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LABORATORY TRIALS TO EVALUATE EFFICACY OF FIVE PREDATORY PHYTOSEIID MITES PREYING *EUTETRANYCHUS AFRICANUS* (TUCKER)

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ABSTRACT: Five species of phytoseiid mites were reared to evaluate their potentiality as predators of *Eutetranychus africanus* (Tucker). Those predators were *Amblyseius hutu* Pritchard & Baker, *Phytoseius finitimus* Ribaga, *Amblyseius swirskii*(Athias-Henriot), *Amblyseius yousefi* Zaher & El-Borolossy and *Typhlodromus pyri* Schueten. The development was successfully occurred from larva to adult on the previous prey. The total developmental period was longer in *T. pyri* than other species. Adult female of *A. hutu* consumed the highest number of the prey, while *T. pyri* consumed the lowest number when fed on adult females of the prey. *T. pyri* had a long life span and adult longevity. The highest rate of egg deposition was recorded by *A. hutu* and *P. finitimus*. In contrast, *T. Pyri* showed the least number of egg laying.

Key words: Phytoseiidae, *Eutetranychus africanus*, biological control.

INTRODUCTION

Members of the genus *Eutetranychus* (Banks) feed primarily on trees and shrubs and some species are considered major economic pests (Momen and El-Borolossy, 1999). The mite, *E. africanus* (Tucker) is commonly found on citrus, other hosts include peach and loquat in South Africa (Jeppson *et al* ., 1975).

Phytoseiid species are important biocontrol predators of tetranychid and eriophyid mites in a number of Egyptian croping systems (El-Banhawy,1974; Abou-Awad, 1983; Abou- Awad & El-Banhawy,1986; Abou- Awad *et al.*, 1989 and Momen & El-Saway, 1993). Overmeer (1985) declared that phytoseiid species are the best known predators among the Acari

and may easily mass- reard and shipped. Also, McMurtry (1982), Pickett& Gilstrap(1986), Moraes (1991), and Noronha & Moraes(2004) referred to the success of phytoseiids as predators on pests of crops such as citrus, cassava, apple, corn and strawberries. Some phytoseiids are generalized predators, i.e. they consume a wide range of food such as mites, scale crawlers (Swirski *et al.*, 1967); pollen, honeydew and mildew (Chant and Fleschner, 1960). A few of phytoseiids are "specialized" predators feeding only on tetranychid mites (Chant, 1961 and Mori & Chant, 1966).

The growing interest in Phytoseiidae stimulated many laboratory studies on the biology of these mites (McMurtry *et al.*, 1970). The present study was designed to determine the ability of some phytoseiid species to develop and reproduce on *E. africanus* as prey in the laboratory.

MATERIALS AND METHODS

The suitability of phytophagous mite, *Eutetranychus africanus* (Tucker), which was collected from leaves of margosa (*Melia azidrachta*) was tested as a food source for five species of Phytoseiidae. Those species are *A. hutu*, *P. finitimus*, *A. swirskii*, *A. yousefi*, and *T. pyri*. The previous predators were collected from Sharkeia Governorate, Egypt. The mite *A. hutu* was collected from weeds under guava obtained from Abou-Kabeer district; *P. finitimus*, *A. swirskii* and *A. yousefi* were collected from mango leaves from Abou- Hammad district and *T. pyri* from castor oil trees from Zagazig region.

Cultures of the five predators were reared on immature stages of *Tetranychus urticae* Koch in the laboratory at Institute of Efficient Productivity, Zagazig University, Zagazig, Egypt.

Ten gravid females of each predator species were taken randomly and transferred to rearing substrates. Females were left 24 hours and their oviposited eggs were used to start biological aspects. Leaf discs of mulberry, *Morus* spp. Leaves, 3 cm in diameter were used as rearing arenas. The discs were placed on cotton wool soaked with water in Petri-dishes. Eggs of each predator were transferred singly to the rearing discs, and the newly hatched larvae were supplied with sufficient known numbers of *E. africanus* adults obtained from margosa leaves.

Replacement of the devoured preys were carried out daily.The development, reproduction, and food consumption were recorded twice a day. All experiments were carried out under laboratory conditions of 29±2°c and 70±5% R. H. Data were statistically analyzed according to Snedcor and Chochran (1980), using SPSS (1998). The difference between means were tested using Duncan's New Multiple Range Test (Duncan, 1955).

RESULTS AND DISCUSSION

Individuals of *A. hutu*,, *P. finitimus* , *A. swirskii* , *A. yousefi* and *T. pyri* were successfully developed from larvae to adults when fed on the tetranychid mite, *E. africanus* (Table 1). The total development period was longer in *T. pyri* than other phytoseiids. The mites, *A. hutu*, *A. swirskii* and *A. yousefi* have been reported to feed in the larval stage (Metwally *et al.*,1984; Momen & El-Saway, 1993; Momen, 1995; Ibrahim, 2000 and El- Kawas, 2005). The consumption rate of the prey increased through the developmental stages of the predators, respectively. Adult female of *A. hutu* consumed higher number of *E. africanus* (129.1 individuals/ female) than other species, while *T. pyri* consumed the lowest number (35.6 individuals/ female) (Table 2). The larvae of *A. hutu*, *P.finitimus*, *A. swirskii*, *A. yousefi* and *T. pyri* consumed an average of 1.6,1.3,3.4,2.3 and 0.6 individuals / female / day, respectively. Some individuals of *T. pyri* moulted to the protonymphal stage without feeding. The results are in agreement with those obtained by Burnett, 1971; Amano& Chant, 1977; Sabelis, 1981 and Momen & El-Borolossy, 1999.

The preoviposition period was long for *T. pyri* compared to other species, while the oviposition period was,however, the similar to the five phytoseiids, (Table 3).*T. pyri* had a long life span period and adult longevity compared with the other species.

The highest rate of egg laying was recorded in *A. hutu* and *P. finitimus* (58.8 and 46.5 eggs/ female) with daily rate (3.23 and 3.19 eggs), respectively. In contrast, *T. pyri* showed the lowest rate of egg laying (4.6 eggs) with daily rate (0.28 egg) suggesting that the host plant may have negative effect on the performance of the predator (Table 4). The total

Table 1. Development of five phytoseiid species on *Eutetranychus africanus* (Adult females) at 29±2°C and 70± 5% R.H.

Predators	Egg	Larva	Protomyph	Deutonymph	Total
Amblyseius hutu	1.53 ± 0.14 bc	1.77 ± 0.14 c	2.51 ± 0.15 c	2.18 ± 0.06 cd	7.99 ± 0.23 d
Phytoseius finitimus	1.90 ± 0.18 ab	2.03 ± 0.16 bc	4.43 ± 0.40 a	4.46 ± 0.09 b	13.42 ± 0.37 b
Amblyseius swirskii	1.40 ± 0.16 c	2.38 ± 0.10 a	2.79 ± 0.11c	2.79 ± 0.11 c	9.35 ± 0.21 bc
Amblyseius yousefi	2.30 ± 0.15 a	1.89 ± 0.12 bc	2.33 ± 0.15 c	2.57 ± 0.08 cd	9.09 ± 0.25 c
Typhlodromus pyri	2.30 ± 0.15 a	2.18 ± 0. 09a b	3.72 ± 0.10 b	8.19 ± 0.30 a	16.39 ± 0.43 a
significant	**	*	**	**	**

Means in the same column having different letter are significantly differ, (P< 0.05)

Table 2. Consumption rate of five phytoseiid species fed on *E. africanus* at 29±2°C and 70± 5% R.H..

Predators	Larva	Protonymph	Deutonymph	Adult female
A.hutu	1.6 ± 0.22 c	9.7 ± 0.0.65 a	12.7 ± 0.40 a	129.1 ± 3.87 a
P.finitimus	1.3 ± 0.15c	5.1 ± 0.35 bc	9.2 ± 0.51 b	83.1 ± 3.20 b
A. swirskii	3.4 ± 0.16 a	5.3 ± 0.37 b	8.2 ± 0.70 b	76.1 ± 1.97 b
A. yousefi	2.3 ± 0.33 b	3.9 ± 0.31 c	6.5 ± 0.27 c	64.9 ± 3.48 c
T. pyri	0.6 ± 0.16 d	5.1 ± 0.38 bc	6.3 ± 0.26 c	35.6 ±1.08 d
Significant	**	**	**	**

Table 3. Average duration (in days) of various stages of adult females of five phytoseiid species at 29±2°C and 70± 5% R.H..

Predator	Preoviposition	Oviposition	Adult longevity	Life span
A.hutu	1.93 ± 0.07 b	18.27 ±0.40 a	21.73 ± 0.35 b	29.72 ± 0.39 b
P.finitimus	1.51 ± 0.13 bc	14.60 ± 0.22 d	17.73 ± 0.27 c	31.15 ± 0.51 b
A. swirskii	1.72 ± 0.12 b	15.88 ± 0.28 c	18.57 ± 0.21 c	27.92 ± 0.19 c
A. yousefi	1.20 ± 0.06 c	16.79 ± 0.44 bc	21.7 ± 0.75 b	30.69 ± 0.74 b
T. pyri	3.34 ± 0.26 a	17.11 ± 0.50 b	26.04 ± 0.80 a	42.43 ± 0.99 a
Significant	**	**	**	**

Table 4. Fecundity of five phytoseiid species fed on *E. africanus* at 29±2°C and 70± 5% R.H..

Predator	Total no. eggs / female	Average no. eggs / female/ day
A.hutu	58.8 ± 1.37 a	3.23 ± 0.11 a
P.finitimus	46.5 ± 1.43 b	3.19 ± 0.09 a
A. swirskii	34.3 ± 1.59 c	2.15 ± 0.07 b
A. yousefi	30.8 ± 1.63 c	1.84 ± 0.10 c
T. pyri	4.6 ± 0.37 b	0.28 ± 0.03 d
Significant	**	**

number of eggs laid per female by *A. hutu* and *P. finitimus* seems to be in the high or medium range, respectively, compared with those obtained for other phytoseiid species (Swirski & Dorzia, 1968 & 1969; Metwally *et al.*, 1984; Abou-Awad *et al.*,1989; El-Bagoury *et al.*, 1989; Shih *et al.*, 1993; and Momen & El-

Borolossy, 1999). Also, a high reproduction rate was recorded with *Eutetranychus orientalis* (Klein) as a prey for *Amblyseius largoensis* Muma, and *A. gossipi* El- Badry (Kamburov,1971 and Yousef & El- Halawany, 1982). Only , a few species are considered in the highest fecundity range, such as, *A. bibens* Blommers or genus *Phytoseiulus* Evans, where they produce more than 50 eggs / female (McMurtry *et al.*, 1970 and Blommers,1976).

In the present study, *E. africanus* did not provide suitable food for egg laying in *T. pyri*. The reason for the unsuitability is not known, but it may be attributed to the morpho-physiological characteristics of the prey or that *E. africanus* may be physiologically unsuitable as a prey. El-Bagoury & Momen (1989) recorded an oviposition rate of 0.9 egg / female / day of *Typhlodromus balanites* El-Badry on the eriophyid mite, *Eriophyes dioscoridis* Soliman & Abou-Awad .

Also, Momen and El-Borolossy (1999) found that the mites, *Typhlodromus talbii* (Athias- Henriot), *T. balanites, A. badri* Yousef & El-Borolossy, *A. cabonus* (Schicha) and *A. lindquisti* Schuster & Pritchard did not provide suitable food for development till egg laying when fed on immature stages of *E. orientalis*. Zacharda and Hluchy (1997) found that the predator, *Typhlodromus pyri* recorded on vine shoots produced no demonstrable control of spider mite and eventually declined in density with their prey.

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Tetranychus urticae on strawberries by the predatory phytoseiid mite, *Tephlodromus pyri* (Acari, Tetranychidae, Phytoseiidae). Experimental& Applied Acarology, 20: 83- 94.

إختبارات معملية لتقييم مقدرة خمسة أنواع من الحلم الـ Phytoseiidae المتغذى على *Eutetranychus africanus* (Tucker)

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تم دراسة تأثير الأكاروس نباتي التغذية *Eutetranychus africanus* (Tucker)، كفريسة على كل من التشكل والنمو (Development) ومعدل الاستهلاك والتكاثر لخمس أنواع من الحلم الفيتوسيدي هى .
Amblyseius hutu **Pritchard & Baker , *Phytoseius finitimus*** **Ribaga, *Amblyseius swirskii*** **(Athias - Henriot), *Amblyseius yousefi*** **Zaher & El-Borolossy *and Typhlodromus pyri*** **Schueten.**

وأوضحت النتائج النقاط التالية:
١- نجحت الأنواع الخمسة المفترسة في التشكل والنمو من طور اليرقة إلي الطور البالغ عند التغذية علي الضحية.
٢- فترة التشكل والنمو الكلية طالت في النوع *T.pyri* بالمقارنة بالأنواع الآخري.
٣- المفترس *A. hutu* استهلك أعلي معدل من الضحية بينما النوع *T.pyri* استهلك المعدل الأقل بالمقارنة ببقية الأنواع المفترسة.
٤- النوع *T.pyri* كانت له أطول فترة لطول العمر وكذلك دورة الحياة بالمقارنة بباقي الأنواع .
٥-أعلى معدل لوضع البيض سجل للنوع *P. finitimus, A. hutu* بينما العكس في النوع *T.pyri* سجل أقل معدل لوضع البيض.