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## Summary

This study was undertaken to survey the prostigmatid mites, mainly terrestrial, soil and stored kinds. In different regions of Egypt, as well as biological studies on the commonest predaceous mites, *Coleoscirus* sp. n. and *Neocunaxoides* sp.n. on the different kinds of preys at different temperatures. The aforementioned studies revealed the following .

### I. Ecological studies

#### I. A. Survey

The study covered 19 Governorates of Egypt. The tested sources were soil, stored product, debris and organic manures and green leaves of vegetative hosts. Survey proved the occurrence of 118 predacious mites belonging to 58 genera and 21 families. The collected predaceous families were Anyistidae, Bdellidae, Caligonellidae, Camerobiidae, Cheyletidae, Cryptognathidae, Cunaxidae, Erythreidae, Eupalopsellidae, Eupodidae, Johnstonianidae, Lolinidae, Paratydidae, Pseudocheyleidae, Ragididae, Raphignathidae, Samiridae, Stigmaeidae, Terponacaridae, Trombididae, and Trombiculidae. While the parasitic mites found in one family only i.e. Pyemotidae. On the other hand the miscellaneous mites recorded by the families : Tydeidae, Pygmephoridae, Siteroptidae, Scutacaridae and Tarsonemidae.

#### • Predaceous mites:

The highest number of the predaceous mites was noticed in the family Cunaxidae (22 species), followed by Cheyletidae (17 species) ; Bdellidae (15 species) , Raphignathidae (14 species), Stigmaeidae (9 species) , Caligonellidae (5 species), Camerobiidae and Erythridae (3 species), Samiridae (2 species). Anyistidae, Cryptognathidae, Eupalopsellidae, Eupodidae, Johnstonianidae, Lolinidae, Paratydeidae, Pseudocheyleidae, Ragididae, Terponoacaridae, Trombiculidae and Tromididae all were represented by (one species) only.

- **Miscellaneous mites.** The miscellaneous mites were represented by six families, Pyemotidae (2 species), Tydeidae (10 species), Pygmephoridae (1 species), Siteroptidae (1 species), Scutacaridae (1 species), and Tarsonemidae (1 species). This group were represented as 14 species in 10 genera.

**I. B. Population dynamics.** It was observed that the commonest predaceous mites collected in this study were belonging to families Bdellidae, Cunaxidae, Cheyletidae and other predaceous mites (Caligonellidae, Cunaxidae, Raphignathidae and Stigmaeidae). It was noticed also that the all tested collected mites were observed during all the sampling count dates. Considering the population of predaceous mites, the other predaceous mites group had the highest number (146 mites) all over the sampling dates followed by cheyletid, bdellid and cunaxid mites (109 , 95 and 83 individuals , respectively) during the first season. On the other hand, the same trend was observed but with different numbers, i.e. 166, 126 , 114 and 96 predaceous mites , respectively.

**I. C. Effect of different factors on the population of certain tested mites**

- **Effect on bdellid mites population.** Both cunaxid and cheyletid mites were affected with very highly and positive significant effects on the population of the mites belonging to family Bdellidae. On the other hand each other predaceous mites, miscellaneous mites, maximum temp., and minimum temperature all were positive non significantly affected except maximum temp. on the population of the bdellid mites.
- **Effect on the cunaxid mites population .**Both bdellid and cheyletid mites were affected with very highly and positive significant effects on the population of the mites belonging to family Bdellidae. On the other hand each other predaceous mites, miscellaneous mites, maximum temp., and minimum temperature all were positive non significantly affected except maximum temp. on the population of the cunaxid mites.

- **Effect on cheyletid mites.** Both bdellid and cunaxid mites were affected with very highly and positive significant effects on the population of the mites belonging to family Cheyletidae. On the other hand each other predacious mites, miscellaneous mites, maximum temp., and minimum temperature all were positive non significantly affected except miscellaneous mites on the population of the cheyletid mites.
- **Effect on the other predaceous mites .**The miscellaneous mites were affected with very highly and positive significant effects on the population of the other predaceous mites . On the other hand each other factors i.e. bdellid, cunaxid and cheyletid mites and maximum and minimum temperature all were positive and non significantly affected on the population of the other predaceous mites.
- **Effect on the miscellaneous mites population.** The other predaceous mites were the only factor which affected with very positively significant affected on the miscellaneous mites population. On the other hand, all other tested factors affected non significantly on the population of the miscellaneous mites population.

## II. Taxonomically studies

Both cunaxid mites *Coleoscius* sp. and *Neocunaxoides* sp. different stages (egg, larva, protonymph, deutonymph, tritonymph and adult female and male) were collected , identified and diagnosis in this study.

## III. Biological studies

In this study, different diets mainly free living nematode, acarid mite, *T. putrescentiae*, the fungi (*Aspergillus* sp., *Fusarium* sp. and *Pythium* sp.) were used as food sources for rearing the cunaxid mites, *Coleoscius* sp.n. and *Neocunaxoides* sp.n. at different temperatures 15, 20, 25 and 35 °C and relative humidity 75 % in laboratory.

### III. A. *Coleoscirus* sp. n.

#### III. A . i. Female

- **Incubation period.** It was found that this period was 7.29, 7.4, 7.27, 7.33 and 7.28 when the mite fed on free living nematode acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. This period took 5.44, 5.45, 5.43, 5.36 and 5.41 days when the predator fed at 25 °C and 4.49, 4.52, 4.45, 4.50 and 4.50 days at 30°C and 3.31, 3.29, 3.29, 3.19 days and 3.30 days at 35 °C when the mites fed on the same mentioned diets, respectively.
- **Life cycle.** This period took 27.61, 28.2 , 25.6, 27.6 and 26.2 days when mite female fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively. On the other hand these periods were 20.5, 21.2, 18.8, 21.1 and 19.9 days at 25 °C . Whoever, this period lasted 18.2, 16.4, 15.6, 17.7 and 16.6 days ; 13.7, 11.7 ,12.2, 14.6 and 13.0 days when the mite fed on the previously mentioned diets mentioned before at 30 and 35 °C., respectively.
- **Adult longevity.** Concerning the adult longevity it was pointed out that the longevity of the resultant females of *Coleoscirus* sp.n. was 47.49 , 43.35 , 50.0 , 43.1 and 42.3 days when the mites fed on free living nematode , acarid mite , *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. and took 43.3 , 41.5 , 44.3 , 42.0 and 38.1 days on the same diets, respectively at 25 °C. changed to 38.7 , 34.5, 39.1 , 32.8 and 32.4 days when the mites reared at 30 °C . and 31.4, 29.3, 32.4, 29.1 and 25.4 days at 35 °C. when the same order of diets mentioned before used.
- **Life span.** The life span period of *Coleoscirus* sp. n.female lasted 75.2, 71.5, 75.5, 71.1 and 69.0 days at 20 °C when the mite fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. ,respectively. Whoever the period took 63.8, 62.7, 63.1, 62.5 and 57.9 when the mites fed on the same diets, respectively at 25 °C. This period took 56.9,

51.0, 54.6, 50.34 and 49.0 days and 45.00, 41.1, 44.6, 43.8 and 36.5 days on the same diets at 30 and 35 °C. respectively.

- **Fecundity.** The host suitability clearly affected the number of eggs deposited by the predacious mite. The number of eggs deposited by the female was 74.2, 62.6, 71.9, 64.4 and 60.3 eggs when the mite fed on living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. This number changed to 98.9, 86.8, 90.5, 85.2 and 82.7 eggs ; 94.2, 81.0, 83.7, 77.2 and 78.5 eggs and 73.3, 67.2, 71.6, 64.8 and 63.7 eggs when the mite reared on living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 25, 30 and 35 °C., respectively.
- **Sex ratio.** The ratio of number of males to females was not affected by the kind of food and temperature used.

### III. A . ii. Male

During rearing experiment, diets and temperature proved to be the two of the main factors affecting the duration of different developmental stages (male). This effect is clearly shown on the following stages.

- **Incubation period.** It was found that this period 7.14 , 7.05 , 7.15 , 7.18 and 7.16 days when the mite female fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. This period on the other hand took 5.23, 5.21, 5.17, 5.17 and 5.14 days ; 4.34, 4.34, 4.33, 4.08 and 4.29 days ; and 3.14, 3.16, 3.14, 3.13 and 3.13 days when the mites fed on free living nematode acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., at 25, 30 and 35 °C. respectively.
- **Life cycle.** The tested temperature suitability clearly affected the life cycle of *Coleoscirus* sp.n. revealed very highly significant differences when the mite fed on different diets. This period took 25.0, 25.9, 23.0, 24.3 and 23.3 days at 20 °C. ; 19.8, 19.7, 17.5, 19.4 and 18.5 days at 25 °C.; 15.9, 15.4, 13.9, 15.9, and 14.5

days at 30 °C. ; and 12.1, 10.6, 10.6, 12.6 and 11.5 days when the mite fed on the previously mentioned diets mentioned before at 25, 30 and 35 °C., respectively.

- **Longevity:** The longevity of the resultant males of *Coleoscyrus* sp.n. was 34.8, 32.7, 34.6, 31.4 and 31.1 days when the mites fed on free living nematode , acarid mite , *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. ; 33.2, 31.0, 32.1 , 29.3 and 28.4 days at 25 °C. ; 27.4, 24.8, 26.2, 23.7 and 22.5 days at 30 °C. and 24.0, 21.6, 24.3, 20.7 and 20.0 days at 35 °C., on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively
- **Life span.** Accordingly , the life span period of *Coleoscyrus* sp. n. male lasted 59.7, 58.5, 57.5, 55.7 and 54.8 days at 20 °C when the mite fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively changed to 52.3, 50.6 , 49.2 , 49.1 and 46.8 days at 25 °C and 44.2, 39.6, 40.01 , 39.50 and 37.00 days at 30 °C and 36.0, 32.2, 34.9, 33.4 and 31.9 days at 35 °C. when the mites fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively.

### III. B. *Neocunaxoides* sp.n.

#### III. B. i. Female

- **Incubation period.** It was indicated that the mean incubation period of egg which give rise to female mites highly significantly affected from the individuals fed on the different diets different temperatures. The incubation period was 6.82, 6.94, 6.83, 6.85 and 6.83 days when the *Neocunaxoides* mite female fed on free living nematode, acarid mite , *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., respectively. Also, no significant differences were shown between those fed on the different diets at 25 °C, it was 5.41, 5.44, 5.44, 5.44 and 5.45 days when the mites fed on the different diets mentioned before, respectively. These values changed to 4.22, 4.26, 4.27, 4.24 and 4.23 days, respectively at the same order of the mentioned order of diets at 30 °C. The incubation period of female resulted progeny also showed no significantly

differences between the different diets mentioned before it lasted 3.31, 3.14, 3.11, 3.13 and 3.15 days at 35 °C , respectively.

- **Life cycle.** It was revealed very highly significant differences when the mite fed on different diets. This period took 30.0, 29.3, 26.5, 28.0 and 28.4 days when mite fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C. at 25 °C . ; 20.2, 21.8, 17.6, 19.4 ,and 19.7 days at 30 °C. and 14.7, 14.9, 11.9, 13.2 and 13.7 days when the mite fed on the previously mentioned diets mentioned before at 25, 30 and 35 °C., respectively. .
- **Longevity.** The mean longevity period of adult female lasted 40.3, 36.8, 40.9,36.8 & 38.5 ; 34.1, 30.5, 33.3, 30.2 & 32.3 ; 30.2, 26.8 , 31.0 , 26.9& 28.8 and 24.9 , 22.1 , 24.1 , 23.6 & 25.1 days when the predatory adult female of *Neocunaxoides* sp. fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., at 20, 25, 30 and 35 °C, respectively.
- **Life span:** The life span of *Neocunaxoides* sp.n. females differed on different diets at different temperatures. This period lasted 70.6, 66.6 , 66.3 , 65.0 & 66.8 ; 68.9 , 54.2, 54.2, 52.5 & 55.1 ; 50.4, 48.7, 48.7 , 46.1 & 46.1 and 48.5; 39.5 , 37.0, 37.1, 36.77 & 38.8 days when the predatory mite fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., at 20, 25, 30 and 35 °C, respectively .
- **Fecundity:** The fecundity of female was found to be affected by diets and temperature . It was high when females when fed on free living nematode and low when fed on *Pythium* sp. The number of deposited eggs were 54.9, 47.5, 64.3, 52.6 & 49.8 ; 71.8, 71.4, 72.5, 69.8 & 63.6 ; 70.6, 64.3 , 74.5, 71.1 & 66.2 and 54.1 , 64.7, 59.3 , 63.4 & 55.5 eggs when the mites fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., at 20, 25, 30 and 35 °C., respectively.

- **Sex ratio:** Considering the effect of different diets on determining the number of males to females offspring, it was clear that the ratio was about 0.33 for most of the tested hosts at different temperature.

### III. B. ii. Male

- **Incubation period.** It was indicated that the mean incubation period of egg which give rise to female mites highly significantly affected from the individuals fed on the different diets different temperatures. The incubation period was 6.79, 6.81, 6.77, 6.84 & 6.79 ; 5.0, 5.34, 5.27, 5.37 & 5.33 ; 4.04, 4.08, 4.05, 4.08 & 4.08 and 3.06, 3.15, 3.06, 3.0 & 3.08 days when the *Neocunaxoides* sp.n. mite male fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. at 20, 25, 30 and 35 °C, respectively. There were significant differences shown between those fed on the different diets at 25 °C and other temperatures.
- **Life cycle.** The tested temperature suitability clearly affects the life cycle of *Neocunaxoides* sp.n. male. It was revealed very highly significant differences when the mite fed on different diets. This period took 27.7, 29.0, 24.1, 25.7 and 26.4 days when mite fed on free living nematode, acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. respectively at 20 °C., On the other hand theses periods were 22.0, 23.0, 19.0, 21.0 and 22.3 days at 25 °C. ; 17.9, 17.9, 15.4, 17.0 and 17.6 days; at 30 °C. and 13.7, 12.8, 11.0, 12.0 and 12.7 days at 35 °C. when the mites fed on the same diets mentioned before, respectively.
- **Longevity.** Concerning the adult longevity, It pointed out that the longevity of the resultant males of *Neocunaxoides* sp.n. was 29.0, 26.5, 31.8, 28.3 & 28.2 ; 25.0, 22.0, 28.0, 24.5 & 25.9 ; 21.0, 18.8, 23.1, 17.9 & 19.3 ; 16.9, 14.7, 19.8, 14.5 & 16.2 days when the mites fed on free living nematode, acarid mite , *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp. at 20, 25, 30 and 35 °C. respectively.

- **Life span :** The life span of *Neocunaxoides* sp. n. males changed on different tested diets at different temperatures. This period lasted 55.6, 55.5, 55.9, 54.0 & 54.7 ; 47.2, 45.4, 47.3, 45.5 & 48.1 ; 38.7, 36.6, 38.5, 35.0 & 36.8 and 30.6, 27.5, 30.8, 26.6 & 28.8days when the predatory mite fed on free living nematode , acarid mite, *Aspergillus* sp., *Fusarium* sp. and *Pythium* sp., at 20, 25, 30 and 35 °C., respectively.