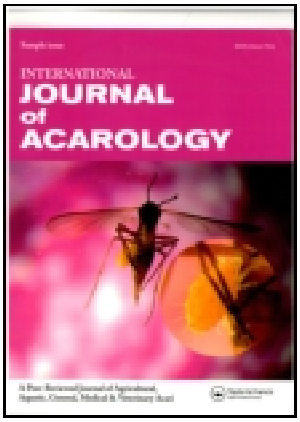

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Response of Amblyseius cydnodactylon (Phytoseiidae) to increasing prey density of Tetranychus urticae (Tetranychidae) in absence or presence of nymphs of Bemesia tabaci (Homoptera) in Egypt

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RESPONSE OF *AMBLYSEIUS CYDNODACTYLON* (PHYTOSEIIDAE) TO INCREASING PREY DENSITY OF *TETRANYCHUS URTICAE* (TETRANYCHIDAE) IN ABSENCE OR PRESENCE OF NYMPHS OF *BEMESIA TABACI* (HOMOPTERA) IN EGYPT

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ABSTRACT - The predacious mite, *Amblyseius cydnodactylon* Shehata & Zaher (Phytoseiidae) is a common natural enemy inhabiting low growing plants like cucumber in Egypt. It has been recorded associated with infestations of the two-spotted spider mite, *Tetranychus urticae* Koch (Tetranychidae) and the white fly, *Bemesia tabaci* (Genn.) (Homoptera). Under laboratory conditions of 28-30°C and 70-80% R.H., the predacious adult female consumed nymphs of *T. urticae* at different experimental densities. However, the consumption rate increased with increasing prey densities up to 32 nymphs/female/day and decreased significantly at 64 and 128 nymphs/female/day. Addition of fixed numbers of 2nd instar nymphs of *B. tabaci* (10 individuals) to each TSSM prey density tested significantly reduced consumption of spider mites although the predator female responded in similar fashion to increasing prey densities. Reproduction increased with increasing prey densities and reached a maximum at 32 nymphs/female/day. The addition of nymphs of *B. tabaci* substantially increased reproduction at every density. This increase in reproduction would have compensated the reduction in nymph prey consumption due to the presence of *B. tabaci.*

Key words - Acari, Phytoseiidae, Tetranychidae, *Amblyseius cydnodactylon*, *Tetranychus urticae*, *Bemisia tabaci*, prey-predator response, Egypt.

INTRODUCTION

The predacious mite *Amblyseius cydnodactylon* Shehata & Zaher (Phytoseiidae) is a common predator, preying on several pests including red spider mites, eriophyids, and nymphs of white flies and thrips (El-Banhawy *et al.*, 2000). It was first described as a new species from grass-land (Shehata and Zaher, 1969), although it was recorded later from several vegetable plants such as cucumber (unpublished data). In spring, typical pest infestations start with the white fly, *Bemisia tabaci* (Genn.) (Insecta: Homoptera) followed by two-spotted spider mite (TSSM), *Tetranychus urticae* Koch (Tetranychidae) or a combination of both pests. For successful release of a predator like *A. cydnodactylon*, one needs to know the response of predators to different densities of TSSM and determine the density at which individuals achieve excellent control. Furthermore, one also needs to understand the predator capacity in the presence of more than one prey.

MATERIALS AND METHODS

Adult females were obtained from a mass culture of *A. cydnodactylon* maintained on different stages of *T. urticae* on mulberry plant leaves. A single gravid female of *A. cydnodactylon* was placed on leaf disc (2.5 cm in diameter placed upside down on wet cotton in Petri dish).

In the first test, females were daily supplied with different prey densities (2, 4, 8, 16, 32, 64 and 128 nymphs of *T urticae*). In the second test, females were daily supplied with the same prey densities, plus each was combined with 10 second instar nymphs of the tobacco white fly, *B. tabaci.* In the third test, females were daily confined to 10 nymphs of *B. tabaci.* At each prey density, 10 females of *A. cydnodactylon* were used and observations on prey consumption and reproduction were recorded

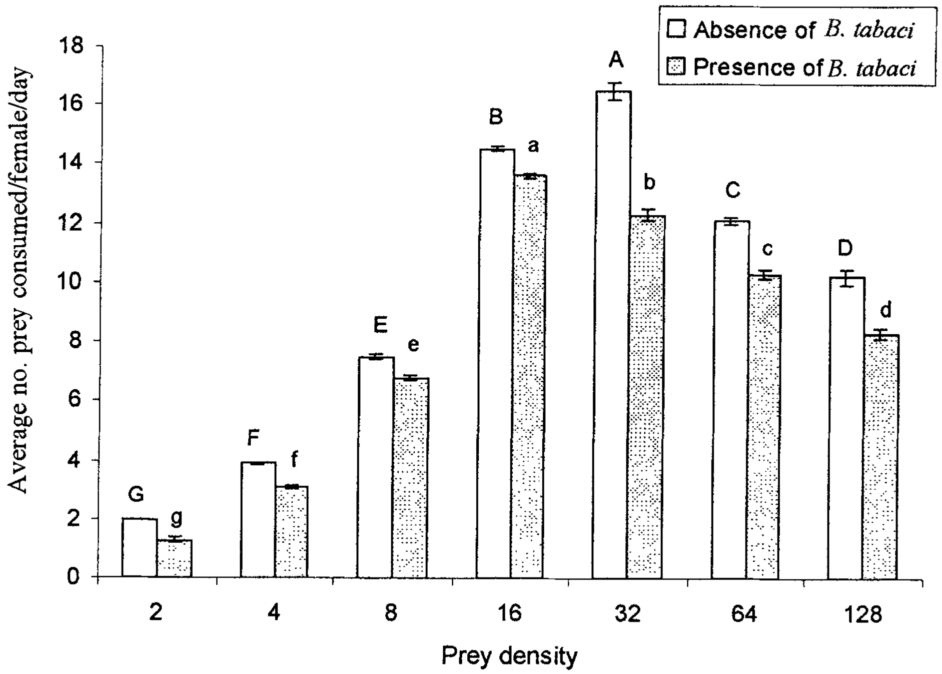

Fig. 1. Average number of prey consumed/female/day when females of *A. cydnodactylon* were maintained on 7 different nymph densities of *T. urticae* in absence and presence of *B. tabaci*. Means followed by the same letter are not significantly different (P<0.05).

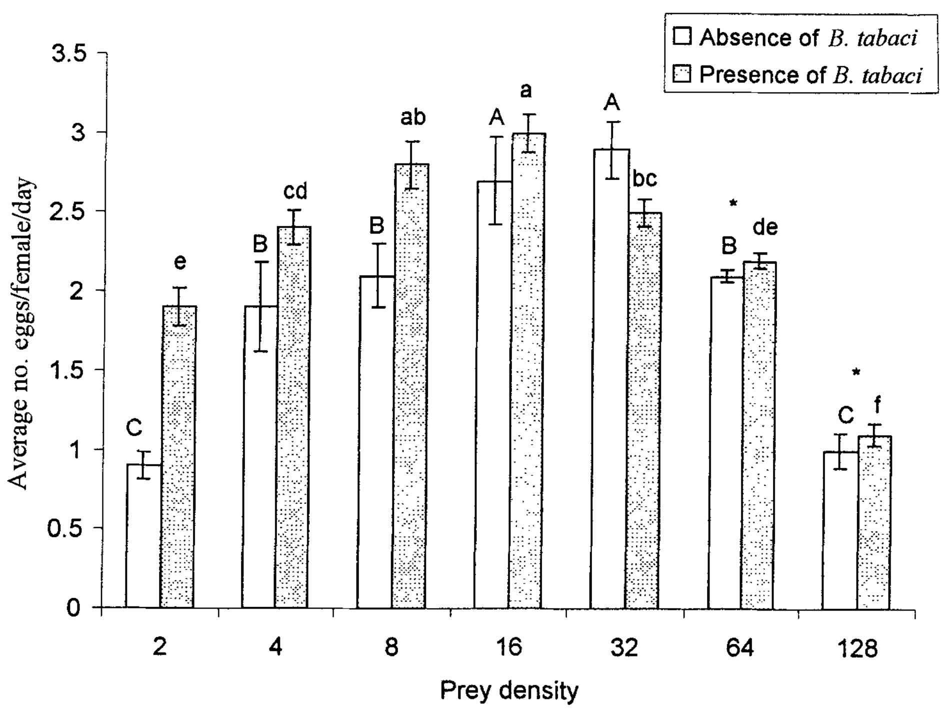

Fig. 2. Average number of eggs/female/day when females of *A. cydnodactylon* were maintained on 7 different nymph densities of *T. urticae* in absence and presence of *B. tabaci*. Means followed by the same letter are not significantly different (P<0.05). Asterisk denotes insignificant difference at the same density (P<0.05).

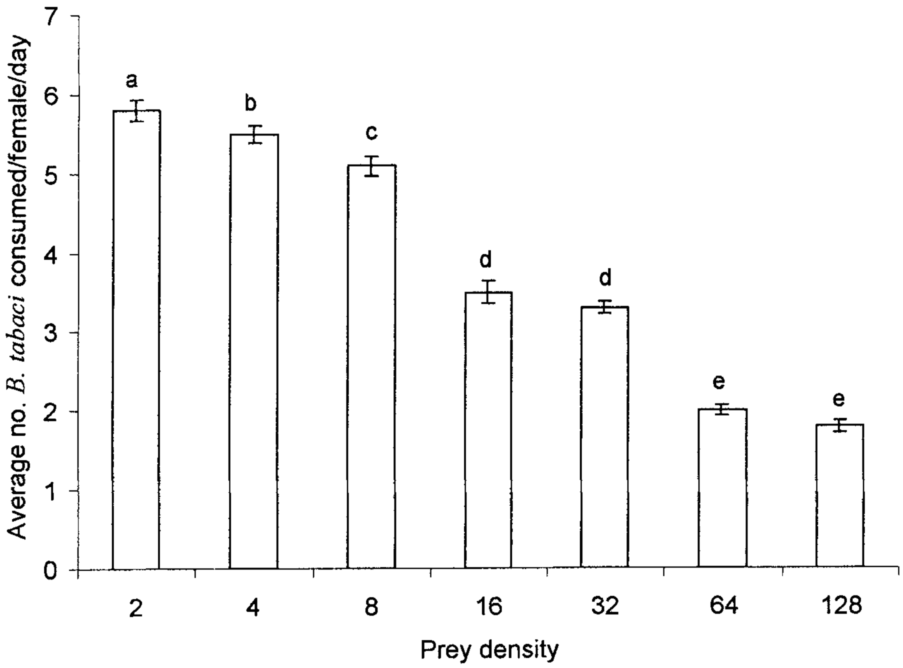

Fig. 3. Average number of *B. tabaci* nymphs consumed by females of *A. cydnodactylon* in presence of 2-128 nymph densities of *T. urticae*. Means followed by the same letter are not significantly different (P<0.05).

every day for 10 successive days. Experiments were simultaneously carried out at laboratory conditions of 28-30°C and 70-80% R.H. Data were compared with ANOVA and means were separated with least significant difference (L.S.D.) at 5% level of probability (Excel-97).

RESULTS

The number of *T. urticae* nymphs consumed by the female predator in the absence of *B. tabaci* significantly increased with increasing prey density. The consumption rate reached a maximum at 32 nymphs/female/day and dropped at higher prey densities (significant at 5% level of probability). Presence of *B. tabaci* did not change the nature of the response, although the maximum consumption by the female predator was recorded at 16 nymphs/female/day (Fig. 1). At every prey density the presence of *B. tabaci* significantly reduced consumption of *T. urticae* (P<0.05). The reproduction rate at the same densities showed a similar responseand reached maximum at the same prey densities in absence or presence of *B. tabaci* (significant at 5% level). Furthermore, the presence of white fly nymphs significantly increased reproduction at nearly every prey density (Fig. 2). *Amblyseius cydnodactylon* consumed a decreasing number of *B. tabaci* when the density of *T. urticae* increased (P<0.05). The maximum consumption of white fly nymphs was recorded at the lowest density of *T. urticae* (2 nymphs/female/day) and the lowest consumption was recorded at the highest density of *T. urticae* (64 and 128 nymphs/female/day) (Fig. 3).

DISCUSSION

Amblyseius cydnodactylon had a specific maximum ability to consume prey and the capacity decreased at high prey density. In fact, the predacious mites have finite capacities for consuming prey, oviposition and moving within limited areas within a unit of time (Takafuji and Chant, 1976). At higher densities, therefore, individuals of *A. cydnodactylon* are likely to decrease activity, allowing several prey individuals to escape predation. In a density-dependent species like *A. cydnodactylon*, reproduction continued to increase with increasing prey density, until it reached its maximum capacity, then ceased to respond. Phytoseiids, however, are more efficient at converting digested prey into eggs at lower densities of prey than at higher ones (Chant, 1961; Ball, 1980; Eveleigh and Chant, 1981; Friese and Gilstrap, 1982). Thus, to achieve the desired control of *T. urticae*, early releases are recommended. On the other hand, releases of *A. cydnodactylon* on infestations of the tobacco white fly, *B. tabaci*, alone, would have maintained the predator population at levels significant to combat infestations of *T. urticae*.

Furthermore, a combined infestation of both pests decreased the consumption rate of spider mites as indicated. Yet, the significant increase in reproduction would have offset the reduction in consumption by indirectly supporting an increase of the predator population (McMurtry and Scriven, 1966; El-Badry and El-Banhawy, 1968). Further field and greenhouse studies however, are recommended.

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