EFFECT OF PREY SPECIES AND STAGES ON PREDATORY EFFICIENCY AND DEVELOPMENT OF THE STIGMAEID MITE, *AGISTEMUS EXSERTUS*

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PREY/PREDATOR RELATIONSHIP
TETRANYCHIDAE
STIGMAEIDAE

ABSTRACT : The effect of the different stages of two tetranychid prey species on the predatory efficiency and biology of the stigmaeid mite, *Agistemus exsertus* Gonzalez was studied. It was found that feeding the predatory immatures on eggs of *Tetranychus urticae* (Koch) favoured faster development compared to feeding on eggs of *T. cucurbitacearum* (Sayed) although the eggs of the latter prey were more attractive to the predator. Also rearing the predatory mite on eggs of either tetranychid prey promoted faster development and a higher rate of oviposition than rearing on larvae or nymphs.

INFLUENCE PROIE/PRÉDATEUR
TETRANYCHIDAE
STIGMAEIDAE

RÉSUMÉ : Nous avons étudié l'influence de la proie, deux tetranychides à leurs diverses stases, sur l'efficacité et la biologie du prédateur Stigmaeide *Agistemus exsertus* Gonzalez. Nous avons constaté que les immatures du prédateur se développent plus rapidement quand on les nourrit d'œufs de *Tetranychus urticae* (Koch) que quand on les nourrit d'œufs de *T. cucurbitacearum* (Sayed), bien que ces derniers se montrent plus attractifs. Le prédateur a aussi, quand on l'élève sur les œufs des tétranychides, un développement plus rapide et un taux d'oviposition plus grand que quand on l'élève sur leurs larves ou nymphes.

INTRODUCTION

Predacious mites of the family Stigmaeidae have a significant role in the biological control of phytophagous mites and scale insect in Egypt (ZAHER & ELBADRY, 1961 ; RASMY, 1975). It was reported by ELBADRY *et al.* (1969) that *Agistemus exsertus* Gonzalez was effective in destroying eggs and postembryonic stages of *Tetranychus cinnabarinus* (Bois.) and *Eutetranychus orientalis* (Klein).

The aim of the present work was to study the effect of prey stages and species, i.e. *Tetranychus urticae* (Koch) and *T. cucurbitacearum* (Sayed), on the biological activities of the stigmaeid mite, *A. exsertus*.

MATERIAL AND METHODS

Five groups, of 20 *A. exsertus* larvae each, were reared singly on five different foods : eggs, larvae or nymphs on *T. urticae* or on eggs or nymphs of *T. cucurbitacearum*. Larvae of the latter prey were not offered because raring *A. exsertus* on

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larvae or nymphs of *T. urticae* produced no substantial differences in developmental periods or in ultimate egg production between predator groups (Table I). Prey-infested leaf discs of sweet potato, about four square centimeters in area, were used as a rearing platform for the predator. The discs were placed dorsal-side down on water satured cotton in Petri dishes. The leaf discs were replaced daily with fresh ones having surplus of the prey stage investigated.

The development of predatory larvae to adulthood was observed daily and the consumed prey were determined. Virgin females of *A. exsertus* were coupled with unmated males within 24 hours after te last moult. Eggs oviposited during the 10 days following the preoviposition period were recorded.

TABLE I. — Developmental periods and numbers of eggs laid per female of *A. exsertus* as effect by feeding on different stages of *T. urticae* and *T. cucurbitacearum*.

	Average duration in days					No. eggs in 10 days
	Larva	Proto-nymph	Deuto-nymph	Total	Preovip.	
			T. urticae eggs			
♀	2.2±0.1	2.1±0.1	2.2±0.2	6.4±0.2	1.1±0.3	34.5±2.8
♂	2.1±0.1	2.1±0.1	2.4±0.2	6.7±0.1		
			T. urticae larvae			
♀	4.0±0.3	2.4±0.1	3.6±0.4	10.2±0.1	2.4±0.6	18.4±1.5
♂	3.4±0.3	2.6±0.2	3.0±0.1	9.0±0.4		
			T. urticae nymphs			
♀	3.7±0.1	3.3±0.4	3.6±0.2	10.6±0.7	3.4±0.3	18.5±1.2
♂	3.6±0.3	2.7±0.2	3.1±0.4	9.4±0.4		
			T. cucurbitacearum eggs			
♀	2.6±0.1	1.9±0.1	2.8±0.2	7.3±0.2	1.3±0.1	35.6±1.6
♂	2.7±0.2	2.7±0.8	1.9±0.2	7.3±0.2		
			T. cucurbitacearum nymphs			
♀	2.6±0.2	3.4±0.3	2.3±0.3	8.4±0.6	1.6±0.1	21.3±0.9
♂	2.6±0.1	2.4±0.4	2.1±0.4	7.1±0.5		

RESULTS AND DISCUSSION

EFFECT OF PREY STAGES

Rearing *A. exertus* on eggs of either tetranychid prey promoted significantly faster development, a higher oviposition rate and a shorter preoviposition than did rearing on prey larvae or nymphs ($P < 0,05$ F-test). Predators fed on larvae showed no differences in development or oviposition rate from those predators fed on nymphs, and the duration of sexes was similar in both groups (Table I).

EFFECT OF PREY SPECIES

Predatory adult and immature stages consumed a higher number of *T. cucurbitacearum* eggs than *T. urticae* eggs (Table II) and the differences were significant ($P < 0.5$). Although the eggs of *T. cucurbitacearum* were more attractive to the predator than eggs of *T. urticae*, the latter promoted faster development. Feeding the predator on eggs of either prey resulted in similar rate of oviposition (Table I).

PREDATORY CONSUMPTION

The nymphs of *A. exsertus* consumed higher numbers of larvae and nymphs of *T. urticae* than did predatory larvae. The rate of predation of either sex of the predator nymphs reared on eggs or nymphs of *T. cucurbitacearum* was higher than that of predatory larvae. Also, the rate of predation of the adults when fed on *T. cucurbitacearum* eggs was higher than that of the predatory nymphs or larvae (Table II).

However, developmental times of the predator were influenced by prey stages as well as by prey species. *A. exsertus* had a shorter developmental time, a shorter preoviposition period, and a higher rate of egg production when fed on prey eggs than when fed on prey larvae or nymphs.

The males of *A. exsertus* were found to develop into adults more quickly than the females when fed on prey larvae or nymphs, while feeding on prey eggs induced similar developmental periods for both sexes. A shorter developmental time for male *A. exsertus* also had been reported by ELBADRY *et al.* (1969) when the predator was reared on the postembryonic stages of *E. orientalis* and *T. cinnabarinus*.

TABLE II. — Average numbers of immature stages of *T. urticae* and *T. cucurbitacearum* consumed by different stages of *A. exsertus*.

	Daily average			Total	
	Larva	Protonymph	Deutonymph		Adult
			T. urticae eggs		
♀	4.7±0.5	5.5±0.5	7.5±1.1	38.5±3.0	16.1±0.9
♂	5.7±1.0	6.4±0.8	5.6±0.5	39.0±4.0	16.0±0.8
			T. urticae larvae		
♀	1.9±0.0	5.3±0.6	7.7±0.5	48.1±3.5	12.4±0.4
♂	3.2±0.2	4.1±0.4	6.3±0.4	40.2±2.7	10.3±0.3
			T. urticae nymphs		
♀	1.6±0.3	2.1±0.2	2.4±0.2	21.1±1.8	3.8±0.3
♂	1.4±0.2	2.1±0.2	2.4±0.1	18.6±1.0	3.4±0.4
			T. cucurbitacearum eggs		
♀	4.4±0.5	8.2±0.6	7.3±0.6	47.3±1.1	21.2±0.6
♂	4.4±0.2	6.1±0.6	8.4±0.7	44.6±1.3	17.5±0.6
			T. cucurbitacearum nymphs		
♀	1.1±0.1	2.2±0.2	3.5±0.2	18.4±0.9	3.6±0.2
♂	1.9±0.3	2.0±0.0	3.3±0.3	16.5±0.5	3.4±0.2

Feeding the predator on eggs of *T. urticae* favoured faster development than feeding on eggs of *T. cucurbitacearum*. However, feeding *A. exsertus* on nymphs of the latter prey promoted a shorter developmental time for the predator when compared with rearing on nymphs of *T. urticae*. A similar response was reported for the phytoseiid mites *Amblyseius gossipi* Elbadry and *Typhlodromus magniferus* sp. n. when fed on *T. urticae* and *T. cucurbitacearum* by RASMY *et al.* (1982).

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