RESULTS AND DISCUSSION

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(1) Phytophagous mites:

Members of the families Tetranychidae; Tenuipalpidae and Eriophyidae are plant feeders of considerable economic importance. Of these, 7 mite species belonging to 7 genera and 3 families were survived (Table 1):

Family-Tetranychidae Donnadieu:

Two species representing the family Tetranychidae were recorded. The mite date palm *Oligonychus afrasiaticus* (McGregor), was collected in high numbers all over the country. This species feeds along the midrib on the lower surface of leaves, causing yellowish patches at the points of attack. Feeding on dates produces scar tissue on date skin, causing it to harden, crack and shrivel with subsequent reduction in the grade of the fruit. Population on mites begins to increase in June and peak in July and August. Number of this species generally decreases during winter. Adults become deep green, while over wintering forms are bright green. Mites live during the cooler winter months on grasses.

The date palm leaf brown mite *Eutetranychus orientalis* (Klein) causes injury to leaf date palm. Feeding by this species on the upper leaf surface produces a mulitude of gray spots, which give leaves a chlorotic appearance. Infested leaves weaken and finally drop. *E. orientalis* was recorded from Giza, Fayoum, Matroh. El-Wadi El-Gaded, Sinai and Aswan Governorates in moderate numbers on leaves of date palm.

Table (1) Incidence of phytophagous mites collected from date palm.

Families	Species	Governorates	Habitat and abundance
Tetranychidae	*Oligonychus afrasiaticus* (McGregor)	All Governorates, which planted, date palm.	Lower surface of leaves +++ - fruit +++
	Eutetranychus orientalis (Klein)	Giza, Fayoum, Matroh, El-Wadi Elgadid, Sinai and Aswan	Leaves ++
Tenuipalpidae	*Raoiella indica* (Hirst)	All Governorates, which planted, date palm.	leaves ++ Fruit +++
	Brevipalpus phoenicis (Geijskes)	Lower Egypt Governorates	Leaves +++
	Phyllotetranychus aegypticus (Sayed)	All governorates	Leaves +++
Eriophyidae	*Mackiella phoenicis* (Keifer)	Beheira; Alexandria and Kafr El-Sheikh	Leaves +++ Buds +++
	Retracrus johnstoni Keifer	All governorates	Leaves +++

+++ High population ++ Moderate population + Low population

Family Tenuipalpidae Berlese

The incidence of date mite, *Raoiella indicae* Hirst was recorded in high numbers on date in all Governorates which planted date palm. While, it was observed in lower number on leaves of date palm. This species is generally abundant on date palm from September to March, except when heavy rains occur during November to January. Starting in April, there is normally a decline in population, which is continuous through August. Date palm red flat mite *Brevipalpus phoenicis* (Geijskes), infests leaves, shoots, bunches and fruits. It prefers the lower surface around the midrib or any places which are protected. By sucking the plant sap, the injured areas become pale then change to rusty brown. When infestation is heavy, the leaves become dry and fall off and brownish areas appear on the fruits of dates. This species was found in high numbers on leaves of date palm in Lower Egypt.

The incidence of date mite, *Phyllotetranychus aegypticus* Sayed was observed in high number on leaves of date palm, allover Governorates which planted the date palm in Egypt. Injury to trees by this mite appears as a reddening of the upper surface of the leaf. The reddened area may be either a small blotch or many such blotches that often complete the entire leaf surface, eventually resulting in complete defoliation of the affected trees. Heavy mite infestations produce sufficient webbing. High temperature and limited rainfall favour mite development.

Family-Eriophyidae Nalepa:

Two species representing the family Eriophyidae were found. Date palm bud mite *Mackiella phoenicis* Keifer and *Retracrus johnstoni* Keifer, occurs on date palm in folds in emerging fronds and buds. Also, this mite causes malformation for old fronds of date palm, then the leaves become dry and fall off.

M. phoenicis was found in high numbers on old fronds and buds in Beheira, Alexandria, Kafr El-Sheikh Governorates.

The incidence of mite, *Retracrus johnstoni* Keifer causes black blotches on the undersides of fronds. The mite secretes amount of waxy covering, which is usually scattered, on the black blotches of the host. This acarine lower surface defaces the fronds of a palm. *R. johnstoni* is an important pest on date palm. This species was observed in all governorates in Egypt in high numbers on leaves of date palm.

(2) Predaceous mites:

Seven species of predaceous mite belonging to 6 genera and 5 families were recorded Table (2), these are:

Family-Phytoseiidae Berlese:

Members of the family Phytoseiidae are usually, expected to be found associated with both mites and insects infestation; **Yousef and El-Halawany (1982); Yousef *et al.* (1984); Kandeel *et al.* (1994) and Abdel-Samad *et al.* (1996).**

Amblyseius swirskii (A-H) was recorded in high number associated with phytophagous mites, scale insects and bugs in all

date palm orchards in Egypt. *Amblyseius cydnodactylon* Shehata and Zaher was found in moderate number on seedling palm in Governorates of Lower Egypt.

Family-Stigmaeidae Oudemans:

Zaher and El-Badry (1962); Yousef and Shehata (1971); El-Halawany and El-Naggar (1984); Yousef (1990) and Abou-Awad and El-Sawi (1993), indicated that members of the family *Stigmaeidae* are associated with phytophagous mites and insects infestations.

Table (2): Incidence of predaceous mites collected from date palm.

Families	Species	Governorates	Habitat and abundance
Phytoseiidae	*Phytoseius plumifer*	All Governorates	Leaves +++
	Amblyseius swirskii (A-H)		
	Amblyseius cydnodactylon (Shehata and Zaher)	Lower Egypt	Leaves ++
Stigmaeidae	*Agistemus exsertus* (Gonzalez)	All Governorates	Leaves +++
Eupalopsellidae	*Saniosulus nudus* (Summers)	All Governorates	Leaves +++
Cheyletidae	*Cheletogenes ornatus* (C. and F.)	All Governorates	Leaves +++
Hemisarcoptidae	*Hemisarcoptes malus* (Shimer)	All Governorates	Leaves ++

+++ High population ++ Moderate population + Low population

Agistemus exsertus Gonzalez seemed to be the most important stigmaeid mite on date palm trees occurring in all orchards in Egypt. It was recorded in high number.

Family-Eupalopsellidae Willmann:

Saniosulus nudus Summers was found in high number associated with scale insects, in all date palm orchards; **Yossef and Shehata (1971).**

Family-Cheyletidae

A single species, *Cheletogenes ornatus* (C & F) was observed with phytophagous mites and scale insects infestation. It was found in high numbers in all Governorate, which planted date palm.

Family – Hemisarcoptidae:

Hemisarcoptes malus Shimer was found in moderate numbers with scale insects allover Egypt.

Table (3): Incidence of mites of uncertain feeding behaviour collected from date palm trees *Phoenix dactylifera* and soil in some governorates of lower Egypt during the period (June 1999 to May 2001).

Families	Species	Governorates	Habital and abundance
Tarsonemidae	*Tarsonemus stifer* (Ewing)	All Governorates	Leaves +++
	Tarsonemus smithi (Ewing)	All governorates	Leaves ++
	Tarsonemus noxius (Humic)	Sidy Kreir, Alex.	Debris ++
Tydeidae	*Tydeus californicus* (Banks)	All Governorates	Leaves +++
	Pronematus ubiquitus (McGregor)	Sidy Kreir, Alex.	Leaves ++ - debris ++
Acaridae	*Tyrophagous putrescentiae* (McGregor)	All Governorates	Leaves +++ - fruit +
	Calogylyphus redikorzevi (Zach.)	Sidy Kreir, Alex.	Debris +++
	Rhizoglyphus robini (Claparede)	Toukh, Qalubiya	Debris +
Scutacaridae	*Heterodispus elongatus* (Jac.)	All governorates	Soil +
Microdispidae	*Brennandania silvestris*	All governorates	Soil ++
	Bakerdania pectiniger (Mahunka)	All governorates	Soil ++
Oribatidae	*Siculobata sicula* (Grandjean)	Toukh, El-Kanater El-Khairia, Qalubiya	Leaves ++
	Zygoribatula sp.	Toukh, Qalubiya	Buds +
	Scheloribates sp.	Toukh, Shebeen El-Kanater, Qalubiya	Debris +

+++ High population ++ Moderate population + Low population

Mites of uncertain feeding habits

The feeding behaviour of this group of mites is unknown. It needs further studies to estimate their role. Mites of uncertain food were collected from inhabiting date palm orchard trees. 14 species belonging to 12 genera and 8 families were recorded Table (3).

1. Family: Tarsonemidae Kramer:

Two tarsonemid species of mites were recorded, *Tarsonemus setifer* was observed with moderate numbers in buds of date palm trees and in debris under date palm trees in Toukh district, Qalubyia governorate and Sidy Kreir district, Alexandria governorate. The mite, *Tarsonemus noxius* Humic. was collected with moderate numbers in debris under Soltani and Adsi date palm trees in Sidy Kreir district, Alexandria governorate.

2. Family: Tydeidae Kramer:

Two tydeid species were recorded, *Tydeus californicus* was found with few numbers, on leaves and in debris of date palm trees in Sidy Kreir district, Alexandria governorate. *Pronematus ubiquitus* was observed with moderate numbers on leaves and in debris of date palm trees in Sidy Kreir district, Alexandria governorate.

3. Family: Acaridae Leach:

Three acarid species were recorded, *Caloglyphus redikorzevi* (Zach.) was collected with high numbers in debris under date palm *Rhizoglypus robini* Claparede and *Tyrophagus purescentiae* Schrank in Sidy Kreir district, Alexandria

governorate. *Rhizoglyphus robini* Claparede was observed with few numbers in debris in Toukh district, Qalubyia governorate. *Tyrophagus putrescentiae* schrank, was collected in moderate numbers on leaves and branches and also was found in soil under date palm of all visited governorates of lower Egypt in July and August.

4. Family: Scutacaridae:

The mite, *Heterodispus elongatus Jacot,* was collected in soil under date palm with low numbers in Qalubyia governorate in August 1999 and 2000.

5. Family: Microdispidae:

The two species, *Bakerdania pectiniger* Mahunka and *Brennandania silvestris,* were found in soil under apple trees with moderate numbers in Behera; Alexandria; Kafr-El-Shekh; Sharkia and Damiata in Egypt in August and September 2000 and 2001.

6. Family: Oribatidae Jacot:

The two mite species, *Zygoribatula tadrosi* Popp., and *Siculobata sicula* (Berlese), were found in association with branches and soil date palm trees, in all visited governorate (Behera; Alexandria; Kafr-El-Shekh; Sharkia, Damiata, Giza, Fayoum, Matroh, El-Wadi Elgadid, Sinai and Aswan), the former from August to December and the second mite from August to November.

Previous studies undertaken in different parts of the world indicated the presence of some of these uncertain feeding

behaviour mites on deciduous trees **(Baker and Wharton (1952); Zaher and Shehata (1963); Oatman (1963); El- Deeb et al. (1965); Soliman (1966); Abd El-Hafiez (1974); EL-Halawany et al. (1986); Momen and EL-Bagoury (1994).**

B. Population dynamics of mites:

1. Population fluctuation of phytophagous mites occurring with date Palm trees:

The seasonal abundance of phytophagous mites occuring with *Phoenix dectylifera* on date plam trees at Shebin El-Kanater district Qalubya Governorate was studied.

This locality was visited twice every month during the period from June 1999 to May 2001. The seasonal abundance of mites was determined by calculating the average monthly numbers at that locality. The monthly average numbers of collected mites are given in Tables (1, 2 and 3). These data are represented graphically in figures (1, 2, 3, 4, 5, 6, 7, 8, 9 and 10), where logarithm of monthly number of mites per 30 fronds is plotted for each month of the two successive years.

Thus, the monthly average numbers, temperature and relative humidity are given in the same tables and these are represented graphically in the same figures.

2. Population fluctuation of eriophid mite, *Mackiella phoenicis* Keifer.

Data in Tables (4 & 5) and Figs. (1 & 2) clearly demonstrated that *M.phoenicis* has one annual peak of seasonal

abundance in September during the two successive years of this study. This species appears in spring (April), then increased in number in the summer months and reached a maximum of 960 and 1020 motile stages in September 1999 and 2001 at monthly average temperature of 33.9 and 33.7°C and 85.0 and 80.0% R.H., respectively. A significant positive correlation was found between the monthly average temperature and abundance of *M. phoenicis*. The number of collected mites decreased gradually in winter months, where it disappeared in January, February and March at monthly average temperature of 19.1, 20.2 and 20.9°C, respectively, and relative humidity 56.0, 64.0 and 62.0%, respectively, in the first year of study 2000, respectively. The monthly average temperature was 21.8, 16.8 and 22°C and relative humidity was 59, 66 and 65% during the second year of the study 2001, respectively. Results obtained from this work clearly demonstrated that relative humidity has significant effect on *M. phoenicis* populations.

These results were in agreement with **Kozlowski. J. (1983); Gonzalez (1985); EL-Halawany et al. (1986); Injac et al. (1988); Meyer (1990); Heikal et al. (1996); Patternotte (1998); Navia and Flechtnamn (2000); and Ebrahim et al. (2001).**

Table (4) : The monthly average number of collected *Mackeilla phoenicis Keifer* motile stages at Shebin El-Kanater Qalubiya Governorate from June 1999 to May 2000.

Months	Motile stages	Monthly average temperature	Monthly average relative humidity %
June 1999	625	33.5	48.0
July	740	34.5	81.0
August	830	35.4	85.6
September	960	33.9	85.0
October	450	29.9	84.0
November	100	28.0	71.0
December	33	22.6	67.0
January 2000	0	19.1	56.0
February	0	20.2	64.0
March	0	20.9	62.0
April	100	29.7	73.0
May	330	32.5	74.0

Correlation coefficient values		
Motile stages	+ 0.866	+ 0.887
Tabulated r at 5%	0.576	

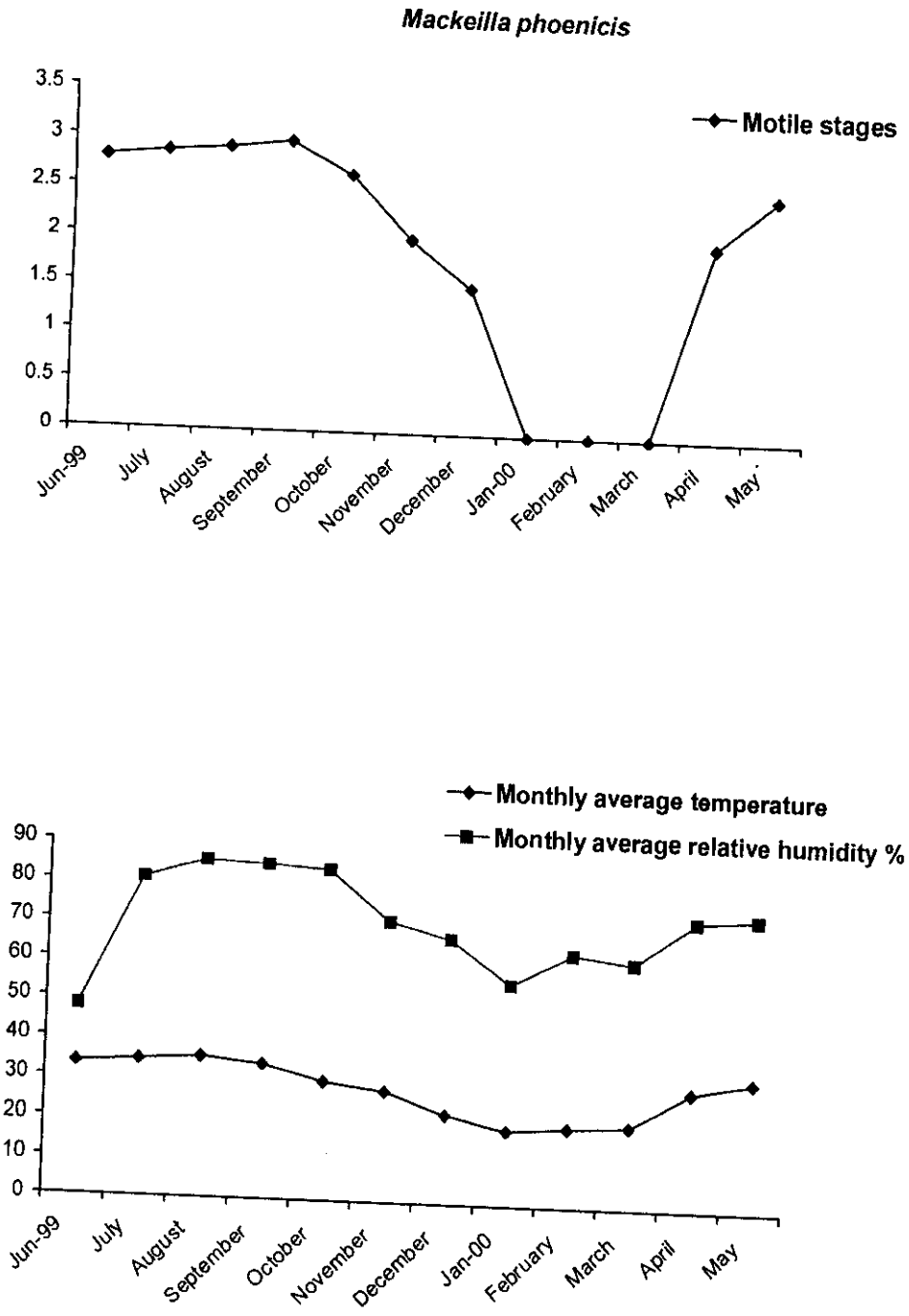

Fig (1) Population dynamics of Eriophyid mite *Mackeilla phoenicis* on date palm at Shebin El-Kanater Qalubiya governorate (Upper portion). Lower of graph represents month averages of temperature and relative humidity from June 1999 to May 2000.

Table (5) : The monthly average numbers of collected *Mackeilla phoenicis Keifer* motile stages at Shebin El-Kanater Qalubiya Governorate from June 2000 to May 2001.

Months	Motile stages	Monthly average temperature	Monthly average relative humidity %
June 2000	510	35.4	80.0
July	750	35.3	85.0
August	885	34.6	88.0
September	1020	33.7	80.0
October	450	32.6	83.0
November	210	26.5	74.0
December	60	27.0	65.0
January 2001	0	21.8	59.0
February	0	16.8	66.0
March	0	22.0	65.0
April	180	33.3	70.0
May	290	32.8	77.0

Correlation coefficient values

Motile stages	+ 0.754	+ 0.871
Tabulated r at 5%	0.576	

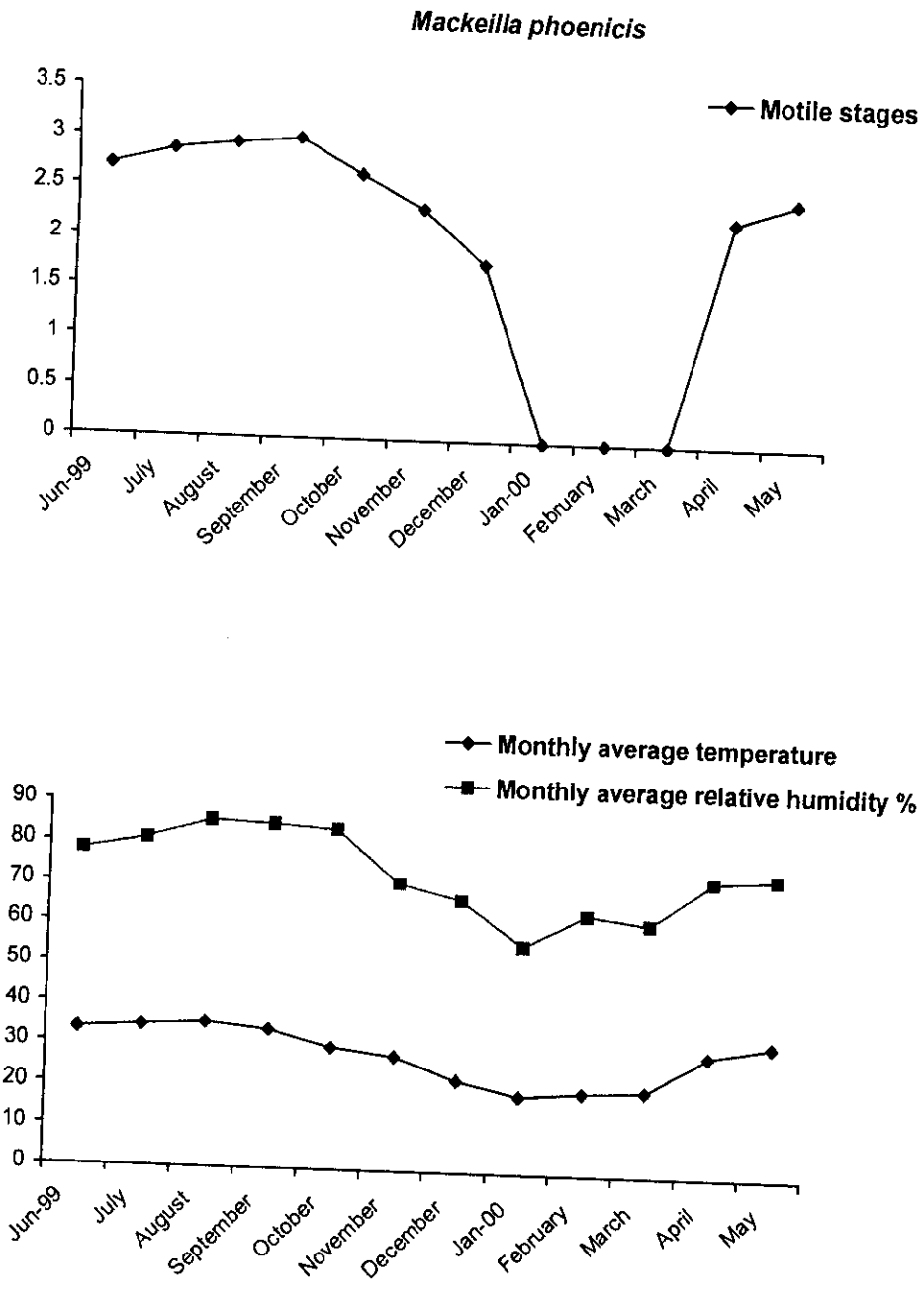

Fig (2) Population dynamics of Eriophyid mite *Mackeilla phoenicis* on date palm at Shebin El-kanater Qalubiya governorate. Lower portion of graph representsmonthly averages of temperature and relative humidity from June 2000 to May 2001.

3. Population fluctuation of tenuipalid mite, *Raoiella indica Hirst:*

The studies were conducted throughout two consecutive years (June 1999 to May 2001) on fronds at Shebin district, Qalubiya governorate. Data in Tables (6 & 7) and Figs. (3 & 4) illustrated that the tenuipalid mite, *R. indicae,* has one annual peak of seasonal abundance in August during the two successive years of this study. *R. indicae* began to appear in few numbers on fronds in March, increasing gradually from April to August reaching a peak of 185 and 230 mites per 20 fronds in August 1999 and 2001. The monthly averages in temperature were 35.4 and 34.6°C and in relative humidity 85.6 and 88.0%, respectively.

In January and February, the mite species was not detected during two successive years of this study. Statistical data showed that the mite population of *R. indicae* was positively correlated with temperature while the relative humidity had no effect during June 1999 till May 2001.

The data obtained from Tables (6 & 7) and Fig. (2) showed that *R. indicae* eggs have one annual peak of seasonal abundance in August 1999 and 2000. The monthly averages in numbers of collected eggs were 190 and 210 eggs in August 1999 and 2001, respectively.

Table (6) : The monthly average numbers of collected *Raoiella indica Hirst* egg and motile stages at Shebin El-Kanater Qalubiya Governorate from June 1999 to May 2000.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 1999	146	140	33.5	78
July	161	170	34.5	81.0
August	185	190	35.4	85.6
September	81	100	33.9	85.0
October	66	70	29.9	84.0
November	52	50	28.0	71.0
December	25	10	22.6	67.0
January 2000	0	0	19.1	56.0
February	0	0	20.2	64.0
March	10	5	20.9	62.0
April	30	20	29.7	73.0
May	90	75	32.5	74.0

Correlation coefficient values

Motile stages	+ 0.995	+ 0.881
Egg stage	+ 0.879	+ 0.820
Tabulated r at 5%	0.576	

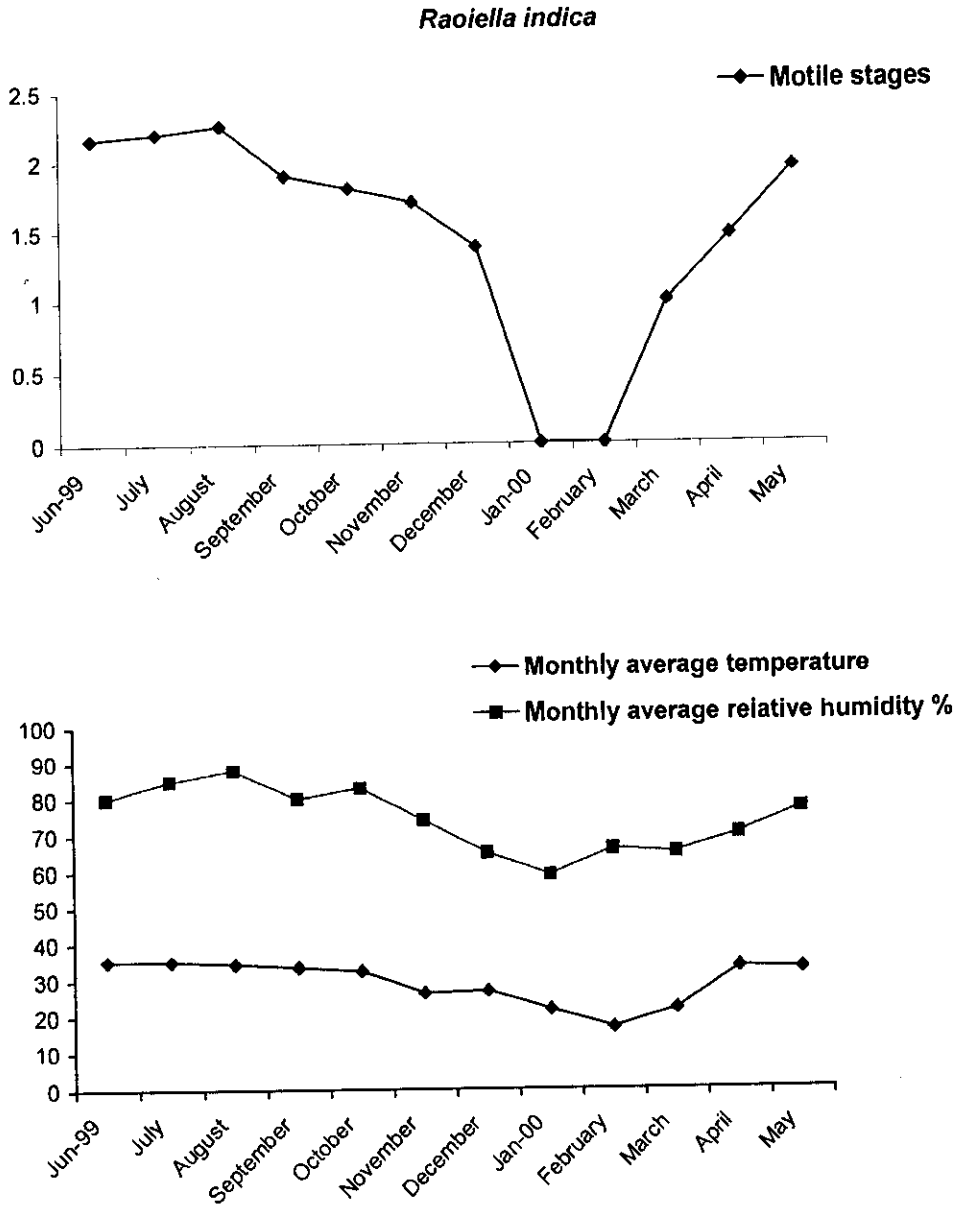

Fig (3): Population dynamics of flat mite *Raoiella indica* on date palm at Shebin El-kanater Qalubiya governorate. Lower portion of graph represents monthly averages of temperature and relative humidity from June1999 to May 2000.

Table (7) : The monthly average numbers of collected *Raoiella indica Hirst* eggs and motile stages at Shebin El-Kanater Qalubiya Governorate from June 2000 to May 2001.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 2000	220	200	35.4	80.0
July	225	180	35.3	85.0
August	230	210	34.6	88.0
September	200	200	33.7	80.0
October	205	185	32.6	83.4
November	190	100	26.5	74.0
December	150	120	27.0	65.0
January 2001	77	85	21.8	59.0
February	0	0	16.8	66.0
March	0	0	22.0	65.0
April	51	66	33.3	70.0
May	119	130	32.8	77.0

Correlation coefficient values

Motile stages	+ 0.840	+ 0.760
Egg stage	+ 0.743	+ 0.693
Tabulated r at 5%	0.576	

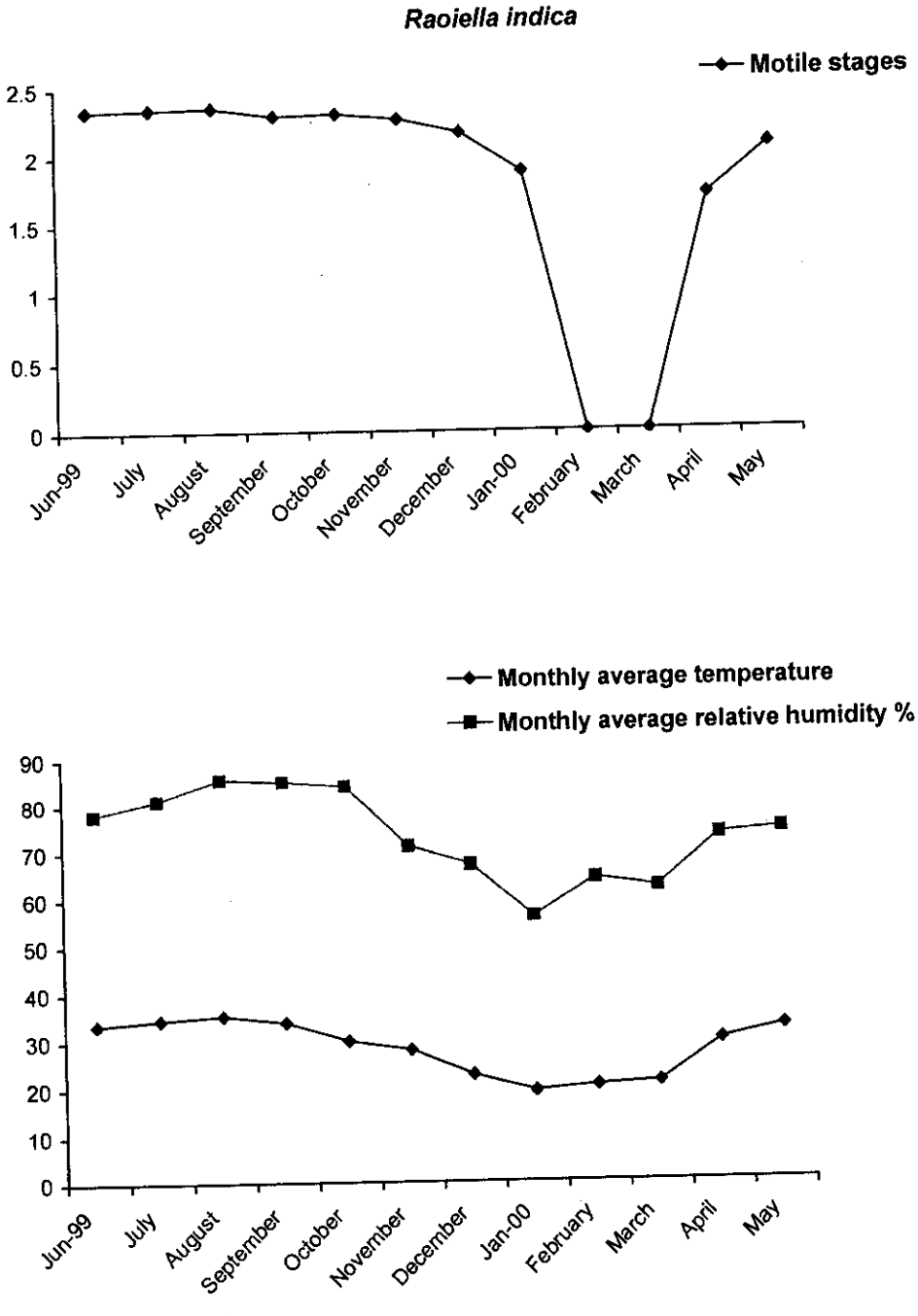

Fig. (4): Population dynamics of flat mite *Raoiella indica* on date palm at Shebin El-kanater Qalubiya governorate. Lower portion of graph represents monthly repres averages of temperature and relative humidity from June 2000 to May 2001.

4. Population fluctuation of the Tetranychid *Oligonychus afrasiaticus McGregor :*

Data in Tables (8 & 9) and Figs. (5 & 6) illustrated that *O. afrasiticus* has one annual peak which was recorded in October during two successive years. The monthly average numbers of individuals was 814 and 720 mites in October 1999 and 2000.

The monthly averages of temperature prevailed at that time were 29.9 and 32.6°C and the relative humidity was 84 and 83.4%. No individual of *O. afrasiticus* could be detected in January and February during two successive years.

A significant positive correlation between the population density of *O. afrasiticus* and temperature was obtained. The relative humidity had a significant positive correlation on mite population during the period June 1999 to May 2001. Also, eggs of *O. afrasiticus* had one annual peak in October during two successive years as that occurred in case of the population of moving stages. There was a significant positive correlation between the monthly averages in numbers of eggs and temperature but there was a positive significant difference between the population density of eggs of *O. afrasiticus* and relative humidity during the period of this study. Similar results were obtained by **Zaher and Osman (1970); Bano and Chandra (1993); Sadana and Cahnder (1973); Gerson (1986); Gutierrez and Etienen (1986); Momen and EL-Bagoury (1994) and Zaman and Maiti (1994).**

Table (8): The monthly averages in numbers of collected *Oligonychus afrasiaticus McGregor* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 1999 to May 2000.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 1999	460	390	33.5	78
July	470	450	34.5	81.0
August	500	420	35.4	85.0
September	651	380	33.9	85.0
October	814	550	29.9	84.0
November	420	240	28.0	71
December	100	86	22.6	67
January 2000	0	0	19.1	56
February	0	0	20.2	64
March	50	80	20.9	62
April	200	240	29.7	73
May	300	340	32.5	74

Correlation coefficient values		
Motile stages	+ 0.936	+ 0.791
Egg stage	+ 0.903	+ 0.937
Tabulated r at 5%	0.576	

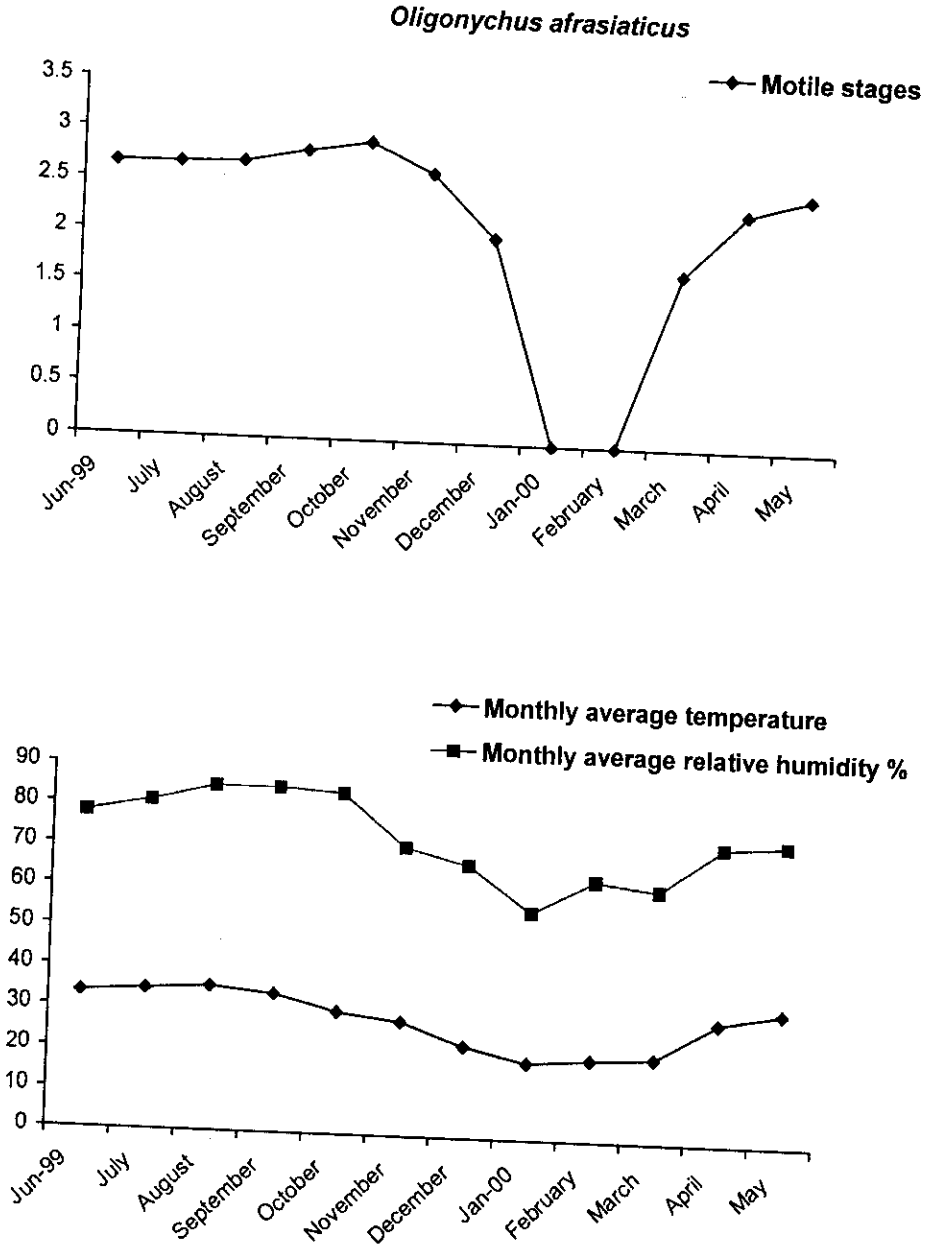

Fig. (5): Population dynamics of *Oligonychus afrasiticus* on date palm at Shebin El-Kanater Qalubiya governorate. Lower portion of graph represents monthly reprse averages of temperature and relative humidity from June 1999 to May 2000.

Table (9) : The monthly average numbers of collected *Oligonychus afrasiaticus McGregor* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 2000 to May 2001.

Months	Motile stages		Monthly average temperature	Monthly average relative humidity %
	Motile stages	Egg stage		
June 2000	300	450	35.4	80.0
July	380	475	35.3	85.0
August	400	525	34.6	88.0
September	550	500	33.7	80.0
October	720	620	32.6	83.4
November	460	400	26.5	74.0
December	170	110	27.0	65.0
January 2001	0	0	21.8	59.0
February	0	0	16.8	66.0
March	50	100	22.0	65.0
April	200	230	33.3	70.0
May	210	225	32.8	77.0

Correlation coefficient values		
Motile stages	+ 0.938	+ 0.670
Egg stage	+ 0.804	+ 0.925
Tabulated r at 5%	0.576	

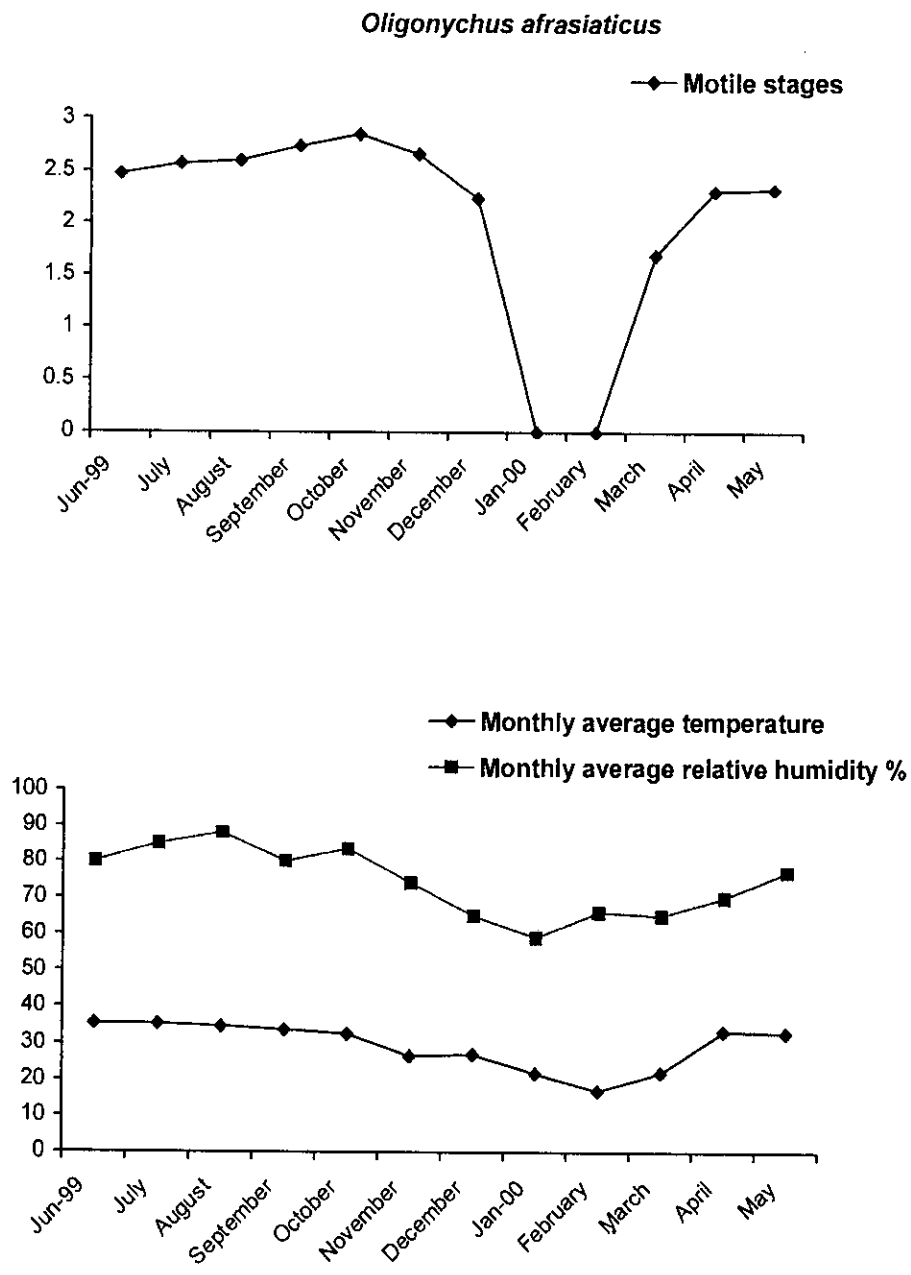

Fig. (6): Population dynamics of *Oligonychus afrasiticus* on date palm at ShebinEl-kanater Qalubiya governorate. Lower portion of graph represents monthly represe averages of temperature and relative humidity from June 2000 to May 2001.

5. Population fluctuation of *Phyllotetranychus aegypticus* Sayed:

Data in Tables (10 & 11) and Figs. (7 & 8) showed that *P. aegypticus* has two annual peaks of seasonal abundance during the two successive years of this study. During in the first year, this species had two annual peaks of abundance in population density of eggs abd moving stages in June and October 1999. The monthly averages in numbers of collected mites were 520 and 430 motile stages, while those of collected eggs were 350 and 360 eggs, respectively. The monthly averages of temperature were 33.5 and 29.9C and relative humidity 78.0 and 84.0%, respectively. Also, in the second year, *P. aegypticus* had two peaks of seasonal abundances for population density of motile stages and eggs, one in June 2000 and the other in October 2000 with the average numbers of 630 and 550 motile stages and 340 and 370 eggs at the monthly averages of temperature 35.4 and 32.6°C and the relative humidity 80 and 83.4%, respectively. Statistical data presented in Tables (10 and 11), showed that the mite populations of *P. aegypticus* were positively correlated with temperature and the relative humidity during two successive years.

Table (10): The monthly average numbers of collected *phyllotetranychus aegypticus Sayed* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 1999 to May 2000.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 1999	520	350	33.5	78
July	230	260	34.5	81.0
August	240	240	35.4	85.6
September	260	230	33.9	85.0
October	430	360	29.9	84.0
November	180	100	28.0	71.0
December	90	50	22.6	67.0
January 2000	0	0	19.1	56.0
February	0	0	20.2	64.0
March	0	0	20.9	62.0
April	105	90	29.7	73.0
May	300	186	32.5	74.0

Correlation coefficient values

Motile stages	+ 0.953	+ 0.771
Egg stage	+ 0.841	+ 0.879
Tabulated r at 5%	0.576	

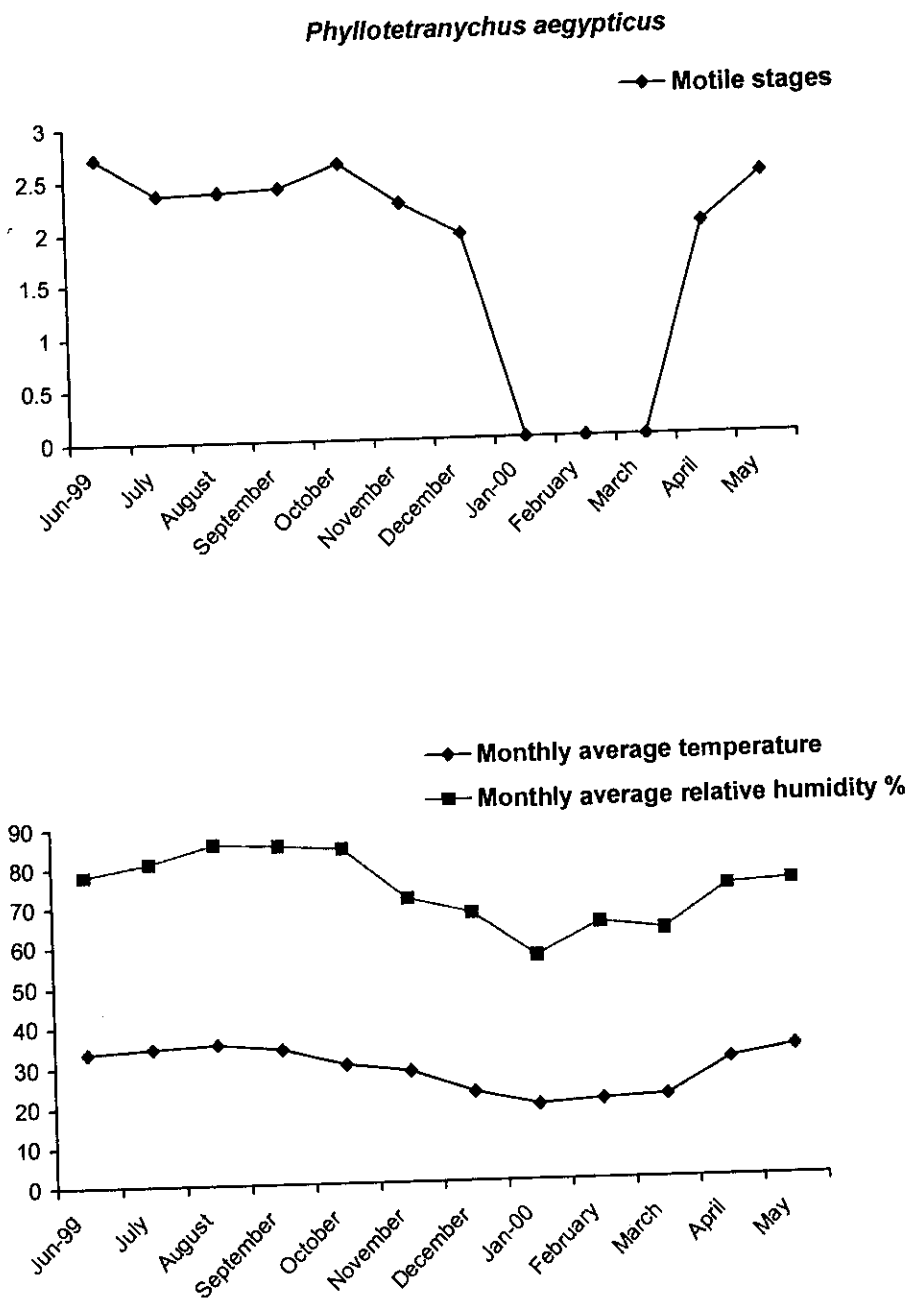

Fig. (7): Population dynamics of Tenuipalpid mite *Phyllotetranychus aegypticus* on date palm at Shebin El-Kanater Qalubiya governorate. Lower portion of graph represents monthly averages of temperature and relative humidity from June 1999 to May 2000.

Table (11) : The monthly average numbers of collected *phyllotetranychus aegypticus Sayed* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 2000to May 2001.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 2000	630	340	35.4	80.0
July	360	280	35.3	85.6
August	380	200	34.6	88.0
September	390	205	33.7	80.0
October	550	370	32.6	83.4
November	200	250	26.5	74.0
December	210	125	27.0	65.0
January 2001	0	0	21.8	59.0
February	0	0	16.8	66.0
March	0	0	22.0	65.0
April	80	160	33.3	70.0
May	320	230	32.8	77.0

Correlation coefficient values

Motile stages	+ 0.910	+ 0.797
Egg stage	+ 0.826	+ 0.819
Tabulated r at 5%	0.576	

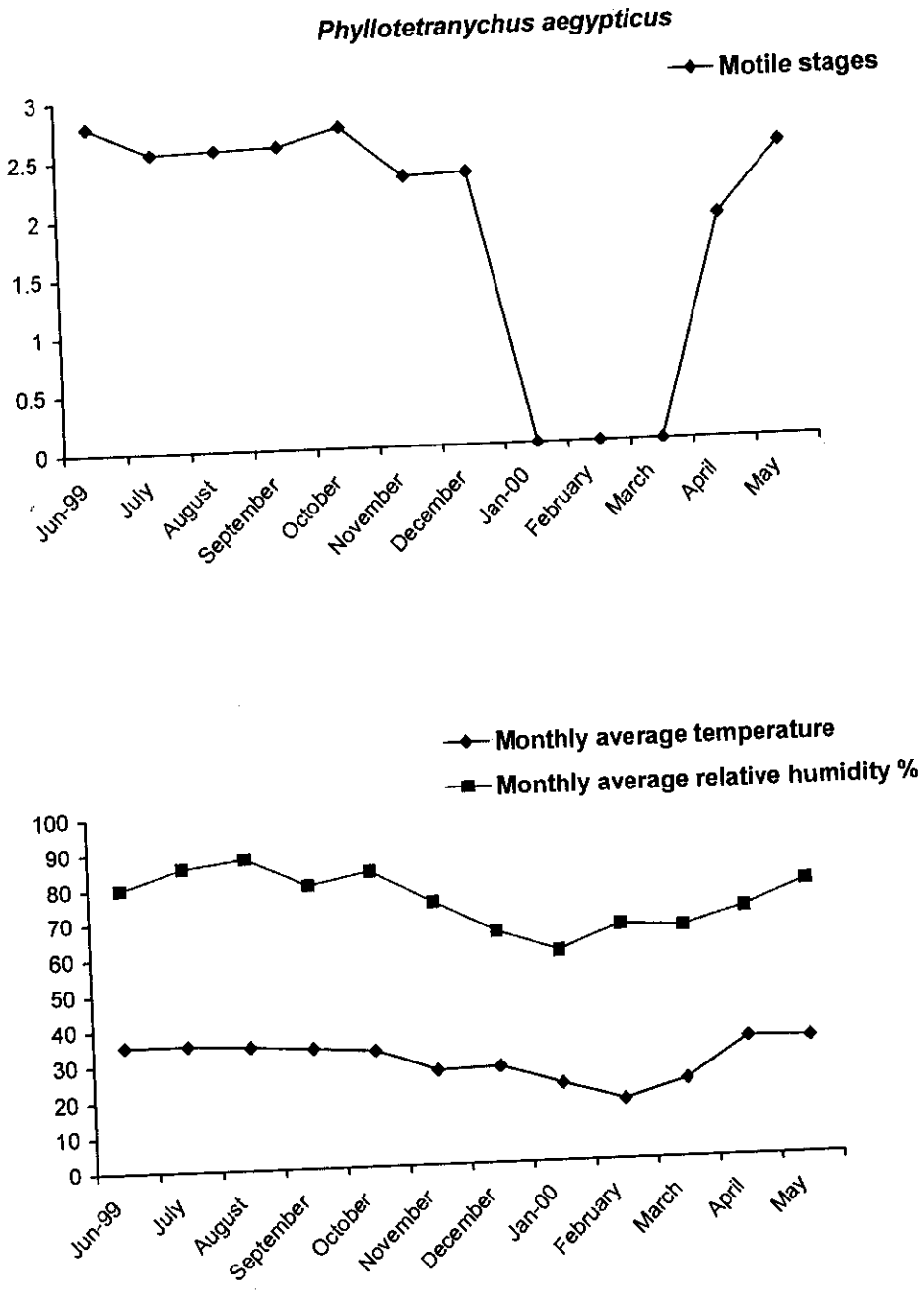

Fig. (8): Population dynamics of Tenuipalpid mite *Phyllotetranychus aegypticus* on date palm at Shebin El-Kanater Qalubiya governorate. Lower portion of graph represents monthly averages of temperature and relative humidity from June 2000 to May 2001.

6. Population fluctuation of *Tydeus californicus* Banks :

The mites prefered inhabiting fronds, usually associated with fungal growths. No mite or egg was collected during the winter months in Egypt (January and February) 1999 and 2000.

The motiles stages appeared in March, those increased gradually reaching the peak of abundance in October 1999 and 2000 during two successive years of study.

Data in Tables (12 & 13) and Figs. (9 & 10) showed that *Tydeus colifornicus* has one annual peak of abundance during the period of study.

The monthly average numbers of collected mites were 1280 and 1340 motile stages, while the average numbers of collected eggs were 770 and 700 eggs in October 1999 and 2000 respectively.

The monthly average temperatures of this month in 1999 and 2000 were 29.9 and 32.6°C and those of relative humidity were 84 and 83.4%, respectively.

A significant positive correlation was found between temperature and the tydeid mite populations. Also, the relative humidity showed significant effect on the population of tydeid moving stages and eggs.

Table (12) : The monthly average numbers of collected *Tydeus californicus (Banks)* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 1999 to May 2000.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 1999	350	260	33.5	78
July	570	385	34.5	81.0
August	740	400	35.4	85.6
September	1170	380	33.9	85.0
October	1280	770	29.9	84.0
November	370	160	28.0	71.0
December	100	110	22.6	67.0
January 2000	0	0	19.1	56.0
February	0	0	20.2	64.0
March	36	25	20.9	62.0
April	100	120	29.7	73.0
May	200	230	32.5	74.0

Correlation coefficient values		
Motile stages	+ 0.917	+ 0.637
Egg stage	+ 0.675	+ 0.852
Tabulated r at 5%	0.576	

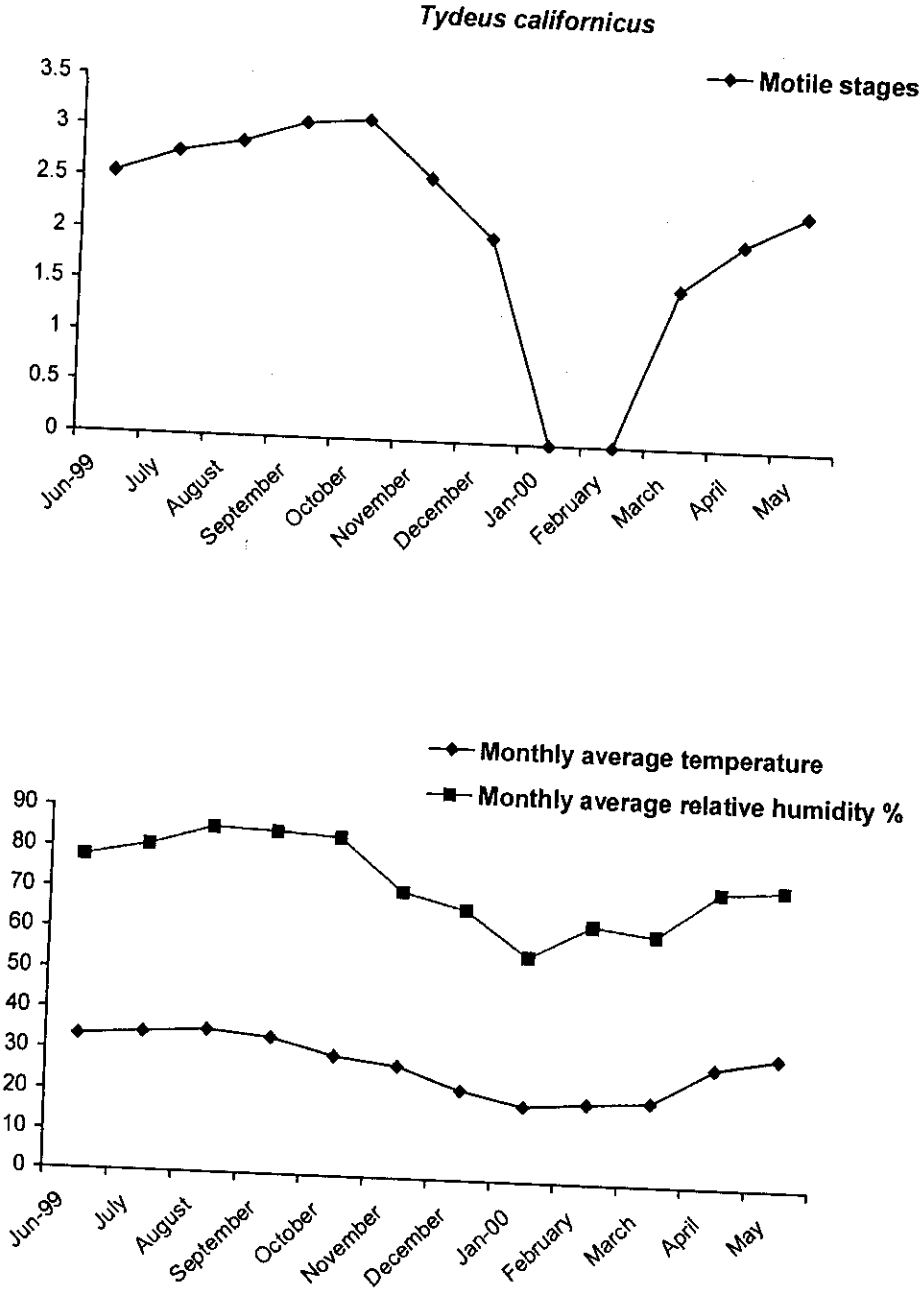

Fig. (9): Population dynamics of *Tydeus californicus* on date palm at Shebin El-Kanater Qalubiya governorate. Upper portion of graph represents monthly averages while the lower shows temperature and relative humidity from June 1999 to May 20(

Table (13) : The monthly average numbers of collected *Tydeus californicus (Banks)* (eggs and motile stages) at Shebin El-Kanater Qalubiya Governorate from June 2000to May 2001.

Months	Motile stages	Egg stage	Monthly average temperature	Monthly average relative humidity %
June 2000	370	250	35.4	80.0
July	580	300	35.3	85.6
August	885	405	34.6	88.0
September	1260	610	33.7	80.0
October	1340	700	32.6	83.4
November	350	260	26.5	74.0
December	200	230	27.0	65.0
January 2001	0	0	21.8	59.0
February	0	0	16.8	66.0
March	130	150	22.0	65.0
April	170	160	33.3	70.0
May	200	190	32.8	77.0

Correlation coefficient values		
Motile stages	+ 0.976	+ 0.557
Egg stage	+ 0.632	+ 0.730
Tabulated r at 5%	0.576	

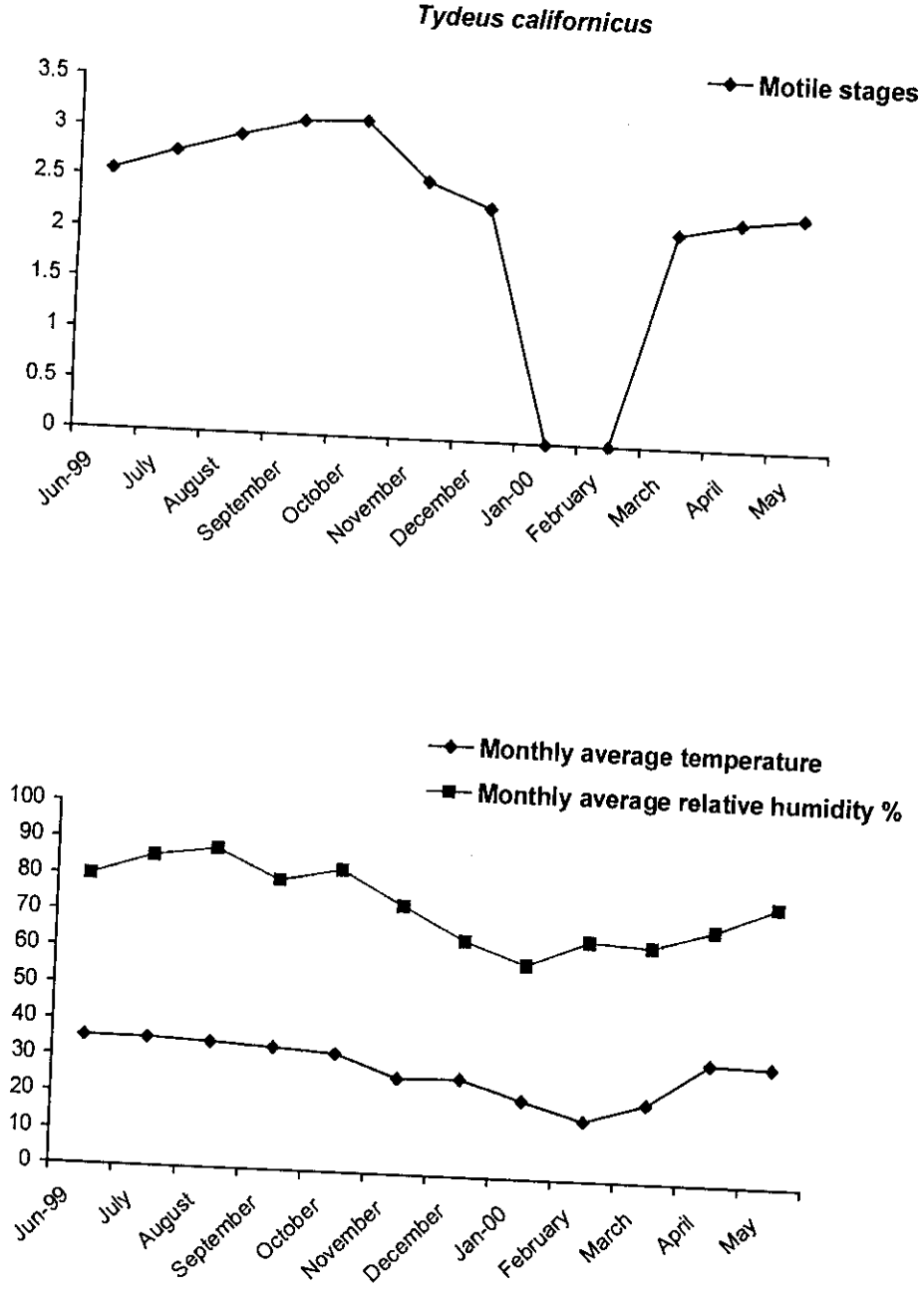

Fig. (10): Population dynamics of *Tydeus californicus* on date palm at Shebin El-Kanater Qalubiya governorate. Lower portion of graph represents monthly averages of temperature and relative humidity from June 2000 to May 2001.

Biological studies :

The duration of the mite *O. afrasiaticus* developmental stages together with its fecundity were recorded on date palm leaves under constant temperature 27 ± 2°C and 75 ± 2% R.H. The incubation period (egg stage) averaged 6.0 ± 0.65 and 5.5 ± 0.40 days for female and male, respectively. The mean durations of larval stage were 2.6 ± 1.7 and 2.3 ± 6.50 days for female and male, respectively.

The mean duration of protonymphal stage was 1.58 ± 0.70 days and 1.30 ± 0.60 for females and males, respectively. Also, the deutonyphal stage duration averaged 2.18 ± 1.02 and 2.0 ± 0.98 days, for females and males, respectively (Table, 14).

Table (14) : Durations in days of different stages of *O. afrasiaticus* at 27 ± 2°C and 75 ± 2% R.H.

Female			Male		
Min.	**Max.**	**Mean ± SD**	**Min.**	**Max.**	**Mean ± SD**
Egg					
5	6.5	6.0 ± 0.65	5	6	5.5 ± 0.40
Larva					
2	5	2.6 ± 1.7	2	4	2.3 ± 0.50
Protonymph					
1	2.5	1.58 ± 0.70	1	2.5	1.30 ± 0.60
Deutonymph					
1	3.5	2.18 ± 1.02	1	3	2.0 ± 0.98

Table (14) shows that the larva and deutonymphal periods were longer than the protonymphal stage of *O. afrasiaticus* The total mean durations of egg and immature stages (developmental time) were 12.36 and 11.1 days for females and males, respectively.

The pre-oviposition, oviposition and post-oviposition periods were 2.5, 20.60 and 3.80 days, respectively.

The generation time for females of *O. afrasiaticus* was 14.86 days. The mean total fecundity (eggs / female) were 22.50 days with a daily rate of 1.48 eggs. Similar results were obtained by **Zaher and Shehata (1971), Flechtmann (1982), Rai et al. (1988), Sirsikar and Nagabhushanam (1989) and Abd Allah (2001)** when reared *O. mangiferus* (Rahman and Sapra) on leaves of Alphons, Taimour and Hindi mango varieties.

Table (15) : Life table parameters of *O. afrasiaticus* McGregor at 27 ± 2°C and 75 ± 2% R.H.

Parameter	Duration (in days)
Developmental time	12.36
Pre-oviposition period	2.5
Oviposition period	20.60
Post-oviposition period	3.80
Generation time	14.86
Mean total fecundity (eggs/ female)	22.50
Daily rate of oviposition	1.48

Effect of biocides vertimec 1.8 % compared with acaricide, kelthane and kz oil against *Oilgonychus afrasiaticus* on date palm *Phoenix dactylifera* under filed conditions:

To minimize the acaricide hazards to environoment, biocide (vertimce 1.8%) was investigated against *Oligonychus afrasiaticus* under field conditions.

The experiment was carried out in a highly infested orchard of date palm trees, with *Oligonychus afrasiaticus* to evaluate the efficiency of vertimec (Abamectin) in comparison with the recommended acaricide kelthane and kz oil in Qalubiya Governorate in 2001.

The rates of application of these compounds were 40cc of vertimec, 250cc of kelthane 18.5% and 1.5 liter of kz oil / feddan. The results in Table (16) showed that, the average percent reduction in mites population after 28 days of treatments were 90.83, 90.30 and 87.77% for vertimec, kelthane and kz oil, respectively.

It was observed that, the biocide vertimec induced almost the same percent reduction of the recommended acaricide kelthane.

Therefore, the biocide vertimec may be recommended to be used instead of the conventional acaricide for its safety to the beneficial species. No phytotoxicity was observed with any treatment.Similar findings were reported by **EL-Halawany and El-Naggar (1984).**

Table (16): Effect of some acaricides against motile stages of *Oligonychus afrasiaticus* McGregor on date palm *Phoenix dactylifera*.

Treatments	Rate of application per / 100 liters of water	Pre-count per 80 leaves	No. of mite individuals / 80 leaves and reduction percentages (R%) after								Arerage reduction (%)
			1 week		2 weeks		3 weeks		4 weeks		
			No	R%	No.	R%	No.	R%	NO.	R%	
Vertemic 1.8%	40 cc	532	12	96.85	36	90.46	20	83.46	12	89.55	90.83
Kelthane 18.5% EC	2.5 cc	460	13	96.01	14	95.70	16	84.69	15	84.89	90.30
Kz oil	1.5 L	412	23	92.20	14	95.20	16	82.91	18	80.77	87.77
Control		440	316	-	312	-	100	-	95	-	-

SUMMARY

SUMMARY

1- During the survey study, 28 species and 25 genera of mites belonging to 14 families were collected from date palm trees at different governorates of lower and upper Egypt .

2- The mites are classified according to their habits into three categories :

(a)- The phytophagous mites were: *Oligonychus afrasiaticus* McGregor, *Eutetranychus orientalis* (Klein) (*Tetranychidae*), P*hyllotetranychus aegypticus* Sayed, *Raoiella indica* Hirst., *Brevipalpus phoenicis, (Tenuipalpidea), Mackiella phoenicis* Keifer and *Retracrus johnstoni* Keifer (Eriophyidae).

(b)- The predaceous mites were: *Phytoseius plumifer, Amblyseius swirskii* (A-H), *Amblyseius cydnodactylon* Shehata and Zaher (Phytoseiidae), *Agistemus exsertus* Gonzalez (stigmaeidae), *Saniosulus nudus* (Eupalopsellidae) and *Cheletogenes ornatus* Summers (Cheyletidae) and *Hemisarcoptes malus* Shimer (Hemisarcoptidae).

(c)- Mites of uncertain feeding habits were: *Tarsonemus stifer* Ewing, *Tarsonemus smithi* Ewing, *Tarsonemus noxius* Humic. (Tarsonemidae), *Tydeus californicus* (Banks), *Pronematus ubiquitus* (McGregor) (Tydeidae), *Tyrophagous putrescentiae* McGregor, *Calogylyphus redikorzevi* (Zach), *Rhizoglyphus robini* Claparede (Acaridae), *Heterodispus elongatus* Jac. (Scutacaridae),

Brennandania silvestris and *Bakerdania pectiniger* Mahunka (Microdispidae); *Siculobata sicula* Grandjean, *Zygoribatula sp.* and *Scheloribates* sp (Oribatidae).

3- The population fluctuation of the eriophyid mite, *Mackiella phoenicis* Keizer, the tenuipalpid mite, *Raoiella indica* Hirst, *and Phyllotetranychus aegypticus* sayed; the tetranychid mite Oliganychus afrasiaticus McGregor and the tydied mite *Tydeus californicus* Banks were studied.

4- The population fluctuation of the eriophyid mite *M. phoenicis* has one annual peak of abundance in september during June 1999 to May 2001.

5- A significant positive correlation was found among the monthly average temperature (33.7 to 33.9°C) and also with the monthly average relative humidity (80 to 85 % R.H) for abundance peak of *M. phoenicis*.

6-The population fluctuation of the tenuipalpid mite *R. indice* has one annual peak of seasonal abundance in August (185 and 230 motile stages of mites) during two successive years.

7- A positive correlation existed among both the average temperature and the relative humidity with the population of the tenuipalpid mite, *R.indicae*.

8- *R .indicae* eggs have one annual peak of abundance in August during two successive years of study.

9- The population fluctuation of *O. afrasiaticus* and its eggs have one annual peak of abundance in October.

10- The average monthly temperature and relative humidity were positively affecting with the population of *O. afrasiaticus* and its eggs.

11- The populalion fluctuation of *P. aegypticus* and its eggs have two annual peaks of abundance in June and October during the two successive years of the study.

12- The population of *P. aegyptiacus* and its eggs were positively correlated with temperature and the relative humidity during two successive years.

13-The population fluctuation of eggs and motile stages of *T. Californicus* has one annual peak of seasonal abundance in October during the two successive years.

14-A sigificant positive correlation was found between temperature and relative humidity with the population density and the eggs of *T. californicus* .

15-The biology of *O. afrasiaticus* was investigated at temperature of 27 ± 2°C and relative humidity 75 ± 2%.

16- The larval and deutonymphal periods were longer than the protonymphal stage of *O. afrasiaticus*.

17-The total mean durations of egg and immature stages (developmental time) were 12.36 and 11.1 days for females and males, respectively.

18-The pre-oviposition, oviposition and post- oviposition periods were 2.5,20-60 and 3.80 days for females.

19-The generation time for females of *O. afrasiaticus* was 14.86 days. The mean total fecundity (eggs/ female) were 22.50 with a daily rate of 1-48 eggs.

20- Effect of the biocide (vertimec 1.8%) compared with acaricide, kelthane and kz oil against *O. afrasiaticus* under field conditions showed that the biocide vertimec induced almost the same percent reduction over 90% as the recommended acaricide kelthane. Therefore, the biocide vertimec could be used instead of these acaricide for its safety to evironment and beneficial species, No phytotoxicity was observed with any treatments.