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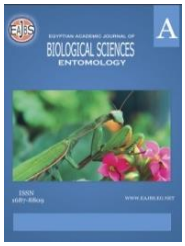

Biological Aspects of Date Palm Dust Mite, *Oligonychus afrasiaticus* (McGregor) (Acari: Tetranychidae) on Fronds of Three Date Palm Cultivars

Ashraf, S. Elhalawany; Naglaa F. R. Ahmad and Ahmad, I. Amer
Plant Protection Research Institute, Agricultural Research Center, Dokki, Giza, Egypt.
Email: dr_ashraf_said@yahoo.com; drashrafsaid2@gmail.com

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ABSTRACT

For several years the palm dust mite, *Oligonychus afrasiaticus* (McGregor) has been an economically important pest of date palm. Biology and life table parameters of the date dust mite, *O. afrasiaticus* were studied on fronds of three date palm cultivars: Bartamoda (dry), Sewi (semi dry) and Zaghlol (soft) at laboratory conditions of 30 and 35°C & 60 ±5% R.H. and 16L. The results revealed that, the longest and shortest oviposition period and total longevity of *O. afrasiaticus* females were recorded at 30°C (22.5 & 26.90 days) on Sewi and 35°C (6.9 & 10.0 days) on Zaghlol variety, respectively. The fecundity increased as temperature decreased from 30.5, 37.45 and 25.5 eggs at 30°C to 27.8, 29.15 and 15.94 eggs at 35°C on Bartamoda, Sewi and Zaghlol varieties, respectively. The lowest and highest values of the intrinsic rate of increase (r_m) were 0.107 and 0.229 individuals/female/day that obtained at 30 and 35°C on Zaghlol and Sewi varieties, respectively. The mean generation time (T) significantly decreased from 23.6, 22.4 and 22.76 days to 13.08, 11.90 and 12.26 days with increasing temperature from 30°C to 35°C, on Bartamoda, Sewi and Zaghlol varieties, respectively. The results of this study indicate that *O. afrasiaticus* could increase rapidly when Sewi and Bartamoda fronds serve as a food source more than Zaghlol date palm variety.

INTRODUCTION

Date palm is one of the most crucial treasures inside the Arab republic of Egypt, which have been well-known for their dietary price within the oases and many agricultural regions of Egypt during the ages. Therefore, Egypt is ranked within the first place some of the date-generating international locations in the international market. Regardless of Egypt's excessive rank in phrases of date production that amounts to greater than 1.7 million tons, nearly 21% of the sector production estimated at 8 million lots, its export contribution to the worldwide dates marketplace is low. The approach goals to raise date exports from 38000 tons in 2016 to one hundred twenty thousand tons over the subsequent five years (El-Sharabasy and Rizk, 2019).

Date palm trees were observed to be badly affected by different injurious mites. This causes large damage and lead to economic losses (Taha *et al.*, 2019). In Iraq, *O. afrasiaticus* caused within 50–80% produce loss of dates within years on dry, dusty and stormy weather (Al-Jboory and Al-Suaide, 2010). The date palm dust mite, *O. afrasiaticus* has become an important pest of immature date palm fruits on Sewi variety at the New Valley Governorate

in Egypt. The population dynamics of *O. afrasiaticus* started with attacking fruits at second week of April and reached its peak at mid of June in the first year and in late of June in the second year on Sewi date palm variety. After that the mites migrate from fruits to fronds and weeds (Elhalawany *et al.*, 2020). The date dust mite infests fronds and fruits on date palms, and in addition in conformity with damage brought on by means of its feeding, it produces great amounts of webbing up to expectation covers the dates. Dust is stock within the webbing, making coloration that prevents the dates below besides coloring (Jeppson *et al.*, 1975). In Yemen, it has been observed that in the absence of fruits and during winter, the pest mite stayed at the bases of the fronds and in the "heart" of the palms. On the "Mijraf" variety, the mite appears on date fruits in the second week of March and is present until the third week of July (Ba-Angood and Bass'haih, 2001).

Several researchers have been investigated the biology of *O. afrasiaticus*, under different environmental condition and biotic factors (Ba-Angood and Bass'haih, 2001; Al-Sweedy *et al.*, 2006; Al-Jboory and Al-Suaide, 2010; Ben Chaaban *et al.*, 2011; Ben Chaaban *et al.*, 2012; and Elhalawany 2013).

Little was known about the dust mite biology on date palm varieties in Egypt. Therefore, the aim of this study is to know the effect of three date palm varieties and two degree of temperature on biology and fecundity of *O. afrasiaticus.* This knowledge indicates useful to our comprehension of the population dynamics on *O. afrasiaticus* of date palm.

MATERIALS AND METHODS

Mite Cultures:

The initial population of *O. afrasiaticus* was collected from date palm in the New Valley Governorate, in May 2019.

The stock culture was maintained on maize plants (*Zea mays* L.) under laboratory condition at Qaha Agriculture Research Station, Qalyubia Governorate, PPRI, ARC, Egypt. Seeds of maize plants were planted in pots containing soil and leaf compost. After suitable growth, plants were infected with *O. afrasiaticus*. The stock culture was maintained in small greenhouse 5x5m^2. Mites were reared for at least three successive generations prior to the experiments; mites from the stock culture were used for the tests.

Rearing Dust Mite on Date Palm Frond:

Experiments were conducted on three date palm variety Bartamoda (dry), Sewi (semi dry) and Zaghlol (soft variety) at 30 & 35°C, 60% R.H. and 16L photoperiod. Six holes (2 cm diameter) were opened in a Petri dish (15 cm diameter) plastic cover and small other holes in the cover were made to provide water. Two pieces of palm frond (10-12 cm) were put on cotton piece in Petri-dish. All pinnae had been pleased ventral-side up. Frond pieces were replaced when needed to keep the level of nutrition and freshness. Pieces of cotton dampened with water between the cover plate and around the edges of the disk and painted with Vaseline to prevent mites escape. About 100 adult females from the stock culture were introduced onto each leaf disc (frond). After mating between males and females on the leaves in the laboratory, females were allowed to lay eggs for 12-h periods. One egg was transferred for each disc using a brush and up to 60 replicates were made for each treatment. Dishes were kept in laboratory at 30 & 35 ± 2°C and 60± 2% RH. Dishes were examined two times daily to record the different stages. This method was proposed by Al-Sweedy (2003) and Elhalawany (2013).

Life table parameters of the *O. afrasiaticus*:

When *O. afrasiaticus* females reached adult stage, they were transferred one at a time onto a new leaf disc with a single male. Eggs were collected daily and reared to adult. During developmental period, mortalities of different stages and sex ratio of progeny were

determined. Oviposition by resulting females was recorded every day for each female. Life table parameters were estimated according to Birch (1948) using the Life48, BASIC Computer Program (Abou-Setta *et al.*, 1986). Parameters were determined by the following formula:

$$\max \Sigma_0 \, Lx \, m \, x \,/\, \exp. \, r_m \, x = 1$$

Where "m_x" is the number of female offspring produced per female during the interval "x", using data on age-specific survival rates (lx) and the number of female offspring per female (mx) for active females at age "x". The net reproductive rate (R_0) = $\Sigma(l_x \times m_x)$; mean generation time (T) = $\Sigma(x \times l_x \times m_x) / \Sigma(l_x \times m_x)$; the intrinsic rate of increase (r_m) = Ln (R_0)/T; time of population to double (DT) = Ln (2)/ r_m, $\lambda = \exp(r_m)$ and gross reproduction rate (GRR)= Σmx. These definitions were presented by Birch (1948).

Statistical analysis: Data were analyzed using Proc ANOVA and mean separation was conducted using Duncan's multiple range test ($P \leq 0.05$). These analyses were conducted using SAS statistical software (SAS Institute, 2003).

RESULTS AND DISCUSSION

Developmental Time and Longevity at 30°C:

The life cycle of the date palm dust mite, *O. afrasiaticus* is completed and passed through four developmental stages with quiescence stages at the end of larval and nymphal stages. The duration of different developmental stages of *O. afrasiaticus* on fronds of three date palm cultivars: Bartamoda (dry), Sewi (semi dry) and Zaghlol (soft) at 30˚C and 65% R.H. is presented in Tables (1 & 2). There is no significant difference between the three varieties during egg incubation period of female and male. Female incubation period ranged from 3.05 to 5.23 days and male incubation period ranged from 4.88 to 5.31 days. Statistical analysis indicated that significant differences were found between the three rearing varieties. The shortest female larva, protonymphal, deutonymphal stages, total immature stages and life cycle were 3.55, 2.98, 2.95, 9.48 and 14.63 days at 30°C on Sewi variety; while the longest were 4.0, 3.55, 2.5, 11.05 and 16.08 days on Bartamoda variety, respectively. The shortest generation was observed on Sewi was 17.47 days, while the longest were 18.97 days recorded on Bartamoda, with statistically differences (*F= 6.95; P= 0.0002*).

The longevity of adult female *O. afrasiaticus* and the length of the pre-oviposition, oviposition, and post-oviposition periods differed significantly between the three date palm varieties. The longest pre-oviposition 2.95 days on Sewi and the longest post-oviposition periods was recorded on Zaghlol (Table 1, *P= 0.0001*). The longest oviposition period was observed on Sewi fronds, 22.5 days, and the shortest period on Zaghlol was 15.0 days with statistically differences (*F= 32.7; P= 0.0001*) (Table 1). Sewi fronds had the highest longevity 26.9 & 22.5 days, while the lowest longevity was recorded on Zaghlol fronds 19.38 & 19.38 days, for female and male, respectively at 30˚C (Tables 1 & 2). The longest female life span on Sewi was 41.53 days, whereas the shortest period on Zaghlol was 35.53 days, with statistically differences (*F= 17.13; P= 0.0001*). No significant differences between male life span on three hosts at 30˚C (Table 2). The highest mean number of eggs laid by female was 37.45 eggs/female with a daily rate of 1.71 eggs/♀/day on Sewi while, the lowest fecundity was 25.5 eggs/♀ on Zaghlol with a daily rate of 1.71 /♀/day at 30˚C (*F=104.49, P= 0.0001*) (Table 1).

Table 1: Mean developmental times in days (± SD) of *O. afrasiaticus* females reared on different date palm verities at 30ºC.

Developmental time	Date palm variety			F-value	Probability	LSD
	Bartamoda	Sewi	Zaghlol			
Egg	5.03±0.82 a	5.15±0.75 a	5.23±0.55 a	0.4	0.6712	0.45
larva	4.00±0.54 a	3.55±0.60b	3.80±0.57ab	3.1	0.0520	0.36
Protonymph	3.55±0.74 a	2.98±0.55b	3.45±0.51a	5.09	0.0090	0.38
Deutonymph	3.50±0.46 a	2.95±0.66b	3.68±0.61a	10.14	0.0002	0.33
Immature stages	11.05±0.93a	9.48±0.94b	10.93±0.99a	20.17	0.0001	0.55
Life cycle	16.08±1.20a	14.63±1.29b	16.15±1.05a	12.94	0.0001	0.67
Generation	18.97±1.22a	17.47±0.69b	18.00±1.16b	6.95	0.0002	0.77
Pre-oviposition	2.93±0.57a	2.95±3.66a	1.93±0.47b	20.27	0.0001	0.36
Oviposition	20.08±3.47b	22.50±0.48a	15.00±1.21c	32.70	0.0001	1.89
Post-oviposition	2.00±0.54b	1.45±3.97c	2.45±0.67a	15.54	0.0001	0.35
Longevity	25.00±3.71a	26.90±3.97a	19.38±1.53b	28.87	0.0001	2.06
Fecundity	30.50±3.56b	37.45±2.31a	25.50±1.64c	104.49	0.0001	1.66
Daily rate	1.56±0.33a	1.71±0.32a	1.71±0.40a	1.88	0.1623	0.17
Life span	41.08±4.06a	41.53±4.40a	35.53±1.80b	17.13	0.0001	2.28

The means are followed by different letters in the same rows are significantly divergent ($P < 0.05$, Duncan).

Table 2: Mean developmental times in days (± SD) of *O. afrasiaticus* males reared on different date palm verities at 30ºC.

Developmental time	Date palm variety			F-value	Probability	LSD
	Bartamoda	Sewi	Zaghlol			
Egg	4.88±0.7 a	5.06±0.4 a	5.31±0.59 a	1.15	0.337	0.60
larva	3.56±0.3 ab	3.13±0.6 b	3.75±0.53 a	3.09	0.406	0.53
Protonymph	3.31±0.8 a	2.94±0.4 a	3.25±0.38 a	1.16	0.352	0.56
Deutonymph	3.19±0.3 b	2.69±0.4 b	3.81±0.75 a	9.87	0.0009	0.52
Immature stages	10.1±0.7 a	8.75±0.8 b	10.81±0.84a	13.88	0.0001	0.82
Life cycle	14.9±1.1 b	13.8±0.7 c	16.13±1.13a	10.93	0.0006	1.02
Longevity	22.4±2.0 a	22.5±1.9 a	19.38±1.92b	6.69	0.0056	2.03
Life span	37.4±1.7 a	36.3±1.6 a	35.50±2.51a	1.78	0.1228	2.07

The means are followed by different letters in the same rows are significantly divergent ($P < 0.05$, Duncan).

Developmental Time and Longevity at 35°C:

Applying the same tests as shown in (Tables 3 & 4) indicated the differences between the three hosts at 35°C. All female and male immature stages developed faster on Sewi, but slowed on Bartamoda date palm variety. The shortest incubation period was 3.3 & 3.25 days on Bartamoda, while the longest were 3.7 & 3.5 days on Zaghlol for female and male, respectively at 35°C. The shortest larva stage, protonymph, deutonymph, immature stages and life cycle were 3.33, 1.98, 0.98, 1.3, 4.25 and 7.58 days for female at 35°C on Sewi, while the shortest the values on male were 1.69, 1.0, 1.25, 3.94 and 7.31 days at 35°C on Sewi, respectively. The shortest generation was observed on Sewi was 8.63 days, while the longest was 10.63 days recorded on Zaghlol, with statistically differences (*F= 15.2; P= 0.000*1). The longest oviposition period 11.68 days was observed on Sewi and the shortest period on Zaghlol was 6.9 days with statistical differences (*F= 35.96; P= 0.0001*).

The highest mean fecundity of female was 29.15 eggs/♀ with a daily rate of 2.61 eggs/♀/day on Sewi, while the lowest was 15.94 eggs/♀ and as 2.4 eggs/♀/day at 35°C on Zaghlol, with statistical differences (*F= 96.57& 1.65; P= 0.0001& 0.2012*). The longest

female and male life span on Bartamoda was 23.05 and 23.1 days, whereas the shortest period on Zaghlol was 19.0 and 18.9 days, with statistical differences.

These results are in agreement with findings by Abdul-Hussein (1969) who studied the biology of *O. afrasiaticus* in Iraq, which revealed that the fecundity ranged between 30-100 eggs/female at 35ºC and 50% RH; incubation period was 3 days, larval period 2 days, nymphal period 4-7 days and generation time 8-14 days. Al-Jboory and Al-Suaide (2010) indicated that, the incubation period was 3.9 days at 30°C and it reached a minimum at 35°C was 2.7 days; the development of the larva, protonymph and deutonymph reached 3.0, 2.53 and 2.7 days at 30°C, and 1.9, 1.3, and 1.4 days at 35°C, respectively. Female and male longevity averaged 14.3 and 11.4 days at 30°C, and 11.5 and 10.1 days at 35°C, respectively. In Tunisia, four date palm varieties ('Deglet Noor', 'Alig', 'Kentichi', 'Besser') at 27°C and 60 % RH indicated that the total development time of immature females was shorter on 'Deglet Noor' fruits than on fruits of the other cultivars. The total fecundity per female is highest on 'Deglet Noor' and the lowest fecundity on 'Besser' (Ben Chaaban *et al.,* 2011). The life cycle of *O. afrasiaticus* ranged from 13 days on 'Alig' date palm to '10.9' days on sorghum leaves at 27°C. The highest fecundity was on sorghum leaves (2 eggs/♀/day) during 5.2 oviposition days, and there was low fecundity on 'Deglet Noor' fronds and 'Alig' fruits at 0.7 eggs/♀/day during 5.4 days. The longevity of *O. afrasiaticus* females ranged from 13.4 to 7.5 days on 'Deglet Noor' fruits and sorghum leaves, respectively (Ben Chaaban *et al.*, 2012). Immature developmental time was fastest on Kamry stage (10.60 days) followed by Yellow Khelal (12.35 days) then Inner fronds (12.71 days). Adult female longevity averaged 15.08, 14.62 and 13.83 days on Kamry stage, Khelal yellow stage and Inner frond, respectively. The shortest generation time was 9.5, 11.32 and 16.04 days at 35°C & 30% RH. The longest was 22.74, 26.74 and 26.68 days at 25°C & 70% RH on Kamry, Yellow Khelal stage and inner frond, respectively (Elhalawany, 2013).

Table 3: Mean developmental times in days (± SD) of *O. afrasiaticus* females reared on different date palm verities at 35ºC.

Developmental time	Date palm variety			F-value	Probability	LSD
	Bartamoda	Sewi	Zaghlol			
Egg	3.30±0.44b	3.33±0.61b	3.70±0.68a	2.93	0.0615	0.37
larva	2.03±0.50b	1.98±0.55b	2.65±0.69a	8.26	0.0007	0.37
Protonymph	2.00±0.58a	0.98±0.34c	1.33±0.34b	28.46	0.0001	0.27
Deutonymph	1.55±0.51a	1.30±0.44a	1.40±0.38a	1.58	0.2156	0.28
Immature stages	5.58±1.02a	4.25±0.94b	5.38±0.93a	11.01	0.0001	0.60
Life cycle	8.88±1.24a	7.58±1.04b	9.08±1.08a	10.47	0.0001	0.71
Generation	10.34±1.33a	8.63±1.15b	10.63±1.29a	15.02	0.0001	0.79
Pre-oviposition	1.43±0.37a	1.00±0.40b	1.53±0.50a	8.54	0.0006	0.27
Oviposition	10.33±1.43b	11.68±2.53a	6.90±1.29c	35.96	0.0001	1.16
Post-oviposition	2.43±0.59a	1.83±0.82b	1.58±0.49b	9.10	0.0004	0.41
Longevity	14.18±1.49a	14.50±2.75a	10.0±0.90b	35.69	0.0001	1.18
Fecundity	27.80±4.84a	29.15±1.53a	15.94±2.64b	96.57	0.0001	2.09
Daily rate	2.73±0.52b	2.61±0.60b	2.40±0.60a	1.65	0.2012	0.36
Life span	23.05±2.08a	22.08±2.36a	19.08±1.43b	21.58b	0.0001	1.26

The means are followed by different letters in the same rows are significantly divergent ($P < 0.05$, Duncan).

Table 4: Mean developmental times in days (± SD) of *O. afrasiaticus* males reared on different date palm verities at 35ºC.

Developmental time	Date palm variety			F-value	Probability	LSD
	Bartamoda	Sewi	Zaghlol			
Egg	3.25±0.4 a	3.38±0.7 a	3.5±0.5 a	0.45	0.6456	0.55
larva	2.06±0.5 ab	1.69±0.4 b	2.44±0.4 a	6.05	0.0084	0.44
Protonymph	2.13±0.5 a	1.0±0.4 b	1.31±0.3 b	16.94	0.0001	0.41
Deutonymph	1.44±0.4 a	1.25±0.4 a	1.44±0.4 a	0.57	0.5726	0.42
Immature stages	5.63±0.6 a	3.94±0.7 b	5.19±0.8 a	12.2	0.0003	0.73
Life cycle	8.88±1.0 a	7.31±1.1 b	8.69±0.9 a	5.74	0.0103	1.04
Longevity	14.3±1.8 a	14.8±2.0 a	10.2±1.6 b	16.35	0.0001	1.83
Life span	23.1±2.5 a	22.1±2.4 a	18.9±2.1 b	7.46	0.0036	2.3

The means are followed by different letters in the same rows are significantly divergent ($P < 0.05$, Duncan).

Life Table Parameters of *O. afrasiaticus* under Different Rearing Conditions:

Results presented in Table (5) clarified that the shortest mean generation time (Tc) was observed on Sewi was 11.90 and 22.40 days, while the longest were 13.08 and 23.6 days recorded on Bartamoda at 30 and 35˚C, respectively. Whereas, the shortest time for population density doubling (DT) was 3.03 and 5.13 days at 30 and 35˚C on Sewi variety while the longest period was 4.31 and 6.48 days at 30 and 35˚C on Zaghlol variety.

The maximum net reproductive rate (R_o) occurred at 30˚C on Sewi recorded 20.97 individuals/ generation, followed by that on Bartamoda 16.01 individuals/ generation, while the lowest value on Zaghlol was 11.57 individuals/generation, while the minimum of these values were recorded at 35˚C.

The maximum intrinsic rate of natural increase (r_m) when the difference between birth rate and death rate was obtained at temperature of 35°C whereas the lowest values were recorded at 30˚C. This indicates that the mite favorable high temperature for population increases; these values were 0.229, 0.203 and 0.161 individuals/♀/day at 35˚C on Sewi, Bartamoda and Zaghlol, respectively.

The finite rate of increase (**λ**) ranged from 1.11 offspring/ individual/day at 30°C on Zaghlol to 1.25 offspring/ individual/day at 35°C on Sewi. Gross reproduction rate (GRR) recorded the highest value at 30°C on Sewi was 30.8 eggs/ individual and the lowest value 14.08 eggs/ individual on Zaghlol.

Table 5: Life table parameters of *O. afrasiaticus* under different temperatures.

Parameter	Bartamoda		Sewi		Zaghlol	
	30°C	35°C	30°C	35°C	30°C	35°C
Mean generation time (T_c) [a]	23.60	13.08	22.40	11.90	22.76	12.26
Doubling time (DT) [a]	5.92	3.41	5.13	3.03	6.48	4.31
Net reproductive rate (R_o) [b]	16.01	14.33	20.97	15.38	11.57	7.25
Intrinsic rate of increase (r_m) [c]	0.117	0.203	0.138	0.229	0.107	0.161
Finite rate of increase (λ)[c]	1.12	1.22	1.14	1.25	1.11	1.17
Gross reproduction rate (GRR)[b]	25.40	22.90	30.80	27.20	17.89	14.08
50% mortality [a]	34.00	18.00	37.00	18.00	30.00	15.00
Survival rate %	0.75	0.70	0.80	0.70	0.70	0.65
Sex ratio (♀/total)	0.70	0.75	0.70	0.75	0.65	0.70

[a] Days [b] per generation [c] Individuals/female/ day

The population of this mite is reduced by half (50% mortality) from 15 to 18 days at 35°C and from 30 to 37 days at 30°C. The daily age-specific survival rate ranged from 0.65 to 0.80%. The sex ratio ranged from 0.65 to 0.75 female/ total not affected by temperature and host plant.

The age specific survivorship (l_x) and age-specific fecundity (m_x) curves for *O. afrasiaticus* are illustrated in Fig. (1), the daily age-specific survival rate was highest at 30ºC and decreased as the temperature increased on three host plants. The maximum number of eggs produced at 30ºC (day 22: 1.44 eggs/♀/day), (day 22: 1.89 eggs/♀/day) and (day 23: 1.4 eggs/♀/day), while these values at 35°C were (day 13: 2.4 eggs/♀/day), (day 11: 2.5 eggs/♀/day) and (day 12: 1.93 eggs/♀/day) on Bartamoda, Sewi and Zaghlol, respectively. After that, egg production decreased gradually. The highest survival rate of females was 0.8% on Sewi at 30°C, while lowest value was 0.65% on Zaghlol at 35°C.

These results are in accordance with that of Al-Sweedy *et al.* (2006) who found that, at 35°C, daily egg production started on the second day and reached a peak (3.95 eggs) on the fourth day. At 20, 25, 30 and 35°C, the total reproduction rate by females was 12.58, 17.80, 19.5 and 21.74, respectively, and the net reproduction rate (R_0) was 12.5, 17.22, 18.68 and 20.05, respectively. The highest mean generation time (T) was 6.04 days at 35°C. The highest rate of intrinsic increase in population (r_m= 0.496) occurred at 35°C, and the doubling time of population was 1.40 at 35°C. In Tunisia, the intrinsic rates of natural increase (r_m), net reproductive rates (R_0) and the survival rates of immature stages of *O. afrasiaticus* on the host plants performs better on 'Deglet Noor' fruits while the lowest r_m was on the 'Alig' variety (0.103 day) (Ben Chaaban *et al.,* 2011).

The intrinsic rate of increase (r_m) was highest on sorghum leaves (0.171) and 'Deglet Noor' fruits (0.166), and lowest on 'Alig' fruits (0.103) (Ben Chaaban *et al.,* 2012). On the biology of *O. afrasiaticus* the maximum values of r_m, R_0 and λ were obtained at 35°C-and 30% R.H. on the three targets, while mean generation time (T) and generation doubling time (DT) values decreased with temperature increase and RH decrease. *O. afrasiaticus* favored high temperature and low RH. The daily age-specific survival rate was highest at 25˚C and decreased as the temperature increase on three date palm stages. The maximum number of eggs was produced on Kamry stage at 35˚C-30% RH (at day 14 as 3.08 eggs/ ♀/day). Also Kamry stage was the favorable followed by Yellow Khelal then inner frond (Elhalawany, 2013).

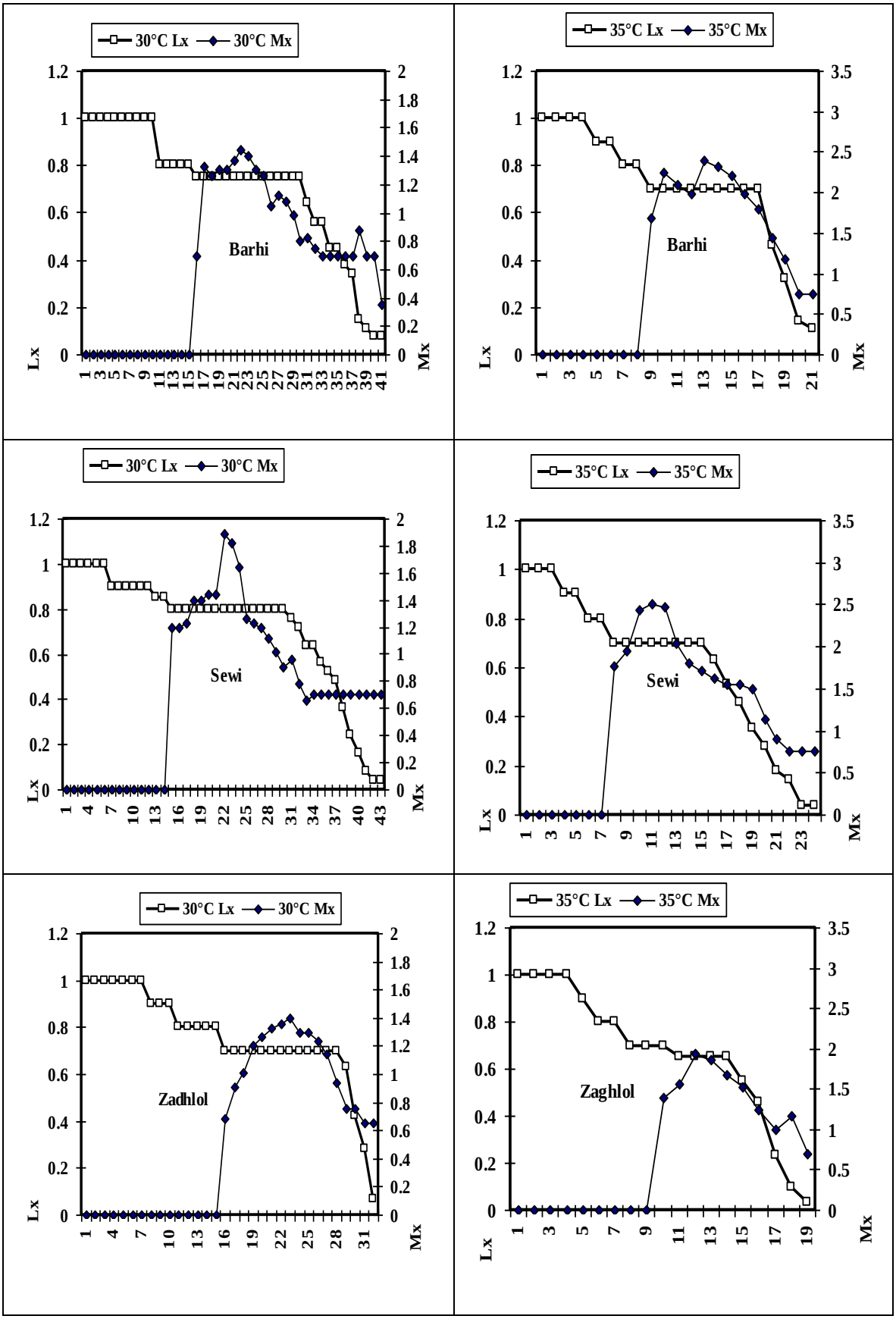

Fig. 1: Age specific survivorship (lx) and age specific fecundity (m_x) for *O. afrasiaticus* on date palm verities and two different temperatures.

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ARABIC SUMMARY

الجوانب البيولوجية لحلم غبار النخيل *Oligonychus afrasiaticus* (McGregor) (Acari: Tetranychidae) على سعف ثلاثة أصناف من النخيل

أشرف سعيد الحلوانى، نجلاء فتحى أحمد، أحمد ابراهيم عامر
معهد بحوث وقاية النباتات- مركز البحوث الزراعية- الدقى -الجيزة – مصر

لسنوات عديدة كان حلم غبار النخيل من الآفات ذات الأهمية الاقتصادية على نخيل البلح. تمت دراسة بيولوجية وإعداد جداول الحياة لحلم غبار النخيل على سعف ثلاثة أصناف من النخيل: بارتمودا (الجاف)، السيوى (نصف الجاف)، الزغلول (الرطب) تحت ظروف المعمل على درجتين من الحرارة ٣٠، ٣٥°م ورطوبة نسبية ٦٠± ٥٪ وفترة إضاءة ١٦ ساعة. تشير النتائج إلى أنه تم تسجيل أطول فترة وضع البيض وفترة حياة الطور الكامل لحلم الغبار عند درجة حرارة ٣٠°م (٢٢,٥، ٢٦,٩ يوما) على صنف السيوى، وأقصرها عند درجة حرارة ٣٥°م (٦,٩، ١٠,٠ أيام) على صنف الزغلول. زادت الخصوبة للإناث عند انخفاض درجة الحرارة من ٣٠,٥، ٣٧,٤٥، ٢٥,٥ بيضة/ أنثى عند درجة حرارة ٣٠° م إلى ٢٧,٨، ٢٩,١٠، ١٠,٩٤ بيضة / أنثى عند درجة حرارة ٣٥° م على أصناف البارتمودا والسيوى والزغلول على التوالي. كان أقل وأعلى معدل للزيادة الذاتي (r_m) ٠,١٠٧، ٠,٢٢٩ فرد/ أنثى/ يوم على درجة حرارة ٣٠، ٣٥° م على صنف الزغلول والسيوى على التوالي. انخفضت فترة الجيل (T) بدرجة كبيرة من ٢٣,٦، ٢٢,٤، ٢٢,٧٦ يوما إلى ١٣,٠٨، ١١,٩، ١٢,٢٦ يوما عند ارتفاع درجة الحرارة من ٣٠° م إلى ٣٥° م على أصناف البارتمودا والسيوى والزغلول على التوالي. تشير نتائج هذا البحث إلى أن حلم الغبار يزداد بسرعة عند التربية على سعف النخيل السيوى والبارتمودا أكثر من الزغلول.