

PREYING EFFICIENCY AND BEHAVIOUR OF *EUSEIUS SCUTALIS* (A.-H.) ON TWO VEGETABLE CROPS IN LABORATORY STUDIES

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Abstract

The aim of this study was to assess the effect of the prey absence and starvation on the biology of *Euseius scutalis* (Athias-Henriot) (= *Amblyseius gossypii* El-Badry) when the prey reared on two vegetable crops and the effect of the host plant on the predator efficiency.

The average period of the different stages of *E. scutalis* differed according to the type of rearing. The adult female could live without food in the rearing cells for an average of 2.5 days, while it lived 3.0 and 2.27 days on cucumber and kidney bean, respectively. Longevity of adult female was 13.27 days for those reared on pollen grains. The total life span was shorter in case of rearing the predator on clean cucumber and kidney bean leaves (7.79 and 7.45 days, respectively), while it reached 16.18 days when pollen grains were added. Larvae failed to reach the nymphal stage in case of the rearing cells. Data also indicated that the predator reared on kidney bean was more active than that reared on cucumber where the percentage of consumed *Tetranychus urticae* Koch nymphs were 50 and 61.12% for both plants, respectively. The percentage of consumed larvae were 44.45 for both hosts.

INTRODUCTION

The common red spider mite, *Tetranychus urticae* Koch is an important pest on different vegetable crops causing serious damage and reducing yield quantity and quality of fruits.

The recent approach in pest control is to minimize using of pesticides in control procedures to avoid the hazardous effect of these chemicals on environment and human health. One of the new approach is to maximize the role of the natural enemies, i.e. predaceous mites and insects in pest control. In this respect, there are many authors who reported this role.

The role of predaceous mites as biocontrol agent was previously recorded by several authors. Swirski *et al.* (1979) reported that *Amblyseius chilensis* Doss and *A. hibisci* (Chant) reduced the population of the citrus brown mite, *E.orientalis*. Cross (1984) used the predatory mite *Phytoseiulus persimilis* (Athias-Henriot) in controlling the two-spotted spider mites, *T.urticae*. Krishnamoorthy and Mani (1980) found that the predator mite *Phytoseiulus persimilis* was effective on *T.urticae* on French beans, *Phaseolus vulgaris*. They reported that a release of 10 adults per plant gave better control than did 5 adults. In 1990, Jarosik studied the efficiency of the predatory mite *Phytoseiulus persimilis* against *T.urticae* on cucumber and pepper under commercial glasshouse conditions and found the predator to be more effective on cucumbers than on peppers.

In Egypt, Zaher and El-Badry (1962) stated the occurrence of several predaceous mites that attacked tarsonemid and tenuipalpid mites infesting vegetable plants in Giza. El-Bagoury (1970) reported that mites belonging to the families Phytoseiidae, Tydeidae and Stigmaeidae were important in affecting the population dynamics of the phytophagous mites *Eutetranychus orientalis*, *Brevipalpus californicus* and *Phyllocoptruta oleivora*. Rasmy and El-Laithy (1988) reported that predaceous mite *Phytoseiulus persimilis*, *Phytoseius finitimus* and *E.scutalis* (A.H.) (= *A. gossipii*) were released in greenhouse against *T.urticae* on cucumber plants and found the former to be sufficiently effective.

MATERIALS AND METHODS

A stock culture of the two-spotted spider mite *T.urticae* Koch was maintained on sweet potato leaves at laboratory condition of average temperature $28 \pm 2^{\circ}\text{C}$ and relative humidity $60 \pm 10\%$.

Effect of non-prey diet on some biological aspects of *E.scutalis*

The aim of this trial was to study the feeding behaviour of *E.scutalis* when the prey *T.urticae* was absent. Eggs of the predator were placed on clean leaves of *C.sativus* and *P.vulgaris*. Newly hatched larvae were divided into 3 groups. The first comprised larvae singly to clean plant leaves, the second with pollen grains of *P.dactylifera* in the rearing cells and the third in empty cells to study effect of starvation.

Effect of host plant

Six rearing Petri-dishes were provided with *C.sativus* or *P.vulgaris* leaves of

about 12 cm² each. A newly emerged single adult female of the predatory mite *E.scutalis* was placed on every leaf plant and provided with 3 of each *T.urticae* eggs, larvae, nymphs and adults (males and females) together in the rearing cell. Two days later, the number of the consumed prey stages were counted.

RESULTS AND DISCUSSION

Effect of non-prey diet

The aim of the present trial is to study the behaviour of the predacious mite in case of the prey absence. Data in Table 1 show that all postembryonic stages succeeded to develop on plant sap, i.e leaves of either *C.sativus* or *P.vulgaris*. Larvae developed to adult stage on pollen grains of *P.dactylifera*, while larvae, protonymphs and deutonymphs confined in the rearing cells without any food lasted for an average of 2.05 ± 0.10 , 1.68 ± 0.1 and 1.18 ± 0.08 days before death, respectively. It was found that when the postembryonic stages were reared in the rearing cells, 28.33% of the predator larvae moulted to the protonymphal stage and 37.5% of these protonymphs moulted to deutonymphs. All deutonymphs failed to moult to adults, Table 2. Protonymphs, deutonymphs and adults were placed singly in empty cages for evaluating the starvation.

The predator immature stages; larvae, protonymphs and deutonymphs developed faster when fed on pollen grains (0.73 ± 0.10 , 1.05 ± 0.08 and 1.23 ± 0.16 days, respectively).

Regarding the adult stage, it was found that those fed on pollen grains lasted for a significantly longer period (13.27 ± 1.10 days) than those fed on *C.sativus* and *P.vulgaris* sap (3.0 ± 0.342 and 2.27 ± 0.453 days, respectively). It was noticed that the predator deutonymphs and adults could tolerate starvation for an average of 1.18 ± 0.084 days and 2.5 ± 0.20 days, respectively.

E.scutalis was found feeding on pollen grains of corn, date palm and cotton (El-Badry and El-Banhawy, 1968), pollen of castor *Ricinus communis* (Rasmy and El-Banhawy, 1976) and pollen of castor oil beans, *Zinia* sp. and date palm (Yousef *et al.*, 1984).

Effect of host plant (Food preference)

Regardless of type of crops leaf, *E.scutalis* preferred to feed on *T.urticae* ny-

Table 1. Life cycle of *E.scutalis* (A.-H.) fed on different types of foods in days.

Predator stage	Type of food				F	L.S.D.
	C.sativus leaves	P.vulgaris leaves	Palm pollen grains	Starvation in cells		
Larva	1.36±0.136	1.55±0.297	0.73±0.101	2.05±0.104	17.89**	0.36
Protonymph	1.55±0.167	2.00±0.186	1.05±0.080	1.68±0.102	7.88**	0.398
Deutonymph	1.89±0.154	1.59±0.170	1.23±0.160	1.18±0.0842	5.15**	0.41
Adult	3.00±0.243	2.27±0.452	13.27±1.100	2.50±0.200	71.25**	1.78

Average based on data of (22) replicates.

Table 2. Average number and percentage of different *T.urticae* stages consumed by an *E.scutalis* adult female on *C.sativus* and *P.vulgaris* during its longevity .

Vegetable plant	<i>T.urticae</i> stages							
	Mean no. of consumed eggs	% of eggs consumption	Mean no. of consumed larvae	% of larvae consumption	Mean no. of consumed nymphs	% of nymphs consumption	Mean no. of consumed adults	% of adults consumption
<i>C.sativus</i>	0.2	5.55	1.3	44.45	1.5	50.00	0.7	22.22
<i>P.vulgaris</i>	0.3	11.10	1.3	44.45	1.8	61.12	1.2	38.90

Average based on data of (6) replicates.

mphs followed by larvae, adults and eggs. *E.scutalis* reared on *P.vulgaris* devoured higher number of eggs, nymphs and adults than those reared on *C.sativus*, Table 3.

It could be concluded that the predator to feed on the moving immatures of *T.urticae* followed by adults than eggs, and the feeding capacity increased on smooth plant surface. These findings are in agreement with the findings of Rasmy (1970) and Jarosik (1990) who reported that the feeding capacity of the predacious mites differed with type of host plant leaf surface.

Table 3. Percentages of developed immature stages of *E.scutalis* for different food types and starvation.

Type of food	Predator stages			
	Egg to larva	Larva to protonymph	Protonymph to deutonymph	Deutonymph to adult
<i>C.sativus</i> leaves	100	100	100	86.36
<i>P.vulgaris</i> leaves	100	100	86.36	63.64
Pollen grain	100	100	100	90.00
Starvation	100	28.35	37.50	--

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كفاءة وسلوك الافتراس للمفترس الأكاروسى
Euseius scutalis (Athias - Henriot)
 علي اثنين من محاصيل الخضر في المعمل

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تهدف هذه الدراسة الي تقدير تأثير غياب الغريسة والتجويح علي النواحي البيولوجية للمفترس الأكاروسى (*Euseius scutalis* (A. - H.) وذلك عند تربية المفترس علي نوعين من محاصيل الخضر، وكذلك دراسة تأثير نوع العائل النباتي علي الكفاءة الافتراسية لهذا النوع.

وقد وجد من الدراسة أن متوسط فترات الأطوار المختلفة قد اختلف تبعاً لطريقة تربية المفترس، فقد أمكن للإناث البالغة الحياة بدون غذاء في خلايا التربية لمدة ٢,٤ يوماً في المتوسط، بينما في حالة تربية الأفراد الكاملة وتتبع دورة حياتها في وجود أجزاء من نباتي الخيار أو الكوسة فقد أمكنها المعيشة لمدة ٣,٠ و ٢,٢٧ يوماً في المتوسط علي الترتيب. وبلغ متوسط فترة حياة الأنثى البالغة ١٣,٢٧ يوماً وذلك عند التغذية علي حبوب اللقاح. هذا وقد وجد أن مدة الحياة تكون أقل ما يمكن عند تربية المفترس علي أقراص من نباتي الخيار أو الفاصوليا وبدون وجود فرائس (٧,٧٩ ، ٧,٤٥ يوماً علي التوالي)، بينما بلغت هذه الفترة ١٦,١٨ يوماً عند اضافة حبوب اللقاح. وقد فشلت اليرقات كلية في التطور الي حوريات وذلك عند التربية في الخلايا الخالية. كما أظهرت النتائج أيضاً أن الفاصوليا أكثر تفضيلاً للمفترس عن الخيار حيث كانت الأفراد أكثر نشاطاً. هذا وقد بلغ متوسط كمية الفرائس من حوريات العنكبوت الأحمر *T.urticae* حوالي ٦١,١٢ و ٥٠ حورية علي الترتيب بينما لم يوجد اختلاف بالنسبة لمتوسط افتراسها من اليرقات حيث بلغت ٤٤,٤٥ يرقة علي كلا العائلين.