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ECOLOGICAL AND BIOLOGICAL STUDIES
ON THE MANGO BUD MITE,
ERIOPHYES MANGIFERAE (SAYED),
WITH DESCRIPTION OF IMMATURE STAGES
(ERIOPHYOIDEA : ERIOPHYIDAE)

by Badawi A. ABOU-AWAD *

ABSTRACT: Description of male and immatures of Eriophyes mangiferae (Sayed) are presented. A minimum of 15 days was required for the life cycle of the bud mite reared on mango seedlings. Duration of different immatures was determined in the laboratory at 26 ± 1°C and R.H. of 70%. Mite population density reached its peak in late May and October. About eight generations might occur over the year. The phytoseiid mite, Amblyseius swirskii (Athias-Henriot) was the most commonly encountered predator associated with this pest.

INTRODUCTION

The mango bud mite, Eriophyes mangiferae (Sayed) is considered the major pest of mango in Egypt. It was recorded in Egypt by HASSAN (1944) and then described as Aceria (= Eriophyes) mangiferae n. sp. by SAYED (1946). Also JEPSSON et al. (1975) reported that this species occurs on its host in southern Asia and in Brazil. The mite attacks the terminal buds of young and old trees, causing bud malformation and stunting of inflorescences. Investigations have been primarily directed towards the development of a control program (OSMAN, 1969; ZAHER, et al., 1970; WAFA et al., 1970). No work has been carried out on the biology of this mite. Studies on ecology, biology and morphology of E. mangiferae are presented in this paper.

MATERIALS AND METHODS

In morphological studies, immature stages were obtained by using eggs collected from infested buds and placed singly on bud-leaf scales kept on wet cotton wool in petridishes. The top

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cover of the petridish was lined inside with a thin layer of moistened cotton wool. Development of hatched nymphs was observed twice daily until they reached adulthood. Scales were renewed whenever found necessary. An eyebrow hair glued to a wooden stick was used to transfer eggs and other stages. Mites were maintained at 26 ± 1°C and about 70% R.H. Immatures as well as adult males and females were mounted on slides in KEIFER's solutions (1954).

For life-cycle study, 70 clean seedlings were maintained outdoors under natural conditions of average temperature ranging from 25 to 29°C. Each seedling was artificially infested with 5-10 adult bud mites and then 2 infested buds were dissected daily to observe the development of life-cycle. To avoid contamination by other undesirable species from outside, each seedling was covered by a muslin bag.

About 120 mango trees of the variety Timour, the preferred host, were chosen in an orchard at Giza to follow the population dynamics of the pest and its predators for one year (Feb. 1977 to Jan. 1978). Samples of twenty vegetative and flowering buds were collected at regular one week intervals. Buds were cut to their leaf scales and were examined to assess numbers of different stages. Associated predatory mites also were counted.

RESULTS AND DISCUSSION

■ Morphology :

Egg.

Oval, measuring 30-35 μm long and 18-25 μm wide, whitish translucent. As incubation proceeded, the egg enlarged and became more translucent just before hatching.

Larva (Fig. 1, A, B).

105-125 μm long, 32.5-36 μm wide, translucent white. Rostrum about 20 μm long. Shield 20 μm long, 33 μm wide, pattern indistinct. Dorsal tubercles 15.5 μm apart, on rear margin; dorsal setae 10 μm long, pointing backward. Legs short. Number of abdominal rings from immediately behind shield to anal lobes about 41 dorsally and 38 ventrally. Rings farther apart ventrally but close together dorsally, microtubercles evident, located on posterior margins. Body setae are short and weak. Accessory setae present. In this stage there are genital setae but no genital organs.

First instar nymph (Fig. 1, C, D).

More active than the larva, whitish in colour, elongate worm-like and measuring 125-145 μm long, 37-42 μm wide. Rostrum about 21 μm long. Shield 24 μm long, 38 μm wide, truncate at rear of rostrum, pattern indistinct; dorsal tubercles 16 μm apart on rear margin, the setae 15 μm long and projecting posteriorly. Rings number about 46 dorsally and about 52 ventrally, closer together ventrally and completely microtuberculate. Body setae longer and stronger than those of larva. Telosome with 5 rings. Telosomal rings with strong microstriations ventrally. As in the larva, genital setae are present, but no genital organs.

Adult stage (fig. 1, E-I).

Female previously described by SAYED (1946). Male resembles female but differs in being smaller and in the shape of the external genital organs (Fig. 1, I). Body measures 170 μm long and 45 μm wide. Genital area is 13 μm long and 16 μm wide, genital seta about 7 μm long.

■ Biology :

Mites transferred to leaf seedlings, usually were active for two days after infestation and then settled in the terminal buds; auxiliary ones were not preferred for infestation. On the third day, mites began to lay eggs under the external budleaf scales. Females preferred to deposit eggs in groups. The egg incubation period lasted from
Fig. 1: *Eriophyes mangiferae* (Sayed). — A, ventral view of larva; B, dorsal view of larva; C, central view of first instar nymph; D, dorsal view of first instar nymph; E, dorsal view of anterior section of shield; F, featherclaw; G, ventral view of adult; female; H, female genitalia; I, male genitalia.

4-7 days under natural conditions. A generation period (from egg to egg) lasted 15-19 days. In addition to the egg, eriophyid mites pass through two immature stages, each of which includes a quiescent stage terminated by moulting (Hassan, 1928; Baker, 1939; Keifer, 1952). Rearing of *E. mangiferae* in the laboratory on bud leafscales at 26 ± 1°C and relative humidity of 70% was successful, at least in part. Eggs hatched in 4.5 or 5.5 days. The larva stage lasted 4-5 days while the first instar nymph lasted 3-4 days. About 18 and 24 hours were
spent as nympho- and imagochrysalis respectively. During the quiescent stage the nymphs had a pearly lustrous appearance, elongate in shape, and were very light. A minimum of 13 days was required from egg to adult emergence.

It is of interest to note that adult females failed to lay any eggs on bud scales in the laboratory. Thus, collecting newly laid eggs from infested plants in nature was the only method for beginning life cycle studies indoors. Excessive handling of the mites often caused their death or loss.

Seasonal variations:

Populations of active stages started to increase in April, reaching a peak in late May (Fig. 2). Populations fluctuated during June, July and August and then increased again, reaching a peak in late October. Egg population also followed this trend and reached the peak in late May, while a second smaller peak occurred in early November. During February and March, infestation was mild. To determine the number of generations/year, relative percentages of eggs to other stages were estimated at weekly intervals. The data indicated the occurrence of about eight generations (Fig. 3).

It was noticed that the mite was found in great numbers in the terminal buds during most of the year. In winter, mites preferred to infest buds accumulated on small shoots. Observations also showed that individuals occurred in late spring or early summer between bases of the outer bud scales, while in fall and winter, mites occurred throughout the bud scales. This finding agrees with that obtained by BAKER and NEUNZIG (1970) in their studies on the blueberry bud mite in North Carolina. Females usually laid their eggs among hairs at the top of the bud, but also occasionally between base scales.

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![Graph](image-url)

Fig. 2: Population trend of *E. mangiferae* moving stages and eggs on mango trees for one year.
Fig. 3 — Egg stage percentage of *E. mangiferae* in Giza orchard throughout a whole year.

| CORRELATION COEFFICIENT VALUES |
| Factors | 1977 | 1978 |
| Moving stages | 0.266 | 0.358 |
| Eggs | 0.133 | 0.214 |

High summer temperature appeared to have an adverse effect on the mite population (Fig. 2). However, insignificant positive correlation was noted between mite population and temperature. Humidity had an insignificant negative correlation with mite population.

The phytoseiid mite, *Amblyseius swirskii* (Athias-Henriot) was recorded in noticeable numbers throughout the year, especially in summer and fall (Table 1).

<p>| TABLE 1 : Abundance of <em>A. swirskii</em> on mango trees throughout a whole year. |</p>
<table>
<thead>
<tr>
<th>sampling date</th>
<th>No. of mites/100 buds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feb. 10</td>
<td>32</td>
</tr>
<tr>
<td>Mar. 10</td>
<td>20</td>
</tr>
<tr>
<td>Apr. 10</td>
<td>05</td>
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<td>Oct. 10</td>
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<td>Nov. 10</td>
<td>30</td>
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<tr>
<td>Dec. 10</td>
<td>15</td>
</tr>
<tr>
<td>Jan. 10</td>
<td>20</td>
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</table>
No other predators were observed during this study except the cheyletid mite, *Cheyletia wellsi* (Baker), which was rarely found.

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**REFERENCES**


