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# BIOLOGICAL ASPECTS OF THE PREDACEOUS MITE *MELICHARES ORIENTALIS* N.SP.

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**ABSTRACT:** When the predatory mite *Melichares orientalis* n.sp. fed on the free living nematodes *E. phlagellicaudatus* and incubated at (20, 25, and 30 C) and 70 % R.H, the results revealed the following: The incubation period of female was (2.97, 2.15 and 1.8) days when reared at (20, 25, and 30 C) respectively, while it was (3.32, 2.12 and 1.88) days incase of male. The larval stages lasted 2.25, 2.02 and 1.1 days for female and 2.1, 2.11 and 0.88 days for male at the same previously mentioned temperature, respectively. The protonemphal stages lasted 3.11, 2.83, 2.05 days at 20, 25, and 30 C for female, respectively, while the male protonemphal stages took 2.9, 2.53 and 1.1 days, respectively. Concerning the dutonymph, it tooks 2.04, 1.44 and 0.85 days for the ascid mite female, while it lasted 1.76, 1.15 and 0.79 days for male when they reared on the last mentioned temperature, respectively. The duration of the total immature and life cycle of the female predator lasted, 7.46, 6.47 and 4.00 days and 10.34, 8.52 and 5.87 days, respectively however it was for the male of 6.73, 5.79 and 2.74 days and 11.25, 7.91 and 4.61 at the same degrees of temperature, respectively. The female and male longevity was affected by temperature, as it was 44.11, 43.61 and 23.35 days for female and 42.57, 40.32 and 19.69 days for male at 20, 25, and 30°C, respectively.

Also the life span was 53.38, 48.23 and 26.59 for female where it affected with temperature, while in case of male it tooks 52.97, 48.23 and 23.81 days. When individuals incubated at 20, 25, and 30 C, the female pre-oviposition period lasted 0.91, 0.86 and 0.79 days at the same previously mentioned temperature. The oviposition and postoviposition period affected when female incubated at 20, 25, and 30 C, as it tooks 21.2, 10.76 and 9.21 for the oviposition period and 21.5, 32.26 and 10.79 for the postoviposition period. Fecundity of this ascid mite when incubated at the same degree of temperature was 57.06, 72.71 and 77.29egg/female, respectively, while the daily rate of depositing eggs/female was 1.33, 1.62 and 3.66egg/day for 20, 25, and 30 C. Life table parameters indicated that, the multiplication per generation was 19.48, 32.83 and 33.63 times in a generation time 16.96, 13.77 and 9.81 when predator incubated at 20, 25, and 30 C, respectively. The intrinsic rate of increase was 0.36 when it fed on the free living nematodes and incubated at 30°C and 0.18 at 20°C.

## INTRODUCTION

Many groups of mites, phytophagous or predaceous inhabit vegetable crops. Plant feeding mites cause various types of symptoms since severe infestation reduced plant growth and crop production. Predaceous mites play an important role in suppressing pest population. On the other hand, mites inhabit soil and weeds are considered to be the important organisms from a biological point of view. Thus the aim of this investigation is to throw some light on the biological studies of the new predaceous soil mite *Melichares orientalis* n.sp. when feed on the free living nematodes *Eudiplogaster phlagellicaudatus* which are associated with the mite and incubated at different degrees of temperature.

Sharma (1971) found *Lasioseius penicelliger* Berlese to be an efficient predator of plant-parasitic nematodes. Binns (1973) studied the duration of *Arctoseius certatus* (Sellnick) when fed on the eggs of the Mashroom sciarid, *Lycoriella auripilla* Winn. (Diptera: Sciaridae). El-Bishlawy (1978) reared two ascid mite species, the first one was *Lasioseius parberlesei* Battacharyya was fed on eggs of the spider mite *T. arabicus* and on the fungus, *Thannidium elegans* at 25°C. she found that this mite preferred humid conditions, developed and reproduced when fed on eggs of the spider mite and the females failed to deposit any eggs when fed on the saprophytic fungi. On the other hand, she reared the other ascid mite *Cheiroseius nepalonsis* (Evens and Hyatt) on the immature stages of the collembola *Lipidocyrtinus* incertus at 25°C, she noticed that the life cycle of this mite was 8.5 days for female and 7.1 for male. Shereef *et al.*, (1980) found that the ascid mite, *Proctolaelaps pygmaeus* (Muller) proved to be fungivorous feeding only on *Penicillium viride, Fusarium oxysporium* and *Aspergillus flavus. P. viride* was the most suitable diet as it shortened duration of immature stages, prolonged adult longevity and increased female fecundity. Kinn (1983) found that the ascid mite species *Proctolaelaps dendroctoni* completed its development when it reared at 25°C and fed on nematodes in 144-222 hours (means, females 171.6 and male 176.0) longevity ranged from 13-39 days for females and 8.38 days for males. The female reproductive period ranged from 13-45 days. The larva molts to a protonymph after 18-54hrs, the protonymphal stage is completed in (24-42)hrs, while the deutonymph molt to adult after (24-48) hrs. The author noticed that there is no period of quiescence precedes molting nymph. Afifi et al., (1984) decided that *Proctolaelaps striatus* completed its life span when fed on *Fusarium oxysporium* and *Aspergillus flavus*, but females laid eggs only on the former diet. By feeding on *F. oxysporium*, female life-cycle ran shorter 9.47 days than on *A. flavus* 11.80 days.

Ahmed (1984) found that *Lasioseius aegyptiacus* Afifi fed on the two acarid mites, *Rzioglypus robini* Claparede and *T. putrescentiae* as a predator. In their trial for rearing the ascid mite, *Protogamasellus minutus* Hafez, El-Badry and Nasr on different food types, Afifi et al., (1986), they observed that the predator tooks 12.4, 13.8, 15.3 and 19.3 days to reach the adult stages when individual female fed on the acarid mite, *Rhizoglyphus robini*, Claporeda, *Tyrophagus putrescentiae*, nematode and Collembola *Lepidocyrtinus incertus* Hand respectively. These period changed to 11.3, 12.9, 14.5 and 17.9 for the male when fed on the previously mentioned preys. Nawar and Nasr (1989)

showed that the ascid mite, *Protogamasellus primitivus similis* Genis. Loots and Rykc was successfully reared and reproduced on immature stages of acarid bulb mite *R. robini* and acarid stored product mite *T. putrescentiae* as well as free living nematodes. *Nasr et al.*, (1990) made a trial for rearing the ascid mite, *Lasioseius athiasae* on moving immature stages of the two acarid mites, *R. robini* and *T. putrescentiae* free-living nematodes and the two fungi; *Asperigillus niger* and *Fusarium oxysporium*. They noticed that the previously mentioned diets were suitable for mite rearing, while it falls to develop on collembola. The mite *R. robini* was the most suitable diet for the predaceous mite. Nawar (1991) reared *Proctolaelaps deleoni* Nawar, Childers and Abousetta on free-living nematodes *R. scania*, two soil fungi *F. oxysporium* and *A. flavus* and two acarid mites, *R. robini* and *T. putrescentiae*. He noticed that all stages of this mite species developed.

Nawar and El-Sherif (1992) studied the biology and the description of the developmental stages of the ascid mite *Lasioseius zaheri* Nasr. The studies showed that the incubation period averaged 1.8, 2.1 and 2.1 days when fed on *Ttrophagus putrescentia* (Schrank) and the two-soil fungi *Fusarium oxysporium* and *Aspergillus flavus*, respectively. The biological aspects of the predatory mite *Proctolaelaps subcorticalis* Lindquist were observed on soil nematode Rhabditis sp., and the pathogen soil fungus *Fusarium oxysporium* by *Ibrahim et al.*, (1992). The authors noticed that the total immature period lasted 7.53 and 8.69 days on the previously mentioned preys, respectively. Aly (1994) reared one of the predaceous mites, *Proctolaelaps pygmaeus* (Muller) on the immature of *Eutetranychus orientalis*, nymphs of *Chrysomphalus ficus* Rilley, adult of *Aphis durantai* Theo., and date-palm pollen grains. She found that first two foods were the most suitable as they gave significantly shorter periods than the other two types. Gomaa (1998) reared two ascid mites, *Protogamasellus dicorus* Manson and *Proctolaelaps orientalis* (Nasr). He reared the first one at three temperatures 18, 25 and 30°C on free living nematodes, the life cycle durated, 26.3, 10.7 and 9.4 days, respectively, while the life span were 62.7, 39.1 and 31.0 days, respectively. The author found that the most favorable temperature was at 30°C and the suitable diet was *R. robini*, when the mite reared on larvae of *M. domestica*, *R. robini*, free living nematodes, organic manure, *F. oxysporum*, *A. niger* and *P. notatum*. The second predaceous mite *P. orientalis* was reared on the same five previously mension diets at the temperatures (18, 25 and 30°C), the result showed that the mite when fed on free living nematodes its life cycle was 19.2, 9.30 and 7.3 days, respectively, but the life span was 45.8, 24.6 and 19.4 days, respectively. Abd El-Halim (1999) studied the biology of the two predaceous ascid soil mites *Proctolaelaps pygmaeus* Muller and *Lasioseius athiasae* Nawar and Nasr. The two species succeeded to develop and deposit eggs when fed on the egg masses of the root-knot nematode *Meloidogyne* sp.. Abou-Awad *et al.*, (1999) in their attempts for study the biological aspect of the predaceous soil mites, *Proctolaelaps backleyi* (Bram) and *P. aegyptiaca* Nasr, when fed on different types of foods, noticed that, the development of the predaceous mites was higher in case of the eriophid mites than the tetranychid nymphs when they used as food. Amin *et al.*, (1999) used the two soil ascid mite *Lasioseius athiasae* and *Protogamasllus discorus* Manson as

predators on Meliodogyne javanica population. They found that the two predatory mites significantly reduced the number of galls, developmental stages, females and consequently the total number of Meliodogyne javanica in kidney been roots. Abd El-Maksoud (2000) reared the predaceous ascid mite *Proctolaelaps pgymaeus* on different types of fungi, *Fusarium oxysporum, Rhizoctonia solani* and *Aspergillus flavus* and free-living nematodes at 20, 25 and 30°C. He found that the life cycle was 9.80, 7.45 and 5.15 days, when the female fed on nematodes at the previously mentioned temperature, respectively. El-Gazzar (2001) studied the biological aspects of the ascid mite *Lasioseius sewai* Nasr and Abo Awad when it fed on five types of food i.e. free-living nematodes *Rhabditis* sp. larval stages of acarid mite *R. robini* and three soil fungi, *Fusarium oxysporum, Rhizoctonia solani* and *Macrophomina phasseoli* (Tassi) Goieanich at 25 C. El-Moghazy (2002) studied the biology of Proctolaelaps palmatus by feeding on free-living nematode *Eudiploaster phlagellicudatus* and yeast, *Saccharmyces cervisia* Hansen, at the temperature degrees 20, 25 and 30 C. He found that the longevity of the female was 15.89, 12.88 and 11.88 days when the mite reared on the free-living nematodes and incubated at the last mentioned temperature. Romeih (2002) made biological studies of acid mite, *Gamasellodes* n.sp. on free-living nematodes, root-knot nematodes, Meliodogyne incognita and Rotylenchulus reniformis.

## MATERIALS AND METHODS

In this study, the effects of various degrees of temperature, 20, 25 and 30°C with 70±5% and relative humidity, on the developmental periods, fertility and longevity of *Melichares orientalis* n.sp. to clarify the basic biological aspects when the individuals fed on free living nematode *Eudiplogaster phlagellicaudatus*.

For preparing pure culture of the tested mite, plastic cell of 2.5cm in diameter and 2cm in depth were filled up with a layer of mixture of plaster of paris and charcoal (9:1) on its bottom to depth of 0.5cm. Drops of water were added daily to maintain suitable relative humidity. The individuals were supplied with free-living nematodes as food for it and kept in an incubator at 25.00±2.00°C as mother culture. For individual rearing, newly deposited eggs were transferred from the mother culture singly to one of every rearing plastic cell. Each newly hatched larva was supplied with prey and was kept till reaching maturity. Mites were examined twice daily. Observations concerning all biological aspects were recorded throughout the mite life span.

*Source of food:-*

For extracting free-living nematodes *Eudiplogaster phlagellicaudatus,* samples of organic materials were put in Baermannís funnel for 24hrs. The extraction was added to a Petri dish, contained slides of ornamental bulb potatoes as food source of rearing nematodes. Petri dishes were left for one week in natural room condition. By using a camel brush, one or two drops of this food mixture were used as source of food for the mites.

*Life table parameter calculation:-*

During developmental period, moralities of different stages and sex ratio of the progeny was determined oviposition by resultant females were recorded daily for each female.

Life table parameters (Birch 1948) were estimated using the life 48, BASIC computer program (Abu-Seita *et al.*, 1986) parameters were determined by the formula:-

S 0ma .x Lx mx / exp rm x = 1

where; S = the female age

mx = is the expected number of daughters produced per female during the interval "x".

Lx = is the fraction of females alive at age "x".

rm = is a natural logarithm of intrinsic rate of increase and indicates the number of times of population multiplies in a unit of time.

Statistical analysis:-

Statistical analysis of data, was carried out using a computer software package, "Costat", a product of Cohort Software Inc., Berkeley, California, U.S.A. Duncan's multiple range test (Duncan, 1955) was used to differentiation between means.

## RESULTS

*1st- Biological aspects of the predatory mite Melichares orientalis n.sp.:-*

Biological studies were carried out to throw light on the biological behavior and the biological aspect of the acarine predator; *Melichares orientalis* belonging to family Ascidae by feeding on the free-living nematodes *E. phlagellicaudatus*, and incubating at three different degrees of temperature 20, 25 and 30°C and 70±5% R.H.

*Habitat and behavior:-*

Individual of ascid mite *Melichares orientalis* were collected from samples of soil under eggplant from El-Khanka district at Qaliobiya governorate. This predator mite found associated with same insects, mites and free-living nematodes. Cannibalism was not observed between the individuals of this mite.

*Ovipostion:*

Usually, females deposited its egg singly or in cluster (2-5 eggs) in protected places such as holes, crack and slits of substratum and sometimes among animal pry. Before oviposition, the female stopped working and moving its posterior end, then extended its abdomen telescopically till laying the egg. This process lasted for few minutes.

*Hatching:*

The newly deposited egg is oval in shape and white in color. As the embryo grows, the eggs gradually tend to be more larger and acquires a darker color. At the time of hatching, the egg splits longitudinally at about one third of the egg narrowest end. After wards, the larva grows outside, then keep quiet for few minutes beside the egg shell which is very thin and transparent.

*1- Moulting:-*

Immature of this predaceous species when full-grown entered a semi-quiescent period during which individual stopped feeding but move when disturbed. This period lasted 15 minutes in the tested condition, after which individual kept quiet, extended its chelicerae, palps and fore-legs anteriorly and hind legs posteriorly. Just before moulting individual made some movements beginning from propodosoma and ending

in opisthosoma. A dorsal transverse slite then occurred between the propodosoma and hyterosoma. The mite tried to free itself from the old exuvium by twisting movements and subsequently withdrew the fore-legs and the anterior part of the body outside. Afterward, it crawled forwardly trying to get rid of the rest of the old skin. Newly emerged individual kept quiet beside its old skin for a short period, then started to move actively searching for its prey. Moulting process lasted for 2-3 hours.

*2- Mating:*

Adult females were accepted to copulation immediately after their emergence. Male is considerably smaller in size than female and the second pair of legs are longer than the others, helping it for holding the female. Female could move carrying male over her back, afterwards, male crawled underneath the female and clasped her body with his second, third and fourth pairs of legs. At that moment male withdraws itself back wordily to a position where his spermadactyl fitted opposed to the female's genital orifice, then the male transfers the spermataphore from his own sexual opening into that of the female. Copulation process duarte for 0.5hours, after which the male moved away from the female. The female could accept more than copulation. Mating was essential for egg deposition.

*3- The duration of the developmental stages:-*

Results of mean duration in days of different developmental stages of *Melichares orientalis* n.sp. when fed on free-living nematode, are shown in table (1), and graphically illustrate in Fig. (1).

*3-a- Incubation period:-*

Data tabulated in table (1) and Fig. (1) showed that the maximum incubation period of female observed at 20°C, 2.97±0.24 days. On the other hand, it lasted at 25 and 30°C, 2.15±0.96 and 1.87±00.19 days, respectively. The differences between incubation period at 20°C and (25, 30°C) was highly significant (L.S.D. at 0.05 level = 0.1558). The same trend observed also in case of male, this period took 3.52±0.46, 2.12±0.19 and 1.88±0.16 days at 20, 25 and 30°C, respectively. (L.S.D. at 0.05 = 0.18437).

*3-b- Larval stage:-*

As shown in table (1) and Fig. (1) the larval period of female of *Melichares orientalis* n.sp seems to be considerably highly, affected by the different temperature conditions. The average duration of this period for female took 2.25±0.27, 2.02±0.27 and 1.10±0.34 on the increased on the other two temperatures 20, 25°C as it lasted 2.04±0.18 and 1.44±0.38 days, respectively. From this table it is also obvious that there were highly significant differences between the three compared temperatures for the deutonymphal female periods (L.S.D. at 0.05 = 0.1289). The same observation was tabulated for male deutonymphal period of this soil mite, as it effected by the different temperatures also, these periods were recorded 1.76±0.30, 1.15±0.29 and 0.79±0.17 days when the mite fed at 20, 25 and 30°C, respectively. Statistical analysis showed also a highly significant difference between these temperatures on mite biology (L.S.D. at 0.05 = 0.1611).

*4- Duration of immature stages:-*

The results of the mean duration in days of developmental stages of *Melichares orientalis* n.sp. fed on free-living nematodes and incubated at different temperatures are shown in table (1) and graphically illustrate in Fig. (1). The mean periods of immature stages were 7.46±0.37, 6.47±0.57 and 4±0.37 days when the individuals incubated at 20, 25 and 30°C, respectively. The statistical analysis shows that there was a highly significant difference between the three total immature periods at the three degrees of temperatures (L.S.D. at 0.05 = 0.3186). The same trend observed in case of male individuals, as the total immature periods took 6.73±0.34, 5.79±0.49 and 2.74±0.18 days, for the previously mentioned temperature, respectively. As similar as the female total immature periods, there was a highly significant different between the male total immature periods (L.S.D. at 0.05 = 0.2368).

*5- Life cycle:-*

Data summarized in table (1) and Fig. (2) show the effect of the different temperatures on the predaceous mite *Melichares orientalis* n.sp. when fed on the free-living nematodes. It was observed that the longest life cycle period was 10.34±0.41 days when the female mite reared on 20°C. However, the result showed that 30°C was the most suitable temperature for the mite because the developmental time from egg to adult was shortened as it recorded 5.87±0.39 days, on the other hand, this period lasted 8.52±0.64 days when the mite reared at 25°C. The statistical analysis showed highly significant differences between the three tested temperatures (L.S.D. at 0.05 = 0.2359). The trend observed also in case of male, as this period lasted 11.25±0.52, 7.91±0.54 and 4.16±0.23 days at 20, 25, 30°C, respectively, also this period differed significantly (L.S.D. at 0.05 level = 1.8813).

*6- Longevity:-*

Data tabulated in table (1) and Fig. (2) showed that the minimum longevity of the adult female was observed at 30°C when the individual fed on free-living nematodes, where it lasted 23.35 days and the maximum period was recorded when the mite reared at 20°C as it was 44.11±1.71 days. However, at the last temperature 25°C, the mite took 43.16±1.81 days. The statistical analysis of the data showed that there was a highly significant difference between those reared on the three tested temperatures. (L.S.D. at 0.05 = 0.7685). The same observation was recorded for the male mite as the lowest longevity 19.69±1.04 days when fed *on E. phlagellicaudatus*, and at 30°C. Also this period lasted 42.70±2.45 and 40.31±1.91 days at 20 and 25°C, respectively. As for female the statistical analysis of the data showed a highly significant difference between tested temperatures (L.S.D. at 0.05 = 1.1813).

*7- Generation period:*

The means of the generation period of the predatory mite can be summarized in table (2). The results revealed that the largest generation period was 11.25±0.41 when the female reared on free-living nematodes and incubated at 20°C, while it was 9.3±0.67 days at 25°C. On the other hand, the lowest mean generation period of this ascid mite was 6.67±0.44 days when it reared at the last tested temperature 30°C. The statistical analysis shows that this period differed significantly for the three tested temperatures (L.S.D. at 0.05 = 0.3236).

*8- Pre-oviposition period:-*

The duration of the pre-oviposition period at different temperatures showing in table (2) and illustrated in Fig (3). It lasted 0.91±0.13, 0.87±0.16 and 0.79±.21 days when the mite individual incubated at 20, 25 and 30°C, respectively. Statistical analysis showed that there is no significant difference between 20 and 25°C, while there is significant difference between 30°C and the previously two mentioned temperatures, (L.S.D. at 0.05 level = 0.0761).

*9- Oviposition period:* .

The oviposition period of the predaceous mite clearly affected the different temperatures. Table (2) and Fig. (3) revealed that there was highly significant difference between these temperatures (L.S.D. at 0.05 = 0.6372). This period took 21.2±0.07, 10.76±1.23 and 9.21±0.83 days when the mite individual fed on the free-living nematodes *E. phlagellicaudatus* and incubated at 20, 25, 30°C, respectively.

*10- Post-oviposition period:-*

The data tabulated in table (2) and Fig. (3) shows that the maximum post-oviposition period was 32.26±1.56 days when the mite individual incubated at 25°C, while the minimum period took 10.79±1.17 days at previously mentioned temperatures, respectively. Statistical analysis of the data indicated that the mean duration of active larva was highly differs significantly (L.S.D. at 0.05 level = 0.1409). On the other hand, and in male, these periods were 2.10±0.24, 2.11±0.24 and 0.85±0.17 days on the same previously mentioned temperatures. The statistical analysis revealed that there was no significant difference between those reared on 20 and 25°C. (L.S.D. at 0.05 = 0.1426), (Table 1).

*3-c- Protonymphal stage:-*

Data summarized in table (1) showed the effect of different temperatures on the female protonymphal period of *Melichares orientalis* n.sp. when fed on free-living nematodes. It was found to be longer when fed at 20°C and decreased for those reared at 25 and 30°C, it lasted 3.11±0.29, 2.83±0.31 and 2.05±0.18 days for the previously mentioned temperatures, respectively. There were significant differences occurred between those fed at 20°C and the rest of other temperatures, (L.S.D. at 0.05 = 0.1047). as for the male protonymphal period of *Melichares orientalis* n.sp. it is clear from the same table that this period averaged, 2.90±0.43, 2.53±0.36 and 1.10±0.23 days at 20, 25 and 30°C, respectively. Statistical analysis of tabulated data (table 1) revealed highly significant differences between mites incubated at the different mentioned temperatures (L.S.D. at 0.05 = 0.2256).

*3-d- Deutonymphal stage:-*

Table (1) indicates deutonymphal stage of the ascid mite *Melichares orientalis* n.sp. at different temperatures and when fed on the free living nematodes *E. phlagellicaudatus*. It was observed that the shortage period was at 30°C, as it lasted 0.86±0.20 days. However, at 30°C, it also recorded 21.50±1.10 days when the mite fed on the *E. phlagellicaudatus* at 20°C. The statistical analysis of the observed data indicated that there were significant difference between the three pot-ovipostion periods at the three tested temperature (L.S.D. at 0.05 = 0.6293).

*11- Life span:-*

As shown in table (1) and Fig. (2) that the minimum incubation period of female observed at 30°C, 26.59±1.33 days. However, it lasted at 20 and 25°C, 53.38±1.81 and

52.61±1.59 days, respectively. From this data it can be indicated that the life span of the predatory mite was affected by increasing the temperature, (L.S.D. at 0.05 level = 0.8924). The same trend was observed also in case of male, this period took 52.97±2.45, 48.23±0.4 and 23.81±1.05 days when the mite incubated at 20, 25 and 30°C, respectively (L.S.D. at 0.05 level = 1.4076).

*12- Fecundity:-*

The fecundity of female *M. orientalis* n.sp. was found to be effected by temperature as shown in table (2). It was higher when females incubated 30°C, 77.29±2.39 followed by 25°C as it recorded total egg average per female 72.71±1.86, while it was 57.06±2.39 at 20°C and when fed on free living nematodes. Statistical analysis of data given show that there was highly significant difference between the three tested temperatures when the adult female incubated at (L.S.D. at 0.05 = 1.1997).

*13- Daily rate:*

Considering the daily rate of depositing eggs of females, it was demonstrated in table (2) and Fig. (4) that there was highly significant difference between mites incubated on the examined degrees of temperatures (L.S.D. at 0.05 = 0.1229). The adult female deposited 1.33±0.23 eggs/day at 20°C. While the largest daily rate was observed when mites kept at 30°C and fed on free-living nematodes 3.66±0.23 eggs/day. On the other hand the daily rate of eggs laid by female of *Melichares orientalis* n.sp. was 1.62±0.08 egg/day when female reared at 25°C.

*2nd- Reproductive potential and life table parameters:-*

Experiments were carried out to study the effect of constant temperature (20, 25 and 30°C) and relative humidity 70±5% R.H. on the duration of the nymphs stages and reproductive potential of the ascid mite *Melichares orientalis* n.sp. and to study the effect of constant temperatures on the adult stages, nymphs were allowed to grow at the previously mentioned temperatures till reaching maturity and starting to produce offspring. Apterous adult were monitored daily to observe the number of nymphs born per adult along its lifetime. The obtained data were statistically analyzed for means and standard deviation. Life table parameters (Birch 1948) were calculated using life 48 basic computer program (Abou-Setta et al., 1986).

*1- Life table parameters:-*

Data in table (3) and Fig. (5) explained the effect of different degrees of temperature (20, 25 and 30°C) and relative humidity 70±5% R.H. when fed on free-living nematodes. The net reproductive rates (Ro), which is a product of mean fecundity, survival rate and sex ratio. The highest (Ro) value 33.63 was obtained when the individual reared on the highest degree 30°C, while the lowest value of (Ro) 19.48 was obtained on the lowest degree 20°C. Mean generation time (T) were varied much between the temperature degrees, this value was the greatest 16.96 when the individuals were reared on 20°C, while was the shortest 9.81 on 30°C. The intrinsic rate of natural increase (rm) was greatest value 0.36 when the biological aspects of the individual studied on 30°C, on the other hand the smallest one was 0.18 on 20°C. The finite rate of increase (exp rm) were 1.43 and 1.19 when the individuals reared at 30 and 20°C, respectively. The sex ratio (females/total) of *Melichares orientalis* n.sp. were 0.15, 0.56 and 0.59 when individuals reared on degrees of temperature 20, 25 and 30°C, respectively. The last parameter, the

generation time (G) obtained during this experiment were 11.25, 9.30 and 6.67 when the mite species reared on the same previously mentioned temperatures.

*2- Age-specific fecundity distribution and survivorship:-*

Age-specific fecundity and survivorship of *Melichares orientalis* n.sp. at different temperature (20, 25 and 30°C) are presented in Fig. (5). Type I represented survivorship (Lx), where most mortality occurring in older adults. All *M. orientalis* n.sp. eggs hatched at temperature 30°C, hatchability was reduced at 20°C indicating type II survivorship (mx) mortality occurred over all cohort life span. Generally, temperature of degree 30°C is considered one of the most suitable degrees, as it is good for the mite survival and population build up as the life cycle was completed in the shortest duration, and the mean generation time (T) and the generation time (G) were the lowest values, while the net reproductive rate (Ro), the intrinsic rate of natural increase (rm) and the finite rate of increase (exp rm) were the highest values, therefore, this degree is the most favored temperature for rearing this mite spices.

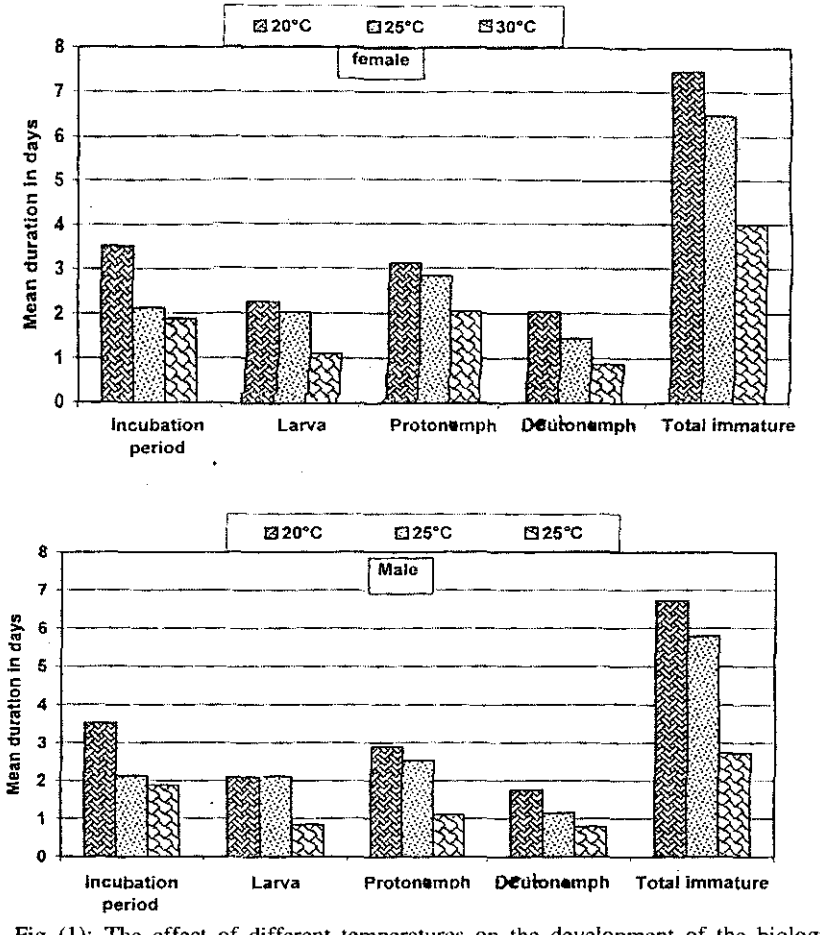
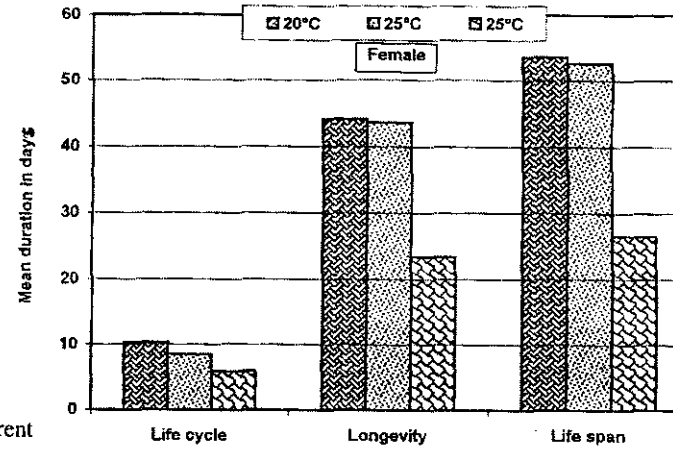



Fig. (1): The effect of different temperatures on the development of the biological aspect of Melichares orientalis.

Table ( 1 ): Average duration in days different biological aspects of the ascid mite *Melichares orientalis* under different conditions when fed on free-living nematodes *E. phlagellicandatus*.

| Biological aspects | Sex | Temperature | | | L.S.D. |
|---|---|---|---|---|---|
| | | 20°C | 25°C | 30°C | |
| Incubation period | Female | 2.97 ±0.24 a | 2.15 ±0.96 b | 1.87 ±0.19 c | 0.1558 |
| | Male | 3.52 ± 0.46 a | 2.12 ± 0.19 b | 1.88 ± 0.16 | 0.1843 |
| Larva | Female | 2.25 ± 0.27 a | 2.02 ± 0.27 b | 1.10 ± 0.34 c | 0.1409 |
| | Male | 2.10 ± 0.24 a | 2.11 ± 0.24 a | 0.85 ± 0.17 b | 0.426 |
| Protonymph | Female | 3.11 ± 0.29 a | 2.83 ± 0.31 b | 2.05 ± 0.18 c | 0.1047 |
| | Male | 2.90 ± 0.43 a | 2.53 ± 0.36 b | 1.1 ± 0.23 c | 0.2256 |
| Deutonymph | Female | 2.04 ± 0.18 a | 1.44 ± 0.38 b | 0.8 ± 0.20 c | 0.1289 |
| | Male | 1.76 ± 0.30 a | 1.15 ± 0.29 b | 0.79 ± 0.17 c | 0.1611 |
| Total immature | Female | 7.46 ±0.41 a | 6.47 ± 0.57 b | 4 ± 0.37 c | 0.3186 |
| | Male | 6.73 ± 0.34 | 5.79 ± 0.49 | 2.74 ± 0.18 | 0.2368 |
| Life cycle | Female | 10.34 ± 0.41 a | 8.52 ± 0.64 b | 5.87 ± 0.39 c | 0.2359 |
| | Male | 11.25 ± 0.52 a | 7.91 ± 0.54 b | 4.61 ± 0.23 | 1.8813 |
| Longevity | Female | 44.11 ± 1.71 a | 43.61±1.81a | 23.35 ± 1.18 c | 0.7685 |
| | Male | 42.57 ± 2.45 a | 40.31 ± 1.91 b | 19.69 ± 1.04 c | 1.1813 |
| Life span | Female | 53.38 ± 1.81 a | 52.61 ± 1.59 b | 26.59 ± 1.33 c | 0.8924 |
| | Male | 52.97 ± 2.45 a | 48.23 ± 0.4 b | 23.81 ± 1.05 c | 1.4076 |



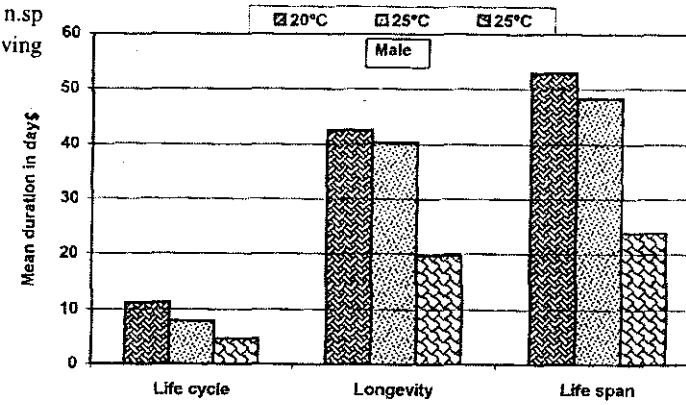




Fig. (2): The effect of different temperatures on the life cycle of M. orientalis n.sp when fed an free-living nematodes.

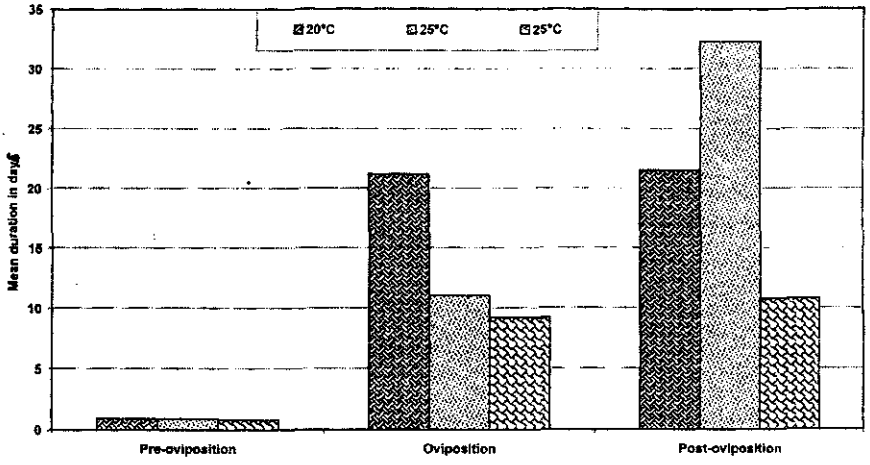



Fig. (3): The effect of different temperatures on the longevity of Melichares orientalis n.sp when fed on free-livinng nematodes *E. phlagellicandatus*.

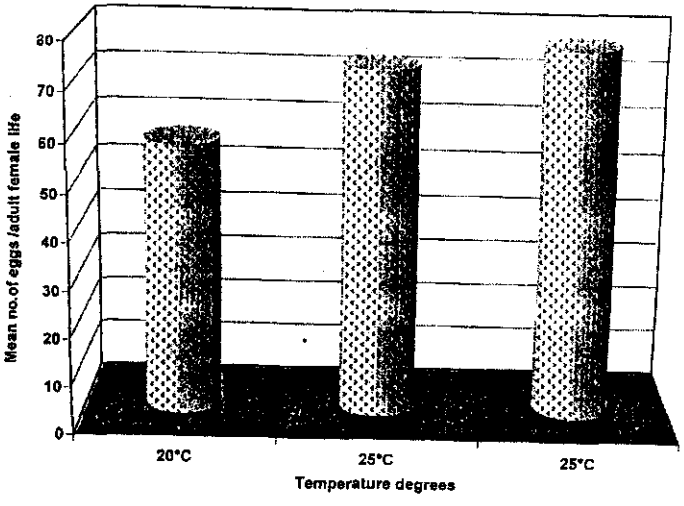



Fig. (4): The effect of different temperatures on the longevity of *Melichares orientalis* n.sp when fed on free-living nematodes *E. phlagellicaudatus*.

Table (2): Average duration in days of different biological aspects and fecundity of the predatory mite *Melichares orientalis* under different conditionswhen fed on free-living nematodes *E. phlagellicandatus*.

| Temperature | Biological aspects. | | | | No. of eggs/female. | |
|---|---|---|---|---|---|---|
| | Pre-oviposition | Generation period | Oviposition | Post-oviposition | Total average | Daily rate |
| 20°C | 0.91 ±0.13a | 11.25 ±0.41a | 21.2 ± 2.07a | 21.5 ± 1.10b | 57.06 ±2.39c | 1.33 ± 0.23c |
| 25°C | 0.86 ± 0.16a | 9.3 ± 0.67b | 10.76 ±1.23b | 32.26 ±1.56a | 72.71±1.86b | 1.62 ±0.08b |
| 30°C | 0.79 ±0.21b | 6.67 ± 0.44c | 9.21 ± 0.83c | 10.79 ± 1.17c | 77.29 ± 2.39a | 3.66 ± 0.23a |
| L.S.D. | 0.0761 | 0.3236 | 0.6372 | 0.6293 | 1.1997 | 0.1229 |

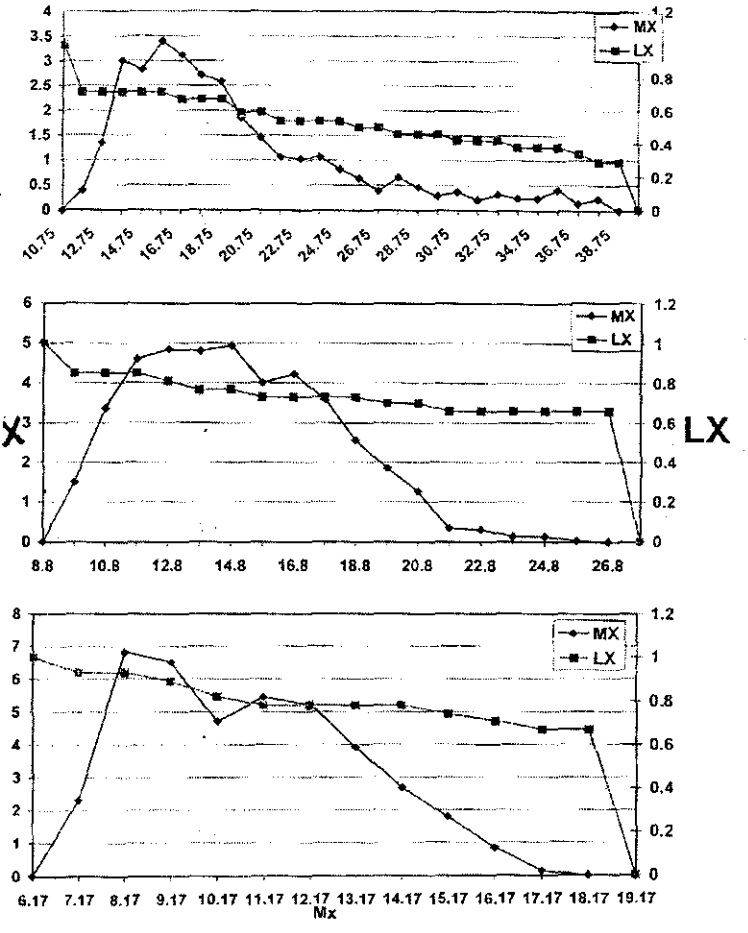



Fig. (5): Age focundity (Mx), the female age (x) and survivorship (LX) of *Melichares orietalis* at 20, 25 and 30 C when fed on free living nematodes *E. phlagellicaudatus*.

Table (3): Life table parameters of the ascid mite *Melichares orientalis* n.sp at different temperatures when fed on the free-living nematodes *E. phlagellicandatus*.

| Life table parameters | Temperature | | |
|---|---|---|---|
| | 20° C | 25°C | 30°C |
| The net reproduction rate (Ro) | 19.48 | 32.83 | 33.63 |
| The mean generation time (T) | 16.96 | 13.77 | 9.81 |
| The intrinsic rate of natural increase ($r_m$) | 0.18 | 0.25 | 0.36 |
| The finite rate of increase ($\exp.r_m$) | 1.19 | 1.29 | 1.43 |
| The sex ratio (females/ total ) | 0.51 | 0.56 | 0.59 |
| The generation time (G) | 11.25 | 9.30 | 6.67 |
| Fraction | 0.71 | 0.85 | 0.93 |

**Table (4):** The differences between reduced sugar content mg/g in different cucumber varieties during their vegetation periods.

| Plant stage / Varieties | Seedling | Flowering | Yielding |
|---|---|---|---|
| Boblyion | 3.18 a | 6.67 a | 4.06 c |
| Brinse | 1.91 c | 4.76 d | 4.45 c |
| Super Dalila | 2.51 b | 5.08 c | 6.67 a |
| Thamine | 1.91 c | 6.03 b | 5.08 b |
| L.S.D. | 0.1804 | 0.1584 | 0.6112 |

**Table (5):** The differences between phosphorus content mg/g in different cucumber varieties during their vegetation periods.

| Plant stage / Varieties | Seedling | Flowering | Yielding |
|---|---|---|---|
| Boblyion | 0.17 a | 0.21 a | 0.23 a |
| Brinse | 0.16 a | 0.14 b | 0.14 b |
| Super Dalila | 0.11 b | 0.20 a | 0.21 a |
| Thamine | 0.11 b | 0.20 a | 0.15 b |
| L.S.D. | 0.0471 | 0.0282 | 0.0231 |

Table (6): Relation between phytochemical components of some cucumber varieties and their infestation by *T. urticae* during season 2001.

| Plant stage | Boblyion | | | | | | Brinse | | | | | | Super Dalila | | | | | | Thamine | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T.N. | P | C | Sugar | | Mean no. of T.u. | T.N. | P | C | Sugar | | Mean no. of T.u. | T.N. | P | C | Sugar | | Mean no. of T.u. | T.N. | P | C | Sugar | | Mean no. of T.u. |
| | | | | T.S. | R.S. | | | | | T.S. | R.S. | | | | | T.S. | R.S. | | | | | T.S. | R.S. | |
| Seedling | 5.75 | 0.17 | 193.69 | 7.62 | 3.18 | 1.76 | 6.43 | 0.16 | 98.14 | 10.32 | 1.91 | 2.76 | 6.47 | 0.11 | 52.67 | 10.48 | 2.51 | 1.69 | 6.15 | 0.11 | 122.99 | 14.61 | 1.91 | 2.04 |
| Flowering | 3.54 | 0.21 | 60.36 | 15.56 | 6.67 | 5.38 | 2.54 | 0.14 | 51.43 | 14.61 | 4.76 | 5.43 | 3.94 | 0.21 | 59.24 | 11.43 | 5.08 | 11.68 | 3.54 | 0.20 | 72.6 | 11.43 | 6.03 | 34.34 |
| Yielding | 2.34 | 0.23 | 78.7 | 5.08 | 4.06 | 3.0 | 2.82 | 0.14 | 69.32 | 10.48 | 4.45 | 1.62 | 2.42 | 0.21 | 53.64 | 18.8 | 6.67 | 5.9 | 3.14 | 0.15 | 41.37 | 12.38 | 5.08 | 17.95 |
| Mean | 3.88 | 0.20 | 110.39 | 9.75 | 4.64 | 3.38 | 4.000 | 0.15 | 99.63 | 11.8 | 3.71 | 3.60 | 4.28 | 0.15 | 55.18 | 10.90 | 4.75 | 6.39 | 4.28 | 0.15 | 78.99 | 12.81 | 4.34 | 18.11 |

T.N. = Total nitrogen (mg/g)
P. = Phosphors (mg/g)
C. = Carbohydrate (mg/g)
T.S. = Total sugar (mg/g)
R.S. = Reduced sugar (mg/g)

**Table (7):** Correlation coefficient between phytochemical components of cucumber varieties leaves and *T. urticae* infestation.

| Varieties / Phyto. Compo. | Bablyion | Brinse | Super Dalila | Thiamine |
|---|---|---|---|---|
| N | -0.49 | -0.39 | -0.55 | -0.79 |
| C | -0.83 | -0.91 | 0.92 | -0.60 |
| T.S. | 0.87 | 0.97 | 0.99 | -0.97 |
| R.S. | -0.16 | 0.97 | 0.54 | 0.95 |
| P | 0.51 | -0.29 | 0.82 | 0.99* |

* Significant at 1% level.

N. = Nitrogen
P. = Phosphors
C. = Carbohydrates
T.S. = Total sugar
R.S. = Reduced sugar

## DISCUSSION

The family Ascidae is considered an important family due to their widespread occurrence also it colonize a wide range of terrestrial and semi-aquatic habitat (Nawar 1992) *Melichares* is one of the ascid mite genera, found in soil and debris. The predator *Melichares orientalis* n.sp. found in soil samples under eggplant in El-Khanka district, also it reared by feeding on the free-living nematodes and incubating at 20, 25 and 30°C and 70±5% R.H.. This species pass through larva and two nymphal stages before reaching adult, also each active immature stage when full-grown is followed by a semi-quiescent one during which individual stop feeding, but can move especially when disturbed, mating was essential for egg production, the female could accept more than copulation and female deposited its eggs singly or in clusters in protected places, these results are in the same harmony with that obtained by (El-Bishlawy 1978, Shereef et al., 1980, Kinn 1983, Afifi *et al.*, 1986, Nasr *et al.*, 1990, Nawar 1991, Ibrahim *et al.*, 1992, Gomaa 1998, Abd El-Halim 1999, El-Gazzar 2001 and El-Moghazy 2002). Duration of developmental stages and female longevity and fecundity were affected by changing the degrees of temperatures (20, 25 and 30°C), as the last degree 30°C proved to be the most suitable degree for rearing *M. orientalis* n.sp. as it shortened female longevity and increased fecundity. This obviously appeared as adult female lived for 23.35±1.18 days, during which it deposited an average 77.29±2.39 eggs when feeding on the free-living nematodes and incubated at 30°C. Considering life table parameters of *M. orientalis* n.sp. the rearing on *E. phlagellicaudatus* and incubating at 20, 25, 30°C, it was observed that the temperature of degree 30°C is considered one of the most suitable degrees, as it is good for mite survival and population build up as the life cycle was completed in the shorted duration, and the mean generation time (T = 9.81) and the generation time (G = 6.67) were the lowest values, while the net reproductive rate (Ro = 33.63), the intrinsic rate of natural increase (rm = 0.36) and the finite rate of increase exp rm were the highest value. These results are in the same direction with that obtained by Nawar (1991) who stated that the most favorable degree of temperature which achives the highest intrinsic rate of increase and also the highest finite rate of increase.

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# الخصائص البيولوجية للمفترس الأكاروسي ميليكارس أورينتالز

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تم جمع المفترس *Melichares orientalis n.sp.* من عينات تربة من تحت نباتات الباذنجان ولقد تم دراسة هذا النوع وتربيته في المعمل تحت ظروف ثابتة وبالتغذية على النيماتودا الحرة وتحت درجات حرارة ٢٠ ، ٢٥ ، ٣٠ م ورطوبة نسبية ٧٥% لمعرفة تأثير درجات الحرارة على دورة حياته ومعدل وضع البيض للإناث.

١- في حالة التربية على درجة حرارة ٢٠م كان طور اليرقة والحورية الأولى والحورية الثانية ومجموع الأطوار الغير كاملة ودورة الحياة وكذلك مدة الحياة ٩٦.٢ ، ٢,٢٥ ، ٣,١١ ، ٢,٠٤ ، ٧,٤٩ ، ١٠,٣٤ ، ٥٣,٣٨ يوم لإناث المفترس على الترتيب ، بينما وجد أنه في حالة ذكور هذا النوع كانت ٣,٥٢ ، ٢,١ ، ٢,٩ ، ١,٧٦ ، ٦,٧٣ ، ١١,٢٥ ، ٥٢,٩٧ يوم لنفس درجات الحرارة السابقة على التوالي.

٢- في حالة التربية على درجة حرارة ٢٥م كان طور اليرقة والحورية الأولى والحورية الثانية والطور غير الكامل لدورة الحياة وكذلك مدة الحياة ١٥.٢ ، ٢,٠٢ ، ٢,١١ ، ٢,٨٣ ، ١,٤٤ ، ٦,٤٧ ، ٨,٥٢ ، ٥٢,٦١ يوم لإناث المفترس على الترتيب ، بينما وجد أنه في حالة ذكور هذا النوع كانت ٢,١٢ ، ٢,١١ ، ٢,٥٣ ، ١,١٥ ، ٥,٧٩ ، ٧,٩١ ، ٤٨,٢٣ يوم لنفس درجة الحرارة السابقة الذكر على التوالي.

٣- وأخيراً في حالة التربية على درجة حرارة ٣٠م كان طور اليرقة والحورية الأولى والحورية الثانية والأطوار الغير كاملة ودورة الحياة وكذلك مدة الحياة ٨٧.١ ، ١,١ ، ٢,٠٥ ، ٠,٨٦ / ٤ ، ٥,٨٧ ، ٢٦,٥٩ يوم لإناث المفترس على الترتيب ، بينما وجد أنه في حالة ذكور هذا النوع كانت ٨٨.١ ، ٠,٨٥ ، ١,١ ، ٠,٧٩ ، ٢,٧٤ ، ٤,٦١ ، ٢٣,٨١ يوم لنفس درجة الحرارة السابقة.

٤- تضاعف تعداد المفترس M. orientalis33.63، ٣٢,٨٣ ، ١٩,٤٨ مرة خلال فترة من الجيل بلغت ٨١.٩ ، ١٣,٧٧ ، ١٦,٩٦ عند تربيته في درجات حرارة ٣٠ ، ٢٥ ، ٢٠م على الترتيب وتغذيته على النيماتودا الحرة.