS

The predatory mite, *Neoseiulus cucumeris* (Oudemans) was reared using leaf discs of citrus (3 cm in diameters) using. These discs were put on cotton wool in Petri-

dishes. Suitable moisture was daily maintained by adding few drops of water as needed. The predatory mite was fed on the movable stages of *P. citri* during the life span, and the biological aspect were recorded the number of devoured individuals of the prey were counted and then replaced by another alive one until the end of life

The experiments were carried out in an incubator at 25 and 30°C and 65±5% R. H. and inspected twice daily.

RESULTS AND DISCUSSION

Duration (in days) of development stages of *N. cucumeris* were reared on movable stages of *P. citri* are shown in Table (1), the incubation period averaged 3.8±0.06, 2.57±0.07, 3.2±0.09 and 2.37±0.1 days for female and male at 25 and 30°C, respectively. The duration of female and male larvae at 25 and 30°C durated 1.3±0.05, 0.9±0.07, 1.2±0.07 and 0.7±0.05 days, respectively. The protonymphal stage lasted 2.5±0.09, 1.9±0.06, 2.3±0.08 and 1.6±0.1 days for female and male at 25 and 30°C, respectively, while the deutonymphal stage durated 2.6±0.12, 2.2±0.07, 2.4±0.1 and 1.9±0.09 days for female and male at 25 and 30°C, respectively.

Table 1. Average duration (in days) of the different stages of predatory mite *Neoseiulus cucumeris* (Oudeman) when feeding on movable stages of *Panonychus citri*(McGregor).

Developmental stages	Duration (in days)			
	Mean ± SD at 25°C		Mean ± SD at 30°C	
	Female	Male	Female	Male
Egg	3.8±0.06	3.2±0.09	2.57±0.07	2.37±0.1
Larva	1.3±0.05	1.2±0.07	0.9±0.07	0.7±0.05
Protonymph	2.5±0.09	2.3±0.08	1.9±0.06	1.6±0.1
Deutonymph	2.6±0.12	2.4±0.10	2.2±0.07	1.9±0.09
Total immatuers	6.5±0.14	5.9±0.07	5.0±0.09	4.3±0.1
Life cycle	10.3±0.11	9.1±0.07	7.6±0.10	6.7±0.2
longevity	20.9± 0.28	16.6±0.19	18.3±0.31	17.53±0.1
Life span	31.1±0.30	25.7±0.21	25.9±0.27	24.2±0.17

The total immatuers of the female and male predatory mite lasted 6.5±0.14 and 5.9±0.07 days at 25°C, respectively, while at 30°C it lasted 5.00±0.09 and 4.3±0.1 days of female and male, respectively.

The life cycle of female and male at 25and 30°C durated 10.21±0.1, 7.6±0.1, 9.1±0.07 and 6.7±0.2 days, respectively.

The female and male longevity averaged 20.9±0.28, 18.3±0.31days at 25°C, 16.6±0.19 and 17.5±0.1 days at 30°C, respectively. The predator life span was longer

at 25°C than that at 30°C, this period averaged 31.1±0.3, 25.7±0.21at 25 °C and 25.9±0.27, 24.2±0.17 days, for female and male respectively. The duration of male was shorter than female

Data in Table (2) revealed that the pre-oviposition period averaged 1.2±0.06 and 1.1±0.05 days at 25 and 3°C, respectively. The oviposition period of female predator durated 18.07±0.0.26 and 15.8±0.47 days at 25 and 3°C, , while the post-oviposition period lasted 1.52±0.09 and 1.4±0.1 days at 25 and 30°C, respectively. Females deposited 16.7±0.46 and 19.0±0.23 eggs with daily rate averaged 1.4±0.09 and 1.6±0.14 at 25 and 30°C, respectively.

Table 2. Longevity and fecundity of *N. cucumeris* females fed on movable stages of *P. citri* at 25 and 30 °C

Temperature	Average period in days				No. of eggs/female	
	Pre-oviposition	oviposition	Post-oviposition	longevity	Total	Daily rate
25 °C	1.2 ±0.06	18.7 ±0.26	1.52 ±0.09	20.9 ±0.28	16.7 ± 0.46	1.4 ± 0.09
30 °C	1.1 ±0.05	15.8 ±0.47	1.4 ±0.1	18.3 ±031	19.0 ± 0.23	1.6 ± 0.14

*** Prey consumed by different stages of *N. cucumeris* when fed on movable stages of *P. citri* at 25 and 30°C:**

Data in Table (3) revealed that the developmental stages of predatory mite consumed different movable stages of *P. citri.* The average number of consumed prey by *N. cucumeris* female and male larvae, protonymph and deutonymph at 25°C were 1.4±0.07 and 0.9±0.02, 3.1±0.17 and 2.6±0.12, 6.5±0.21 and 3.2±0.1 individuals, respectively. While, it consumed 1.1±0.08 and 0.7±0.05, 3.7±0.21 and 2.1±0.07, 7.1±0.17 and 4.5±0.09 individuals deutonymph at 30°C, respectively.

Total immature of females fed more than males. The average numbers of consumed prey were 10.6±0.21, 6.7±0.2 and 12.1±0.08 7.4±0.09 individuals for females and males at 25 and 30°C, respectively. The average number of consumed prey during the pre-oviposition, oviposition and post-oviposition period were 10.9±0.3, 47.4±0.93 and 8.1±0.21 individuals at 25°C, while it averaged 14.6±0.29, 56.4±0.38 and 12.1±0.29 individuals at 30 °C respectively.

The average number of consumed prey by adult females and males were 66.3±0.85 and 42.3±0.6 individuals at 25°C, while it averaged 83.1±0.52 and 51.1±0.5 individuals at 30°C.

During life span, the predator female and male consumed 78.8±0.9 and 49.0±0.6 individuals at 25°C, and 95.1±0.53 and 58.5±0.5 individuals at 30°C. From the previous results it clear that the predatory mite, *N. cucumeris* may be considered as potential biological control agent of the citrus red mite, *P. citri.* These obtained results are in agreement with those obtaind by Blaeser et al (2002) , Ibrahim *et al.* (2005) , Marisa and Sauro (1990), Remakers (1987) , Zhang et al (2000) and Zhang *et al.*

(2003) all these authors reported that the predatory mite *N. cucumeris.* gave good results in controlling the tetranychid mites and can depend on as a biocontrol agent.

Table 3. Number of movable stage of *P. citri* consumed by different movable stages *Neoseiulus cucumeris* (Oudeman) different stages at 25 and 30°C. when fed on motile stages of *Panonychus citri* (McGregor).

Predator Stages	Average No. of consumed prey (*P. citri*)			
	Mean ± SD at 25°C		Mean ± SD at 30°C	
	Female	Male	Female	Male
Larva	1.4±0.07	0.9±0.02	1.1±0.08	0.7±0.05
Protonymph	3.1±0.17	2.6±0.12	3.7±0.21	2.1±0.07
Deutonymph	6.5±0.21	3.2±0.1	7.1±0.17	4.5±0.09
Total immatuers	10.6±0.21	6.7±0.2	12.1±0.8	7.4±0.09
Pre-oviposition	10.9±0.3	-	14.6±0.29	-
Oviposition	47.4±0.93	-	56.4±0.38	-
Post-oviposition	8.1±0.21	-	12.1±0.29	-
Longevity	66.3±0.85	42.3±0.6	83.1±0.52	51.1±0.5
Life span	78.8±0.9	49.0±0.6	95.1±0.53	58.5±0.5

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دراسات بيولوجية للمفترس الأكاروسي نيوسيولس كيوكوميرس عند تغذيته علي الأطوار المتحركة لأكاروس الموالح الأحمر

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يعتبر أكاروس الموالح الأحمر من الآفات الأكاروسية حديثة الظهور في السنوات الأخيرة وأصبح منتشراً في معظم محافظات الوجه البحري ويسبب خطراً شديداً علي محصول الموالح حيث أنه يهاجم الأوراق والثمار مسبباً بواسطة أجزاء فمه الثاقبة الماصة شحوب الأوراق والثمار مما يؤثر علي الثمار بدرجة تعيق عملية التصدير.

في هذه الدراسة تم استخدام أحد المفترسات الأكاروسية نيوسيولس كيوكوميرس في التغذية علي الأطوار المتحركة لأكاروس الموالح الأحمر بهدف تقليل استخدام المبيدات وقد تم إستجلاب هذا المفترس من هولندا وأقلمته تحت ظروف البيئة المصرية وذلك لتعظيم دور المفترسات الأكاروسية في المكافحة الحيوية وقد تم دراسة كفاءة هذا المفترس وطول دورة الحياة عند تغذيته علي أكاروس الموالح الأحمر وذلك بهدف استخدام هذا المفترس الأكاروسي في القضاء علي هذه الآفة علي الموالح في الدراسة المستقبلية وقد تم تربية هذا المفترس تحت الظروف المعملية علي درجتي حرارة ٢٥، ٣٠°م ورطوبة نسبية ٦٥±٥%. علي احد الآفات الاكاروسية علي الموالح اكاروس الموالح الأحمر وتشير النتائج المتحصل عليها بأن دورة حياة المفترس الأكاروسي بلغت ١٠,٢، ٧,٦ يوم في حالة الأنثي أما في حالة الذكر فقد بلغت ٩,١، ٦,٧ يوم وإستطاعت الأنثي أن تضع ١٦,٧، ١٩ بيضة في المتوسط كما إستطاعت الأنثي أن تستهلك ٧٨,٨، ٩٥,١ فرداً في المتوسط علي درجتي حرارة ٢٥، ٣٠°م علي التوالي.

علي ضوء هذه النتائج نجد أن المفترس الأكاروسي نيوسيولس كيوكوميرس يتغذي علي أكاروس الموالح الأحمر بكفاءة عالية وبالتالي يمكن استخدام هذا المفترس الأكاروسي في مكافحة أكاروس الموالح الأحمر تحت ظروف البيئة المصرية.