

## MITES IN MARJORAM AND CHAMOMILE CULTIVATIONS IN FAYOUM AND THE RELATIVE ABUNDANCE OF TWENTY SIX SPECIES

[71]

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### ABSTRACT

A study on mite species in marjoram and chamomile plantations in Fayoum was carried out during 2003 and 2004 seasons. Twenty-six species were found and divided according to their feeding habits into three major groups, phytophagous (7 species), predaceous (8 species) and a group of debatable feeding habits (11 species). Population density evaluation showed that *Tetranychus urticae* Koch was the main phytophagous mite on both hosts. The predatory mite *Amblyseius cydnodactylon* Shehata and Zaher was dominant on marjoram followed by *Hemicheyletia bakeri* (Ehara). From the debatable group, *Pronematus ubiquitus* Mc Gregor was the dominant followed by *Tyrophagus putrescentiae* (Schrank) and *Paralorriya gizai* El-Bagoury. On chamomile, the predatory mite *Eupodes niloticus* Abou-Awad & El-Bagoury was dominant and from the debatable group, *Tydeus kochi* Oud. was dominant followed by *T. putrescentiae* and *P. gizai*. Population densities were insignificantly affected by temperature and relative humidity.

**Key words:** Marjoram mites; Chamomile mites; Mite population

### INTRODUCTION

In recent years, aromatic and medicinal plants attracted more attention and became of increased economic importance in Egypt as export agricultural products used in various pharmaceutical therapeutic purposes. Thus, there has been a considerable expansion in cultivation of these crops, which reached to about 15000 feddans during 2005 in Fayoum alone. Almost 78% of this area is cultivated with Marjoram, *Majorana hortensis* and

chamomile, *Matricaria chamomilla*. As pointed out by **Rakova, 1961 and Crale et al 1989**, these plants are the main source of highly aromatic essential oils.

Mite species associated with these crops fall into three main categories, a) phytophagous, b) predaceous, and c) of other feeding habits or debatable. *Tetranychus cinnabarinus* was reported by **Harakly (1974)** on *Capsicum minimum*. *T. arabicus (urticae)* was reported by **Mesbah et al (1983 a)** on *Mentha piperita*, *Pelargonium graveolens*, *Rosemurinus officinalis*,

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*Cucurbita* sp. and *Rosa* sp.; also *Brevipalpus obovatus* Donn. on *M. piperita*, *Ocimum basilicum*, *O. kilimandsharicum* and *Thymus vulgaris*, and the predatory mite *Amblyseius rubini* Swirski & Amitai on *M. piperita*, *O. basilicum*, *R. officinalis* and *Vinca rosae*. **Mesbah et al (1983b)** found *A. rubini* on *Hibiscus sabdarifa*. **Nagy and Tetenyi (1986)** also reported *T. urticae* on *Mentha* spp. and found a gall-forming mite (not identified) associated with *Carum carvi*. **Gupta, (1990)** found *Petrobia latens* on *Cuminum cyminum* in India. **Krips et al (1996)** mentioned that *T. urticae* is an important pest of *Gerbera jamesonii*. **Petanovic et al (2000)** reported the eriophyid mite *Aceria matricariae* associated with *Matricaria chamomilla* in Serbia.

However, studies on species and densities of population of mites on marjoram and chamomile are few, and more information is needed in this respect. Therefore, the objective of the present study was to survey mite species associated with these two crops and to evaluate the population of each species throughout two successive years.

## MATERIAL AND METHODS

This study was carried out at the farm of the Faculty of Agriculture, El-Fayoum during two successive years; 2003 and 2004. Marjoram and chamomile were transplanted (one plant per hill) in December, each in an area of ¼ feddan, divided into 16 equal plots. The usual agricultural practices were followed, except for pest control.

Twenty plants were biweekly picked at random, starting two weeks after transplantation. For marjoram, sampling continued from January 2003 to December 2004. For chamomile sampling continued from January to May each year. Direct examination was made in the laboratory under a stereomicroscope. Mites found were counted and enough specimens were mounted in Hoyer's medium for identified.

Taxonomy systems and keys given by **Hughes, 1961; McDaniel, 1979 and Zaher, 1986** were the basis for identification of species. Population data for *T. urticae* was statistically treated using the simple correlation with weather conditions (average temp. and R.H.).

## RESULTS AND DISCUSSION

**I- Survey:** Mites found on marjoram and chamomile were identified as follows:

- 1- Family: Tetranychidae;** *Tetranychus urticae* Koch; *Eutetranychus orientalis* Klein; *Aponychus imperatus* Hafez and El-Badry; *Petrobia lycopersici* Zaher, Gomaa and El-Enany and *Oligonychus punicae* (Hirst).
- 2- Family: Tenuipalpidae;** *Brevipalpus obovatus* Donn. and *Phyllozetanochus aegyptiacus* Sayed.
- 3- Family: Phytoseiidae;** *Euseius scutalis*, Athias & Henriot; *Amblyseius cydnodactylon* Shehata and Zaher; *A.*

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*longispinosus* (Evans) and  
*Typhlodromus athiasae* (= *T.*  
*pelargonicus* El-Badry).

- 4- Family: Bdellidae; Spinibdella**  
*bifurcata* Atyeo.
- 5- Family: Cheyletidae; Hemicheyletia**  
*bakeri* (Ehara)
- 6- Family: Eupodidae; Eupodes**  
*niloticus* Abou-Awad & El-  
Bagoury
- 7- Family: Stigmaeidae; Agistemus**  
*exsertus* Gonz.
- 8- Family: Tydeidae; Pronematus**  
*ubiquitus* Mc Gregor;  
*Tydeus kochi* Oud.;  
*Paralorryia gizai* El-  
Bagoury and *P.mali* Oud.
- 9- Family: Acaridae; Tyrophagus**  
*putrescentiae* (Schrank);  
*Caloglyphus berlesei*  
(Mich.); *Aleuroglyphus ovatus*  
(Troup.) and *Rhizoglyphus*  
*robini* Claparede.
- 10- Family: Glycyphagidae;**  
*Glycyphagus destructor*  
(Schrank).
- 11- Family: Ctenoglyphidae;**  
*Ctenoglyphus plumiger*  
(Koch).
- 12-Family: Pyroglyphidae;**  
*Dermatophagoides farinae*  
Hughes

These 26 mite species could be classified, according to their feeding habits and to plant in association with, as follows:

#### A- Species found only on marjoram

##### 1. Phytophagous mites

Five species; *T. urticae*; *E. orientalis*; *A. imperatus*; *B.obovatus* and *P. aegyptiacus*.

##### 2. Predaceous mites

Six species; *E. scutalis*; *A. cydnodactylon*; *A. longispinosus*, *H. bakeri*, *S. bifurcata* and *A. exsertus*.

##### 3. Mites of debatable feeding habits

Six species; *T. kochi*; *P. ubiquitous*; *P. gizai*; *T. putrescentiae*; *G. destructor* and *C. berlesei*.

#### B- Species found only on chamomile

##### 1. Phytophagous mites

Four species; *T.urticae*; *O. punicae*; *P. lycopersic* and *B. obovatus* .

##### 2. Predaceous mites

Three species; *A. cydnodactylon*, *T. pelargonicus* and *E. niloticus* .

##### 3. Mites of debatable feeding habits

Nine species; *T. kochi*; *P. ubiquitous*; *P. gizai*; *P. mali*; *T. putrescentiae*; *R. robini*; *C. plumiger*; *A. ovatus* and *D. farinae*.

#### C- Species found on both marjoram and chamomile

##### 1. Phytophagous mites

Two species; *T. urticae* and *B. obovatus*.

##### 2. Predaceous mites

One species; *A. cydnodactylon*.

##### 3. Mites of debatable feeding habits

Four species; *T. putrescentiae*; *P. ubiquitous*; *T. kochi* and *P. gizai* .

## **II- Relative abundance of the most populated species collected**

### **A) On marjoram**

#### **a-During 2003 (Table, 1)**

### **1) *Tetranychus urticae***

This phytophagous species was the main mite pest found on marjoram all over the year, the highest densities occurred in May and September with 99 and 92 individuals /40 plants at average

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temperature 29.4 and 29.0°C with 50 and 58% RH, respectively. The lowest densities (7 and 8 individuals/40 plants) were recorded during June and July at average temperature 31.3 and 31.7°C with 53 and 55% RH, respectively.

A positive insignificant correlation was found between population and temperature ( $r = 0.242$ ), whereas the relationship with humidity was negatively insignificant ( $r = -0.393$ ).

According to Mesbah *et al* (1983 a) *T. arabicus (urticae)* had two peaks on rosemary during the first half of June and the second half of July. The highest population was recorded on rose during June, while on geranium the numbers were extremely low all over the growing season.

### 2. *Amblyseius cydnodactylon*

This predatory mite was the most abundant. The population density began with two individuals /40 plants in March and increased to 7 individuals in April, then fluctuated till reaching a peak in October (12 individuals/40 plants).

### 3. *Hemicheyletia bakeri*

This predator was mostly found during the period from September, 2003 till February 2004 with successive monthly count of 2, 10, 8, 22, 12, and 8 individuals / 40 plants at respective average temperatures 29.2, 26.2, 21.6, 15.9, 15.1 and 16.2°C with respective RH 58, 59, 63, 58, 52 and 59%.

### 4. *Tyrophagus putrescentiae*

This acarid mite, surpassed in number the other species of debatable feeding habits. The highest population was during November (25 individuals/40 plants).

### 5. *Pronematus ubiquitus* and *P. gizai*

These mites of debatable feeding habits were second in population to *T. putrescentiae* with a total number of 23 and 21 / 40 plants, respectively.

### b- During 2004 year (Table, 2)

#### 1. *T. urticae*

The highest numbers, 62, 59, 77 and 63 individuals /40 plants, were recorded during January, February, April and July at average temperatures 15.1, 16.2, 30.1 and 21.4 °C with 59, 60, 52 and 51 %RH, respectively. The lowest numbers, 6, 7, 6 individuals /40 plants, were recorded in September, November and December, at average temperature 26.6, 21.2 and 16.3°C with 53, 62 and 60 RH %, respectively.

A negative insignificant correlation was found between these numbers and both temperature ( $r = - 0.137$ ) and RH% ( $r = - 0.219$ ).

#### 2. *A. cydnodactylon*

The highest number was recorded in January (11 individuals /40 plants), decreased sharply in February 4 individuals/40 plants, disappeared during March and April, then later these numbers 6, 4, 2 individuals/40 plants, were found during May, June and July, respectively. Thereafter, only two individuals were found in September.

**3. *P. ubiquitous***

This tydeid mite, was abundant in September with population reaching 107 individuals / 40 plants although it did not exceed 6 individuals / 40 plants throughout survey.



#### 4. Other species of debatable feeding habits

*P. gizai*; *T. putrescentiae*; *G. destructor*; *T. kochi* and *C. berlesei* were found in considerable numbers reaching 80, 77, 75, 64 and 7 individuals, respectively as a total numbers during the year.

#### B- On chamomile (Table, 3)

##### a- During 2003

##### 1. *T. urticae*

This species was the main mite pest found on chamomile. None of this mite could be observed during January. The population density began with 4 individuals / 40 plants in February at average temperature 15.4°C with 58 %RH, then it gradually increased till reaching its peak in April (86 individuals / 40 plants) at average temperature 21.8°C and 56% RH. After this peak, decreased sharply to 11 individuals/40 plants in May at average temperature 26.8°C with 51 %RH.

A positive insignificant correlation was found between population and temperature ( $r = 0.343$ ), whereas the relationship with humidity was negatively insignificant ( $r = - 0.262$ ).

##### 2) *Eupodes niloticus*

The population of this mite fluctuated in few numbers to record 4 individuals / 40 plants in February, decreased in March and April ( 2 individuals / 40 plants for each), while none of this mite was recorded during January and May.

##### 3) *Ctenoglyphus plumiger*

This species was found in January and February reaching 19 and 16 individuals and disappeared during April and May.

#### 4. Other species of debatable habits

*T. putrescentiae* and *T. kochi* were found in considerable numbers reaching 39 and 33 individuals, respectively throughout survey.

##### b- During 2004

##### 1. *T. urticae*

The population density gradually increased with the progress of the season till reaching its peak in May, the monthly collected numbers were 2, 5, 5, 18, 118 individuals/40 plants from January to May at average temperatures 13.6, 15, 17.6, 19.2 and 23.6°C with 57, 61, 56, 55 and 48 % RH, respectively.

From the above results, peak of *T. urticae* observed in April 2003, while in 2004, peak occurred in May.

The correlation between population and temperature was positively insignificant ( $r = 0.829$ ) whereas with R.H.% was negatively significant ( $r = - 0.900$ ).

##### 2. *E. niloticus*

More numbers of this species were found compared to that recorded during 2003. The highest number was recorded in February (15 individuals / 40 plants), decreased to 6 and 9 individuals / 40 plants in March and April, respectively.

##### 3. *T. kochi*

Less numbers of this species were found compared to that recorded during

2003, only 15 individuals/40 plants was recorded in February.

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### III- The relationship between populations of phytophagous and predaceous mites

#### a) On marjoram (Tables, 1-2 and Figs. 1-2 )

In 2003, the number of phytophagous mites was generally low during January and February with a total of (9-10 individuals/ 40 plants). During this period no predaceous mites were found, the population density of phytophagous mites fluctuated normally with two peaks (May & September), meanwhile, the population of predaceous mites was relatively at low level until September (2-13 mites / 40 plants). Therefore, predation was ineffective against these mite pests, perhaps due to a high level of *T. urticae* mites compared to that of predators, besides the effect of weather conditions. By October, the phytophagous mites reach the lowest level whereas the number of predators found well exceeded the number of phytophagous.

On the contrary in 2004, high numbers of phytophagous and predaceous mites were collected during January and February to record 27 & 12 of predaceous mites correlated with 62 & 59 of phytophagous mites, respectively, then the population density of phytophagous mites increased gradually till April to record 58 and 77 individuals / 40 plants compared to low numbers of predator mites (3 individuals/40 plants in both March and April). Thereafter, the population density of phytophagous and predaceous mites fluctuated in the period from May to December, lately when the

phytophagous mites reached to the lowest level (6 individuals), the predaceous mites reached to considerable numbers (5 individuals) during September.

#### b) On chamomile (Table, 3 and Figs. 3-4)

In 2003, one individual of phytophagous mites was found during January and no predaceous mites were observed during this month. In February to April a considerable numbers of predaceous mites were recorded and the ratios between predaceous to phytophagous mites reach to about 0.66:1, 1:1 and 1:5 during the mentioned period, respectively. Lately, 11 individuals of phytophagous mites only were found during May.

In 2004, the number of phytophagous mites was generally recorded allover the season. population density fluctuated during January, February and March, then increased during April and reach its peak in May. For predaceous mites the recorded numbers surpassed phytophagous during February & March and occurred in considerable numbers in April.

From the previous results it could be stated that marjoram and chamomile inhabited 26 mite species. Seven species were recorded on both plants, 10 species were recorded on marjoram only and 9 on chamomile only. *T. urticae* was the main phytophagous mite but was more abundant on marjoram. The predaceous mite *A. cydnodactylon* was the only predator found on both plants and was also more abundant on marjoram. The cheyletid predator *H. bakeri* was

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observed in high numbers on marjoram especially during 2003, meanwhile, *E. niloticus* was more abundant on chamomile than other predators. Of the species of debatable feeding habits, *P.*

*ubiquitus*, *T. putrescentiae* and *P. gizai* were recorded in high numbers on marjoram whereas *T. kochi* numbers surpassed each of *T. putrescentiae* and *P. gizai* on chamomile.

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1033-1046، 13(3) مقره اقل، س مشن ي ع ة عم ا ج ة ع ا ر ز ل ن و ح ب ل ن ا س ا ر د ق ل ي ب ر ع ل ت ا ع م ا ج ل ا ح ا ق ل ج م ، 2005

## *Majorana hortensis* شوق در بئلا ت اب ن ف ح اص م ل ن ا س و ر ا ك ا ل ل ر ص ح *Matricaria chamomilla* ي ش ل ا و اعون و رش ع و ت س ي ل ب س ن ل ا ج ا و ت ل ا ع م ي ف ل ا ة ظ ف ا ح ي ف

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### ل ا ي ح ا و ض ر ظ ي ف ح ل د ب ع ف ر ش أ

ر ص م - ع ر ه ا ق ل ا ة ع م ا ج و ي ف ل ا ب ة ع ا ر ز ل ن ا ي ل ل ف ت ا ب ن ل ة ي ا ق و س ق - 1

ر شك أ ن ع ي ر ط ع ل ة ي ب ط ل ا ت ا ب ن ل ا ع ت  
ة ي ج ا ل ع ص ا و خ ن م ا ه ل ا م ل ة ي ل ه ا ي ص ا ح م ل ا  
د ق ي ي ء ا ق و د ا و ح ل ا ع ي ا و ت ح ا ل ع ج ر ت  
ن ا و ي ح ل ا ف ا س ن ا ل ن ل م ا ك ة ي ض ر ب ت ل ا ب س م ل ا  
ت ا ت ا ب ن ل ا ن ق م ب س ت ك ف ا ر ي خ ا ل ن ا و ن س ل ي ف و  
ر ي د ص ت ب ق ل ا د ل ه ا ي ق ل ا ر ظ ن ا ص ا خ ا م ا م ت ه ا  
ج ر ا خ ل ا ي ل ا ا ه و ي م ي ب ك ت ا ي م ك  
ا م ا م ت ه ي ط ا ن م ل و ا ت ك أ م و ي ف ل ا ة ظ ف ا ح م و  
د و ع ي ي ل م ل ت ا ب ن ل ا ن م ة و ع م ج م ل ا ه ذ ل ة ع ا ر ز و  
ي ت ج س ا ن م ي د ا م ء ا ع ن م ع ر ا ز م ل ا ي ل ع  
ي ل ا 2005 م ا ع ي ف ت ي ل ا م ج ا ل ة ح ا س م ل ت ل ص و  
ن ا د ف 5000 ا ي ل ا و ح

و ة س ا ر د ل ا ه ذ ن م ف د ه ل ا ن ك ا ذ ل  
ن ي ن ت ا ل ب ح ا ص م ل ت ا س و ر ا ك ا ل ا ي ل ع ر ع ت ل ا  
ة ظ ف ا ح ي ف ا ش ت ق و ي ا ب ط ل ا ت ا ب ن ل و ا ت ك أ ن م  
ة ح ا س م ل ا ي ل ا م ا ج ا ن م % 78 ي ف ل ا  
ح ي ش ل ن و ق د ر ب ي ل ت ا ب ن ا م ه و (ة ع ر ز ن م ل ا  
ا ر ظ ن ع ا و ن أ ل ا ن ه ا د ع ت ي ل ع و ع ت ل ل ك ل ذ و  
د ق ا ق ب ا س ك ل ن ت ل و ا ن ي ق ي ت ل ت ا س ا ر د ل ا ق ل  
ي ل ا ي ا م س ا ر د ل ا ت ح ض و أ

### شوق در بئلا : ال و أ

- 1- و ي ه ذ غ ب ق ل ي ت ا ب ن ع ا و ن ل ي ج س ت م ت -  
ط ط ب م ل م ل ح ل ا و ء ا ر م ح ل ي ا ك ا ن ي ع ل ل ا ي ص ف  
ع و ن ل ا و ل د ج ا و ت ع ا و ن أ ل و ا ت ك ا ن ا ك و  
ة س ا ر د ل ا ي م ا ع ل ا ل خ *urticae*  
ا ه ق ت ب ا ل ق ش و ر ت ف م ع ا و ن ل ي ج س ت م ت - 2  
ل ك ن م ع و ن و *toseidae* ص ف ط ع ا ت  
و *Bdellidae* و *yletidae* ي ص ف ن م  
ا د ج ا و ت ع ا و ن أ ل و ا ت ك ا ن ا ك و *Stigmaeidae*  
ع و ن ل م ل ت *A. cydnodactylon* ع و ن ل ا و ه  
*H. bakeri* .
- 3- ن ق ي ذ غ ت ل ا ع و ن ت م ع ا و ن ل ي ج س ت م ت -  
م ت *P. ubiquitus* ع و ن ل ا م ر ت ك أ  
*T. putrescentiae* .

### ح ي ش ل ا ي ن ا ت

- 1- ي ت ل ي ص ف ة ق ي ت ا ب ن ع ا و ن ل ي ج س ت م ت -  
ن ا ك و ط ط ب م ل م ل ح ل ا و ء ا ر م ح ل ي ا ك ا ن ع ل ا  
ل ا ل ا خ ا ش ت ن ا م ر ت ك أ *urticae* ع و ن ل ا  
ة س ا ر د ل ا ي م س و م

- 2- نمن اعقيرت فم عاون لى ج س تمت -  
 ةل يصف نم عون و Eupodidae  
 عاون لاد- ج اوتاهر شك أن الكو  
*E. niloticus* .
- 3- ن القويذ غت لعا عون تم عاون لى ج س تمت -  
 مث *T. kochi* عاون لاد ج اوتاهر شك أ  
*putrescentiae T.*

ظفا اچف طص فب يرش د: لمي كحت  
 ان حزي زع مر كم د. أ