

5. SUMMARY

The mites being important pests of stored grains are responsible of both qualitative and quantitative losses in stored grains, as they make direct consumption on human food, animal feed or other products changing the quality of infested products, they can penetrate the hard grains and feed directly on the grain kernels, therefore they destroy their germination power, change the moisture contents of mediums because spoil products by faces, skins moulting, dead bodies and micro organisms, initiating growth and spread mould, secondly, interaction to microorganisms leading to the transfer of mycotoxins production fungi or pathogenic bacteria; Thirdly, production of hazardous compounds among them the allergens are of the highest importance.

The present work aimed to study the following points:-

1–Incidence:

Incidence and collection of mites inhabiting different sources of stored products at Qalubia governorate , identification and classification of mites for their categories.

2–Biological studies:

Biological studies of only one mite species *lardoglyphus* sp. belong to astigmatid mites which were collected during the period of the work to study the effect of different food on:

- a– Biological aspects.
- b– Longevity and fecundity.
- c–Reproduction rate.
- d-life span.

3–Morphological studies:

Morphological studies of *lardoglyphus* sp. which was found associated with stored grains, were carried out.

1- Ecological Studies:

- Incidence of mites associated with stored products :

In this study, Incidence indicated that 75 mite species belonging to 4 sub orders collected from different stored products; wheat, rice, bean ,peanut ,garlic, onion, corn, animal feed, seeds, flour ,cheese ,grain, barley and faba bean during the period from September 2016 up to September 2018 in different localities in Qalubia governorate.

The collected mites belonged to both orders Parasitiformes and Acariformes:

1-Order Parasitiformes:

This order was represented by one suborder; Gamasida which represented by five families: Ascidae, Laelapidae, Ameroseiidae , Eviphidae , Macronyssidae. These families have ٧٧ species belonged to ١٢ genera.

The Family Ascidae :

This family was represented by ١٢ species; *Blattisocius tarsalis*, *Blattisocius dentriticus*, *Blattisocius mali*, *Blattisocius keegani*, *Proctolaelaps pygmaeus*, *Proctolaelaps* sp., *Proctolaelaps scolyti*, *Arctoseiu* sp., *Protogamasellus denticus*, *Protogamasellus* sp., *Melichares* sp., *Lasioseius bispinosus* .

Family Laelapidae:

This family was represented by five species ; *Hypoaspis miles*, *Hypoaspis orientalis*, *Hypoaspis wahabi*, *Androlaelaps zaheri*, *Androlaelaps casalis* .

Family Eviphididae:

This family was represented by one species *Alliphis halle* .

Family Macronyssidae:

This family was represented by one species *Megistonyssus africanus*.

Family Ameroseiidae:

This family was represented by three species; *Klemania plumigera*, *Klemania plumosus*, *Ameroseius* sp .

2- Order Acariformes:

This order was represented by three suborder Actinidida ,Acaridida and Oribatida.

a- Suborder Acaridida :

Which included five families; Acaridae, Suidasidae, Glycyphagidae, Labidophoridae and Chortoglyphidae. These families have represented by Thirty four species , belonged to sixteen genera.

Family Acaridae:

This family was represented by 24 species, *Caloglyphus mycophagus*, *Caloglyphus berlesei*, *Caloglyphus rhizoglyphoides*, *Caloglyphus* sp., *Caloglyphus oudemansi*, *Caloglyphus hughesi*, *Rizoglyphus* sp., *Rizoglyphus callae*, *Rizoglyphus robini*, *Tyrophagous tropicus*, *Tyrophagus perniciosus*, *Tyrophagus brevicrinatus*, *Tyrophagus palmarum* , *Tyrophagous longior* , *Tyrophagous similis*, *Tyrophagous lini*, *Tyrophagous neiswanderi*, *Tyrophagus putrescentiae* , *Thyreophasus entomophasus* , *Acarus farris*, *Aleroglyphus ovatus* , *Mycetoglyphus fungivorus* , *Lardoglyphus konoii*, *Tyrolichus casei*.

Family Suidasidae:

This family was represented by one species , *Suidasia nesbitti* .

Family Labidophoridae:

This family was represented by one species, *Gohieria fusca*.

Family Chortoglyphidae:

This family was represented by two species *Chortoglyphus* sp., *Chortoglyphus arcuatus*.

Family Glycyphagidae:

This family was represented by six species; *Lepidoglyphus destructor*, *Glycyphagus destructor*, *Lepidoglyphus* sp., *Glycyphagus* sp., *Lepidoglyphus michaeil*, *Blomia* sp.

b-Suborder Actinedida:

Which included of 17 species, belonging to eleven genera of six families; Bdellidae, Cunaxidae ,Eupodidae, Tydidae , Cheyletidae and Raphignathidae.

Family Bdellidae:

The family Bdellidae was represented by one species *Spinibdella bifurcata*.

Family Cunaxidae:

This family was represented by one species, *Cunaxa* sp.

Family Cheyletidae:

This family was represented by eleven species *Cheyletus malaccensis*, *Cheyletus fortis*, *Cheyletus* sp., *Cheyletus cacahuamilpensis* , *Cheyletus eruditus* , *Cheyletus aversor* , *Hemicheyletia* sp., *Cheyletomorpha lepidopterorum*, *Nodele* sp., *Acaropsella* sp., *Ker bakeri*.

Family Eupodidae:

This family was represented by two mite species, *Eupodes momeni*, *Eupodes voxencollinus*.

Family Raphignathidae:

This family was represented by one species *Raphignathus* sp.

Family Tydidae :

This family was represented by one species *Pronematus rykei*.

C-Sub order Oribatida:

This suborder was represented by one family Oppiidae and one species *Oppia* sp.

2- Biological studies:-

In the present investigation, biological studies were carried out. One species of astigmatid mite *Lardoglyphus* sp. were reared under laboratory conditions on four types of food; peanuts ,yeast, dry cheese and luncheon at ($26 \pm 2^{\circ}\text{C}$ and $70 \pm 5\%$ R.H) .

The obtained data showed that *lardoglyphus* sp. pass through its life by egg, larvae ,protonymph ,tritonymph and adult stage, and all of these were affected by food types .Also ,fecundity , life span and Longevity were affected by different food types

Incubation period:

Incubation period of *lardoglyphus* sp. lasted 4.03, 3.85, 3.66 and 3.42 days for female, while it was 3.08 , 2.75 ,2.71 and 3.12 days for male under laboratory condition ($26 \pm 2^{\circ}\text{C}$ and $70 \pm 5\%$ R.H). when it fed on peanuts ,yeast, luncheon and dry cheese, respectively.

Larval stage:

The total larval periods were 2.39, 1.41, 2.86 and 2.49 days for female, while it were 1.20, 0.91, 1.66 and 2.37days for male when it feed on the previous diet, respectively.

Protonymphal stage:

The total protonymphal period was 3.19, 1.34, 2.19 and 1.87 days for female, while it was 2.07, 0.91, 1.83 and 1.78 days for male at the same trend.

Tritonymphal stage

The total Tritonymphal periods were 2.64, 1.11, 3.37 and 1.76days for female, while it were 1.24, 0.91, 2.70 and 1.66 days for male at the same trend from the obvious data.

Immature stage

The female total immature which included larval, protonymphal and Tritonymphal stages lasted for 8.22, 4.36, 9.14 and 6.13 days while those of male lasted 4.52, 2.72, 6.18 and 5.81 days when the individual feed on peanuts ,yeast, luncheon and dry cheese, respectively. in brief the time required for female immature stage was longer than the male immature stage

Life cycle

It is interest to note that male emerged ealier than female. the life cycle of female completed in 12.25, 8.20, 12.80 and 9.54 days when fed on peanuts ,yeast, luncheon and dry cheese, respectively while, the life cycle lasted 7.60, 5.47, 8.89 and 8.93 days for male when fed on aforementioned diets at the same trend.

Longevity:

The female longevity period was 15.90, 14.45, 15.75 and 19.85 days, while it was 13.88, 11.00, 14.38 and 17.38 days for male when fed on peanuts, yeast, luncheon and dry cheese, respectively.

Life span

The life span (which included the period of life cycle and longevity) averaged 28.15, 22.65, 28.55 and 29.39 days for female while it was 21.47, 16.47, 23.26 and 26.31 days for male when fed on peanuts, yeast, luncheon and dry cheese, respectively.

Specific female stages

The generation, preoviposition, oviposition and postoviposition period were on averaged 14.15, 1.90, 10.80 and 3.20 days respectively when feed on peanuts at ($26\pm 2^{\circ}\text{C}$ and $70\pm 5\%$ R.H), while it was 9.25, 1.05, 9.55 and 3.85 days respectively when feed yeast at ($26\pm 2^{\circ}\text{C}$ and $70\pm 5\%$ R.H), while it was 13.90, 1.10, 11.75 and 2.90 days respectively when feed on luncheon at ($26\pm 2^{\circ}\text{C}$ and $70\pm 5\%$ R.H), while it was 11.79, 2.25, 11.70 and 5.90 days respectively when feed on dry cheese at ($26\pm 2^{\circ}\text{C}$ and $70\pm 5\%$ R.H).

Fecundity:

female *lardoglyphus* sp. feed on yeast increased the number of deposited eggs with an average of 162.50 eggs with daily rate 16.93 eggs/day recorded the highest average fecundity value followed by the females fed on luncheon which gave totally 143.35 eggs with daily rate 11.64 eggs/day then when fed on dry cheese which gave totally 127.20 eggs with daily rate 10.65 and finally, the peanuts which gave the minimal total of 104.85 eggs and daily rate 8.37 eggs/day.