

## Predaceous mites (Acari) associated with scale insects (Hemiptera) on fruit trees

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### ABSTRACT

Due to the importance of predaceous mites, this work was carried out to survey Raphignathoid mite species inhabiting fruit trees and debris and associating with scale insects in different localities of Delta and Middle Egypt. In addition, the biology, prey range and its effect on feeding capacity and fecundity of the two prevalent species *Eupalopsellus olearius* Zaher and Gomaa and *Saniosulus nudus* Summers (Eupalopsellidae: Acari) were studied. This however might throw light on their role in biological control of associated scale insects.

**Keywords:** Predaceous mites, scale insects, fruit trees

### INTRODUCTION

The abundance of many plant feeding mites (Acari) and scale insects (Hemiptera) on fruit trees is sufficient to destroy or seriously reduce plant growth or crop production in the absence of chemical or biological control. Among the more important natural enemies are the predatory mites, which may play an important role in suppressing pest population. Of these predaceous mites, members of the Superfamily Raphignathoidea are considered important due to their wide spread on several fruit trees, all over the examined area. Therefore a general survey of raphignathoid mites inhabiting fruit trees and debris in Delta and Middle Egypt was carried out. Moreover, biological studies on two of the most common species were investigated to throw some light on their efficiency as biological control agents.

### RESULTS

#### 1. Survey and Economical Importance:

In (1946) Nesbitt observed *Mediolata nova-scotia* Nesbitt preying on eggs of *Bryobia proetiosa* Koch. on apple trees; while Mc-Gregor (1950) collected the mite *Neophyllobuis* sp. preying on scale insects and their crawlers on apple trees, he proved that this mite preferred to attack the crawlers. Baker and Wharton (1952) mentioned that few raphignathoid mites were observed on fruit trees attacking scale insects. Of these predators, *M. nova-scotia* was collected from apple trees in Nova-Scotia. They also reported that *Mediolata terminalis* (Qualye) *Eupalopsis penicola* Oudemans and *Neophyllobuis* sp. attacked citrus bud mite, apple mites, and crawler stages of scale insects respectively, Parant and Le Raux (1956) stated that *Mediolata mall* Ewing devoured the apple mite *Metatetranychus ulmi*. Zaher and El-Badry (1962) observed that *Agistemus exsertus* Gonzalez was dominant in Giza region; its seasonal incidence proved that its population generally reached the peak during August and September. Soliman (1966) mentioned that predaceous mites *A. exsertus* Gonzalez, *Eupalopsis punctata* l. & *S. Molothrognathus* sp., *Saniosulus nudus* Summers and *Neophyllobuis* sp. occurred in deciduous orchards, Wood (1967) created two new genera

(Mecognatha and Pseudostigmoeus) and described 23 new species of stigmatid mites from New-Zealand.

Smiley and Moser (1968) described several new species of mites which were found in the outer bark of *Pinus taeda* L. at Elizabeth, in Louisiana such as *Neophyllobius loruii*, *Molothrognathus rosei*. They also mentioned two new genera of which *Paraeupalposellus* from the family Eupalopsellidae including the new species *P. hodegesi* and *Neoraphignathus* from family Raphignathidae including the mite *N.howei*. Zaher *et al.* (1970) stated that *A. exsertus* Gonzalez was present in few numbers all over the republic, and few individuals of *S. nudus* Summers were associated with scale insects, while *Neophyllobius citri* S. & Z. was common during autumn in Upper Egypt. Yossef and Shehata (1971) recorded the stigmatid mite *A. exsertus* Gonzalez and *Eupalopsis acgyptiaca* Z. & S associated with tetranychid and tenuipalpid infestation and the Eupalopsellid mite *Saniosulus nudus* Summers associated with the scale insects on some fruit trees. In (1972) Rasmy *et al.* recorded *A.exsertus* on citrus trees in few numbers on leaves and fruits of citrus trees, associated with scale insects. They also recorded the stigmatid mites, *Agistemus* sp., *Mediolata* sp. *Barbutia* sp. and *Eupalopsis acgyptiaca* Z.& S.. in few numbers on citrus trees. They referred to the occurrence of *Neophyllobius aegyptiaca* S. & Z. and *Raphignathus* sp. in rare numbers.

Soliman *et al.* (1973) noticed the Eupalopsellid mites *S. nudus* Summers and *E.aegyptiaca* Z. & S. associated with and attacking scale insects and also the stigmatid mite *A.exsertus* Gonzalez. They mentioned that the neophyllobud mite *N. aegyptium* S& Z. was observed to feed on the crawlers and eggs of *Parlatoria oleae* (Clovee), *P. blanchardi* (Targ.) and *Lepidosaphes ulmi* (L.) Studying the incidence of the raphignathoid mites in Egypt Gomaa (1975) stated the occurrence of 22 species belonging to five families, Neophyllobiidae, Stigmatidae, Caligonellidae, Raphignathidae and Eupalopsellidae. Jeppson *et al.* (1975) observed the stigmatid mite *Zetzellia mali* (Ewing) as a predator on the two spotted spider mite, the European red mite, the brown mite and other mites on fruit trees in North America. He also mentioned that the genus *Agistemus* included a number of known predators of mites, *A. floridanus* Gonzalez, *A.fameri* Dosse and *A.longisetus* Gonzalez predated on the tetranychids *Panonychus ulmi*, *Eotetranychus sexmaculatus*, *P.citri* in Lebanon and *P.ulmi* respectively.

## 2. Rearing Methods:

For rearing the cheyletid mites Zaher and Soliman (1971 and 1971b) used glass rings fixed on glass slides by paraffin wax. Other slides were used as covers and fixed to the rings and slides by rubber bands. A small piece of cotton wool soaked in water was put in every ring to raise relative humidity. In the same year, *Spinibdella bifurcata* Atyeo and *Neomolgus aegyptiacus* S. & M. by covering the cell bottom with a thin layer of soil on which a wet filter paper disc was placed for giving humid environment. The first attempt for rearing raphignathoid mites was done by Zaher & El-badry (1961) who reared the predator *Agistemus fleschneri* on *Tetranychus cucurbitacearum* by using leaves of sweet potato cuttings. These cuttings kept in test tubes filled with Hogland solution. Mites were confined to leaves by encircling them with a mixture of Canada balsam and castor and citronella oils. In 1971, Zaher *et al.* used the same technique in rearing *A. exsertus* except in using water instead of Hogland solution. For rearing *Saniosulus nudus* Summers, Ibrahim (1971) confined the mite to citrus leaf placed up-side down on filter paper covering disc of wet rubber foam pad and all kept in petri dish. Hassan used another technique for rearing the same predator (adopted by Kandil 1974) on two scale insects, this was by using a

hemispherical plastic chamber of 8m. m in diameter and 4 m • m. in depth, and with scratched bottom. Suitable moisture was maintained through a lateral tubular hole of about 1.5 m.m in diameter coming out the cell, filled with plaster of paris and charcoal and always moistened with water.

### 3- Biology

For rearing *A.fleshneri* Summers, Zaher & El-badry (1961), found that the predator preferred to feed on eggs than other stages of the red spider mite *Tetranychus cinnabarinus* (Boisd). During summer months the female life span was greater (31.3 days) than that of male (23.6 days). Also female fed on greater number of preys (430.6 eggs or 149.8 larvae) than male (137.7 eggs or 47.2 larvae). They concluded that the adult was more efficient predator which completely failed to survive on plant sap. They also added that when the predator fed on eggs, developed more rapidly and lived longer than those fed on prey larvae. El-badry *et al.* (1969) studied the life history of *A. exsertus*, and concluded that it was a facultative predaceous mite as it developed and reproduced successfully on either *T. cinnabarinus* or *Eutetranychus orientalis* (Klein). In (1969) Wafa *et al.* studied the feeding range of the predator mite *A. exsertus*. They reared it on 4 types of animal dities and 3 plant dities and found that this predator preferred to survive and reproduce on eggs and immatures of *T. cinnabarinus* than on eggs of *E.orientalis*. Also, date plm pollen grains were more suitable for development. Studying the effectiveness of *A. exsertus* as an egg predator of *T. cinnabarinus* (Bois). Al ify *et al.* found that its effectiveness increased. as the predator advances in age. The daily rate of food consumption was directly proportional to temperature, and females were more effective than males specially in the adult stages.

In (1971) Zaher *et al.* found that this predator had 21 generations per year in Egypt. The generation period averaged about 10.9., 16.9, 43.7 and 14. 5 days during summer, autumn, winter and spring respectively. Biological experiments also showed that about 65% of the total number of generations could be completed during the warm months from May to October Ibrahim (1971) reared *S.nudus* Summers on eggs of the scale insects *Lepidosaphes beckii* Newman, and found that female was more efficient and reached adult stage before male. He stated that female deposit larger number of eggs during autumn (23.4 °c) and eggs of *L. balidi* were the only diet on which the predator normally lived.

Studying the food range, Gomaa' (1975) found that *A.exsertus*, fed on eggs of *T. arabicus*, crawlers of the scale insect *C. ficus*, eggs of both *L. balidi* and *L. beckii*, and nymphs of the white fly *Bemisia tabaci*. The predator developed and reproduced on all the four former prey types but at different rates. Eggs of *T.arabicus* were the best food for quicker development, longer longevity and higher rate of reproductivity, while nymphs of white fly were not in favour to the predator. Hassan, (1976) examined the biological response of *S.nudus* to immatures of *C. ficus* and *L. tapleyi* and mentioned that the total period of immatures averaged 13.6 and 14.8 days when fed on crawlers of *C.ficus* and *L. tapleyi* respectively, oviposition period was 12.7 days on *C. ficus* and 10.5 days on *L. tapleyi* but female longevity was shorter on the former (30 days) and longer on the latter (33. 4 days). During the life span, the adult female predator consumed an average of 180.8 and 158.3 crawlers of *C. ficus* and *L. tapleyi*, respectively. The total average of deposited eggs per female was 17.0 and 14.8 eggs on both preys respectively. In the same year (1976a) Hassan reared *Neophyllobius mangiferus* Gomaa, on *C ficus* and found that the duration of the life cycle (from egg to adult) was shorter at 25°c (50.5 days) than at 30°c (108.9

days). Also, the predator has only one nymphal stage, and feeding effectiveness successively increased with the predator development.

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### ARABIC SUMMARY

#### الأكاروس المفترس المصاحب للحشرات القشرية في مصر

مجدى فوزى

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة - مصر

تم انجاز هذا الحصر للأهمية البالغة للمفترسات الأكاروسية ، فتم عمل حصر والمصاحبة لاشجار الفاكهة وانواعها Raphigmathoid للاكاروسات المفترسة المصاحبة للحشرات القشرية في مناطق مختلفة من الدلتا ومصر الوسطي .بالإضافة لعمل دراسة بيولوجية ومدى الافتراس وتأثيرها علي الكفاءة الافتراسية .والخصوبة لنوعين من الاكاروسات المفترسة .بتلك الدراسة نلقي الضوء علي دورها في المكافحة الحيوية للحشرات القشرية