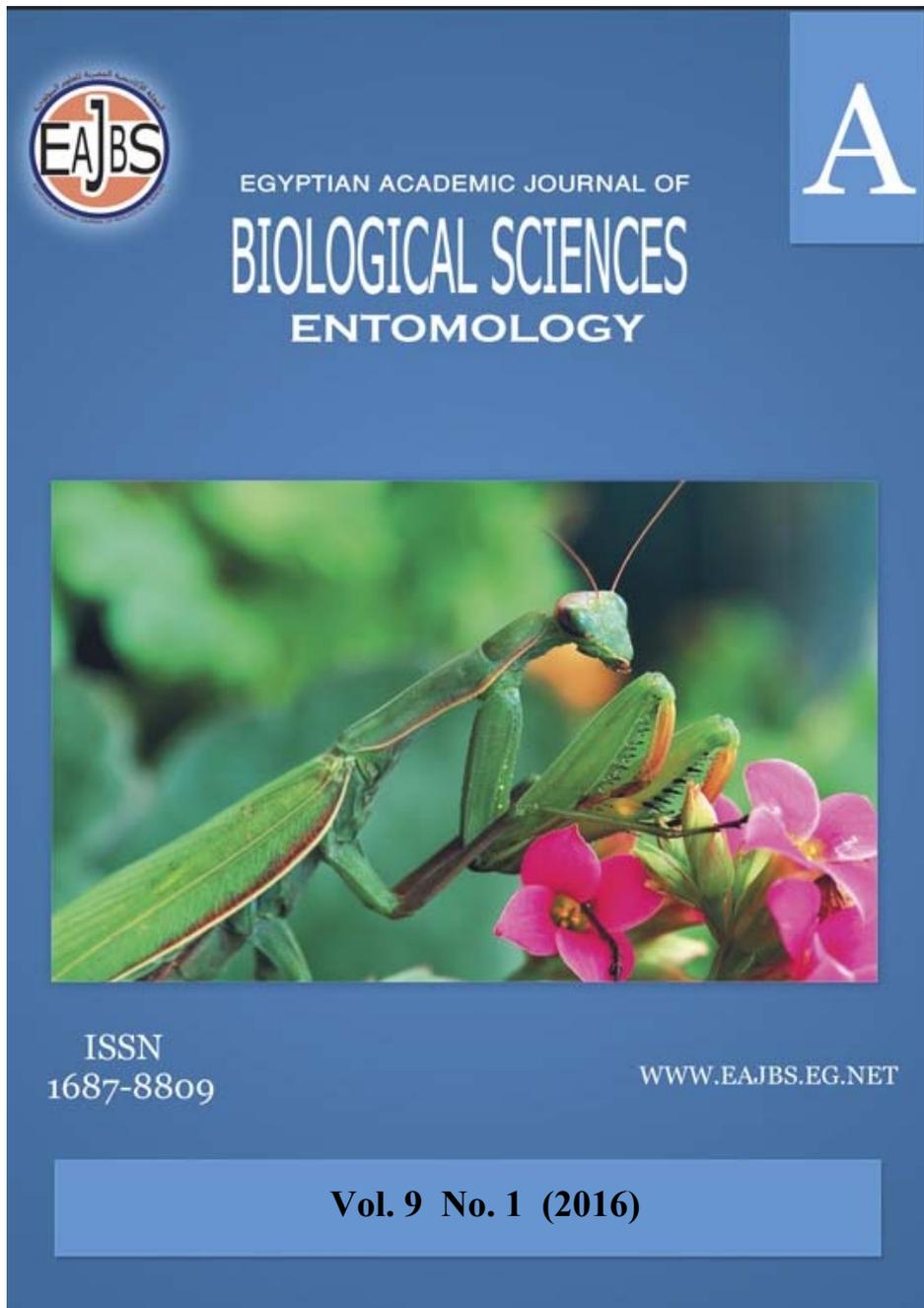


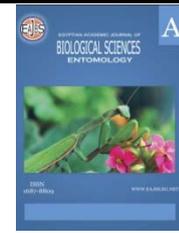
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**Population Fluctuation of The Citrus Red Mite *Panonychus citri* (McGregor) on Some Citrus Species at Giza, Egypt**

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**ABSTRACT**

The population fluctuation of *Panonychus citri* was studied during two successive years on three citrus species at Giza Governorate namely: Lemon (*Citrus limon* L.), Sweet orange; Navel orange (*Citrus sendonensis* L.). The obtained results recorded negative correlation between number of mites and average temperature and positive correlation between mite population and average relative humidity. Moreover, the citrus red mite, *P. citri* has one annual peak of year abundance in March on Lemon trees, while on naval orange and sweet orange, the annual peak occurred in April during two successive years.

**INTRODUCTION**

The citrus is one of the most important fruits in the world. In Egypt, the cultivated area is estimated by 518,694 Fadden produced 3,980,151 ton, average produced 9.54 ton per Fadden (In 2012). Citrus cultivations are centered in two large geographic regions, which are the fertile delta area and newly reclaimed land. The citrus red mite, *Panonychus citri* (McGregor) (Acari: Tetranychidae) is one of the most important pest that attacks citrus trees and distributed worldwide. This mite attacks more than 80 species of plants, including citrus, rose, almond, pear, castor bean, and several broadleaf evergreen ornamentals (Gotoh & Kubota 1997; Bolland *et al.*, 1998; Zhang, 2003; Childers *et al.*, 2007). All moving stages of this species feed on citrus leaves causing grayish or silvery spots which known as white stippling injury (Knapp *et al.*, 1996). *P. citri* and other factors such as drought may cause heavy leaf drop, resulting loss of photosynthetic tissue that likely lead to twig dieback and fruit drop (Kranz *et al.*, 1977; Tan *et al.*, 1989; Knapp *et al.*, 1996 and Childers *et al.*, 2007). In Alabama, *P. citri* is also an important pest of Satsuma mandarin (*Citrus unshiu* Marcovitch) (English & Turnipseed 1941, Fadamiro *et al.*, 2007, 2008). This mite species prefers sweet oranges as a host plant followed by lemon, clementine and hybrids that affected equally (Izquierdo *et al.*, 2002). This study aims to throw more light on the population fluctuation of *P. citri* on three citrus species during two successive years, consequently determine the relation between Temperature, relative humidity and population.

## MATERIAL AND METHODS

### Experimental design:

The study was conducted on citrus species namely Lemon (*Citrus limon* L.), Sweet Orange and naval Orange (*Citrus sendonensis* L.) in Abo-Galeb region at Giza Governorate. Twenty trees from each species were chosen in the same locality and kept free from any chemical application. Monthly samples were taken including leaves and fruits from each species mentioned above and individually bagged in tightly-closed plastic bags and transported the same day to the Fruit Acarology Department, Plant Protection Research Institute (PPRI), Agricultural Research Center (ARC). The samples were examined in the laboratory by the aid of Stereomicroscope. Number of mite per twenty leaves (upper, lower surface) and 5 fruits were recorded. Population fluctuation of mite was studied during two successive years from November, 2013 to October 2015.

### Weather factors:

The temperature and the relative humidity previously prevailed in Giza Governorate was obtained from the Meteorological Magazine.

### Statistical analysis:

Simple correlation was carried out to clear up the relationship between prevailing weather factors (temperature and relative humidity) and the population of the citrus red mite *P. citri*.

## RESULT AND DISCUSSION

### Population fluctuation of *Panonychus citri* (McGregor) on lemon trees (*Citrus limon*):

Data in Tables (1&2) and Figs. (1&3) demonstrated that, the red citrus mite, *Panonychus citri* (McGregor) has one annual peak in March during two successive years (November 2013 / October 2014 & November 2014 / October 2015). The monthly total numbers of mite were 244 and 184 individual at average temperature 19 and 18.8 °C and average relative humidity 52 and 56.06 % during two successive years, respectively.

Table 1: Population fluctuation of *P. citri* on Citrus species at Giza Governorate during period (November 2013 to October 2014).

Date of inspection	No., of mite per sample			Weather factors	
	Lemon	Navel range	Sweet orange	Mean temp.	Mean RH %
November	72	84	30	20.83	52
December	158	60	18	14.49	51
January	170	70	12	17.7	48
February	206	105	20	16.4	52
March	244	180	60	19	52
April	102	260	90	22.8	53
May	72	98	55	26.1	52
June	54	70	15	28.5	54
July	30	39	7	29.1	54
August	10	5	5	29.9	55
September	40	10	3	28.5	54
October	56	30	10	24.2	55

Table 2: Population fluctuation of *P. citri* on Citrus species at Giza Governorate during period (November 2014 to October 2015).

Date of inspection	No., of mite per sample			Weather factors	
	Lemon	Navel orange	Sweet orange	Mean temp.	Mean RH %
November	28	34	20	19.6	65
December	56	20	10	16.5	67.9
January	80	25	2	13.6	57.93
February	142	44	26	14.8	55.96
March	184	105	56	18.8	56.06
April	50	167	66	20.8	48.4
May	40	110	30	25.7	47.61
June	30	90	20	26.91	51.7
July	25	32	15	29	55.03
August	15	5	6	31.4	52.45
September	36	10	4	30.02	51.53
October	46	27	18	25.7	58.81

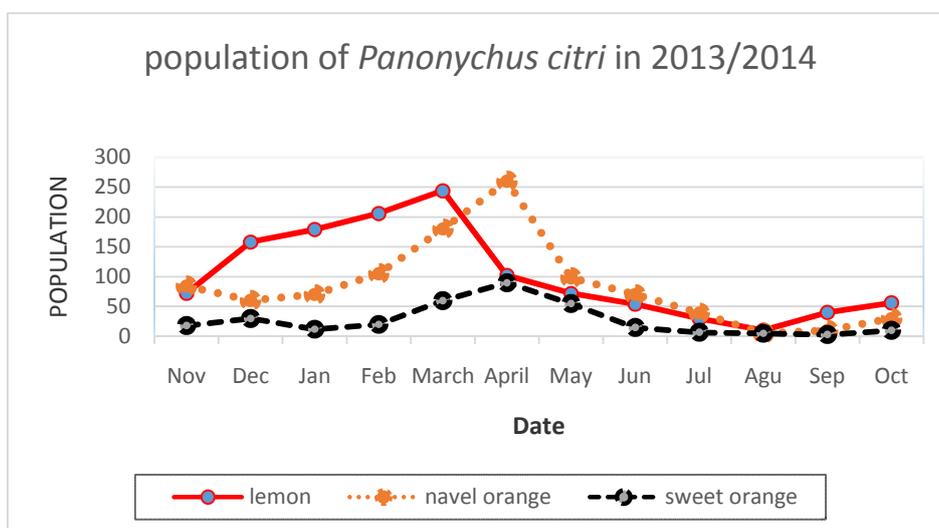


Fig. 1: The population of *Panonychus citri* in 2013/2014 at Giza governorate.

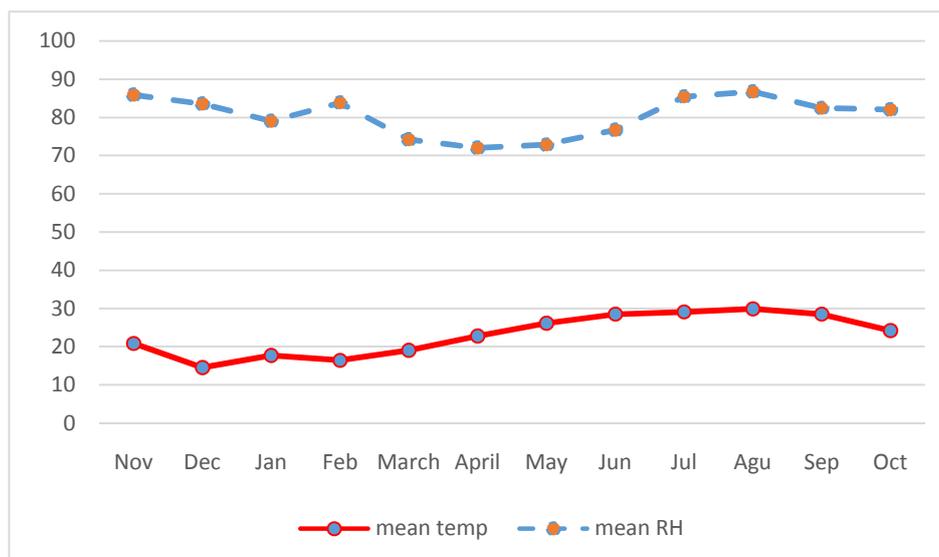


Fig. 2: The mean temperature degree and the mean relative humidity 2013/2014 at Giza governorate.

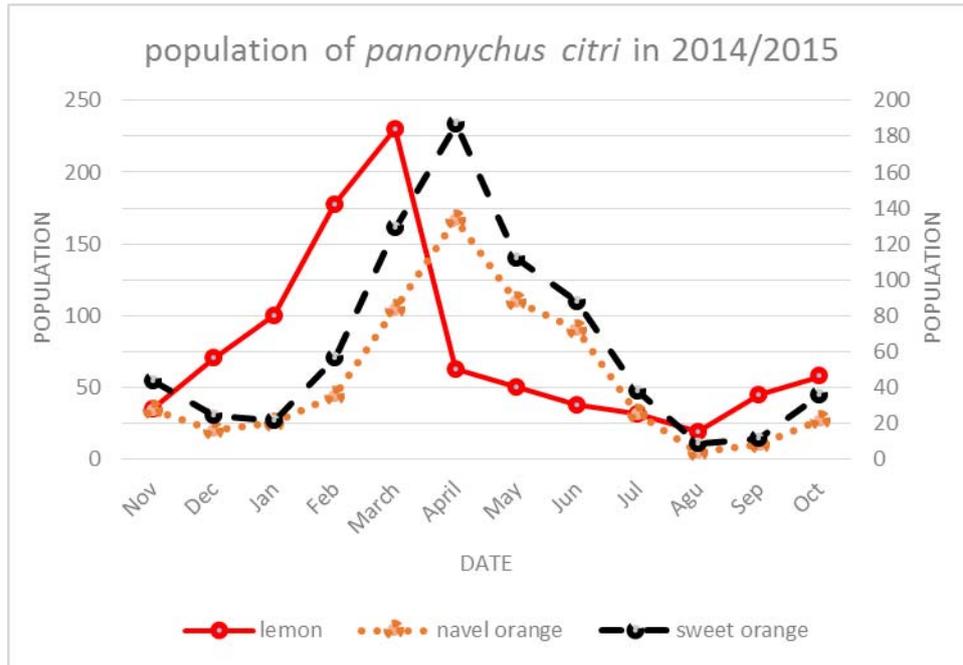


Fig. 3: The population of *Panonychus citri* in 2014/2015 at Giza governorate.

The population of *P. citri* was gradually increased in number from November until reached to the highest number in March and gradually decreased in number from April to August and then began to increase again from September to October during two successive years. The monthly total numbers of mites were 72, 158, 170, 206, 244, 102, 72, 54, 30, 10, 40 and 56 individual at average temperature 20.83, 14.49, 17.7, 16.4, 19, 22.8, 26.1, 28.5, 29.1, 29.9, 28.5 and 24.2 °C and average relative humidity 52, 51, 48, 52, 53, 52, 54, 54, 55, 54, 54 and 55% in November, December, January, February, March, April, May, June, July, August, September and October in the first year, respectively. In the second year, the monthly total numbers of mite were 28, 56, 80, 142, 184, 50, 40, 30, 25, 15, 36 and 46 individual at average temperature 19.6, 16.5, 13.6, 14.8, 18.8, 20.8, 25.7, 29.9, 29, 31.4, 30.02 and 25.7 °C and average relative humidity 65, 67.9, 57.9, 55.9, 56.06, 48.4, 47.61, 51.7, 55.03, 52.45, 51.43 and 58.81 % in November, December, January, February, March, April, May, June, July, August, September and October, respectively.

The correlation coefficient between the red citrus mite *P. citri* population and average temperature & average relative humidity clearly recorded in table (3) which showed negative correlation between number of mites and average temperature during two successive years while, positive correlation was recorded between mite population and average relative humidity during two successive year, respectively.

#### **Population fluctuation of *Panonychus citri* (McGregor) on navel orange trees (*Citrus sinensis* L.) osb.)**

Data in Tables (1&2) and Figs. (1&3) explained that, *P. citri* has one annual peak in April during two successive years (November 2013 / October 2014 & November 2014 / October 2015). The monthly total numbers were 260 and 167 individual at average temperature 22.8 and 20.8. °C and average relative humidity 53 and 48.4 % during two successive years.

The population of *P. citri* was fluctuated according to temperature and relative humidity changes during two years where the numbers of mite began with moderate numbers in November and decreased in December then, gradually increased from January until reached to the highest number in April and return to decrease again

from May to August. Finally, the population increased again from September to November during two successive years. The monthly total numbers of mite were 84, 60, 70, 105, 180, 260, 98, 70, 39, 5, 10 and 30 individual at average temperature 20.83, 14.49, 17.7, 16.4, 19, 22.8, 26.1, 28.5, 29.1, 29.9, 28.5 and 24.2 °C and average relative humidity 52, 51, 48, 52, 53, 52, 54, 54, 55, 54, 54 and 55% in November, December, January, February, March, April, May, June, July, August, September and October in the first year, respectively. In the second year, the monthly total numbers of mites were 34, 20, 25, 44, 105, 167, 110, 90, 32, 5, 10 and 27 individual at average temperature 19.6, 16.5, 13.6, 14.8, 18.8, 20.8, 25.7, 29.9, 29, 31.4, 30.02 and 25.7 °C and average relative humidity 65, 67.9, 57.9, 55.9, 56.06, 48.4, 47.61, 51.7, 55.03, 52.45, 51.43 and 58.81 % in November, December, January, February, March, April, May, June, July, August, September and October, respectively.

Statistical analysis in Table (3) showed that the population of *P. citri* was negatively correlated with average temperature and average relative humidity during two successive years.

#### **Population fluctuation of *Panonychus citri* (McGregor) on sweet orange trees (*Citrus sinensis* (L) osb.)**

Data in Tables (1&2) and Figs. (1&3) explained that, *P. citri* has one annual peak in April during two successive years. The monthly total numbers were 90 and 66 individuals at average temperature 22.8 and 20.8 °C and average relative humidity 53 and 48.4 % in the first and second year, respectively. The population was appear with moderate numbers in November and decreased from December to reach to the lowest number in January then return to increase again from February until reached to the highest number in April and finally, the population decreased from May to September and began to increase in October during two successive years. The monthly total numbers were 30, 18, 12, 20, 60, 90, 55, 15, 7, 7, 5, 3 and 10 individual at average temperature 20.83, 14.49, 17.7, 16.4, 19, 22.8, 26.1, 28.5, 29.1, 29.9, 28.5 and 24.2 °C and average relative humidity 52, 51, 48, 52, 53, 52, 54, 54, 55, 54, 54 and 55% in November, December, January, February, March, April, May, June, July, August, September and October in the first year, respectively. In the second year, the monthly total numbers of mites were 20, 10, 2, 26, 56, 66, 30, 20, 15, 6, 4 and 18 individual at average temperature 19.6, 16.5, 13.6, 14.8, 18.8, 20.8, 25.7, 29.9, 29, 31.4, 30.02 and 25.7 °C and average relative humidity 65, 67.9, 57.9, 55.9, 56.06, 48.4, 47.61, 51.7, 55.03, 52.45, 51.43 and 58.81 % in November, December, January, February, March, April, May, June, July, August, September and October, respectively.

Statistical analysis recorded in Table (3) showed negative correlation between population of *P. citri* and average temperature and average relative humidity was existed during two successive years, respectively.

Table 3: Simple correlation values of some climatic factors in relation with number of *P. citri* on Citrus species in Giza Governorate during period (2013/2014 and 2014/2015).

Factors	Citrus species					
	Lemon		Navel orange		Sweet orange	
	First year	Second year	First year	Second year	First year	Second year
Mean temp.	-0.86043	-0.62982	-0.37046	-0.13247	-0.26695	-0.22117
Mean R.H.%	0.412419	0.1002	-0.24872	-0.53039	-0.37799	-0.33881

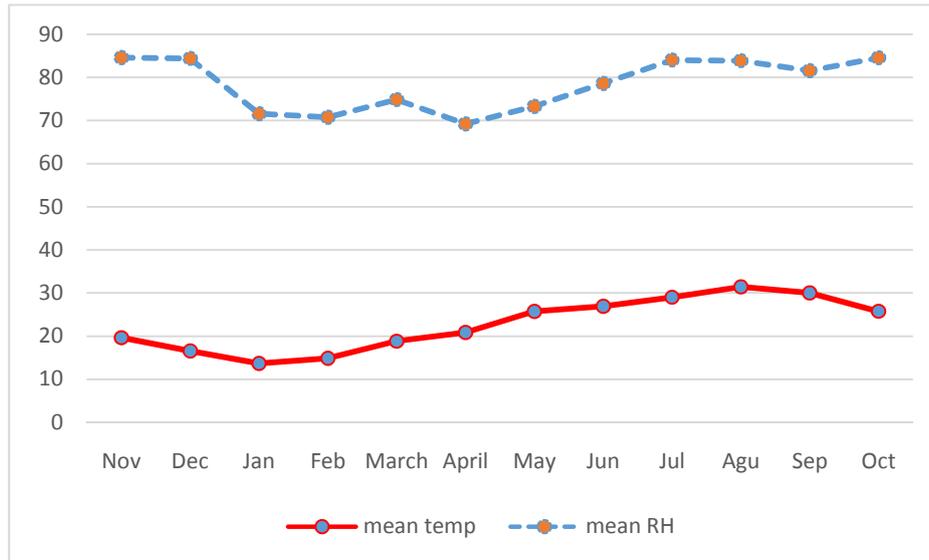


Fig.4: The mean temperature degree and the mean relative humidity 2014/2015 at Giza governorate.

## REFERENCES

- Bolland, H. R., Gutierrez, J., and Flechtmann, C. H. W. 1998. World catalogue of the spider mite family (Acari: Tetranychidae). Leiden, the Netherlands: K. Brill.
- Childers, C.C., McCoy, C.W., Nigy, H.N., Stansly, P.A. and Rogers, M.E. 2007. Florida pest management guide: rust mite, spider mite and other phytophagous mites. Univ., of Florida cooperative Extension service Institute of food and Agricultural Sciences Available from <<http://edis.ifas.ufl.edu/CG002>>
- English, L. L. and Turnipseed, G. F. 1941. The influence of temperature and season on the citrus red mite (*Paratetranychus citri*). J. agric. Res. 62: 65-77.
- Fadamiro, H.Y., Nesbitt, M. and Wall, C. 2007. Crop profile for Satsuma mandarin in Alabama. Available from: <[http://www.aces.edu/anr/ipm/crop\\_profiles/a\\_satsuma\\_citrus.pdf](http://www.aces.edu/anr/ipm/crop_profiles/a_satsuma_citrus.pdf)>
- Fadamiro, H.Y., Xiao, Y.F., Hargroder, T., Nesbitt, M., Umeh, V. and Childers, C., 2008. Seasonal occurrence of key arthropod pests and associated natural enemies in Alabama satsuma citrus. Environmental Entomology. 37: 555-567.
- Gotoh, T. and Kubota, M. 1997 Population dynamics of the citrus red mite *P. citri* (Mc Gregor) (Acari: Tetranychidae) in Japanese pear orchards Exp., Appl. Acarol.21: 343-356.
- Izquierdo, J.V. Mansanet, J.V. Sanz and Puiggros, J.M., 2002 Development of Envidor® for the control of spider mites in Spanish citrus production. Pflanzenschutz-Nachrichten Bayer 55:255-266.
- Knapp, J.L., Peña, J.E., Stansly, P.A., Bullock, R.C. and Shapiro, J. 1996. Chemical control of the Citrus leafminer: what are the options? In: Hoy, M. (ed.) Proceedings of the International Conference on Managing the Citrus Leafminer, Orlando, Florida, 23 -25 April. University of Florida, Gainesville, Florida: 21-24.
- Kranz, J., Schmutterer, H. and Koch, W., 1977. Diseases, Pests and Weeds in Tropical Crops. Paul Parey, Berlin, Germany.
- Tan, B., Huang M. and Jialum, L. 1989. Studies on the damage and economic threshold of citrus red mite, *Panonychus citri* (McGregor) to citrus. Studies on the Integrated Management of Citrus Insect Pests. Academic Book and

Periodical Press. Guangzhou, China: 15–26  
Zhang, Z. 2003 Mites of greenhouses: identification, biology and control. CABI publishing Wallingford UK. 240 p.

### ARABIC SUMMERY

تذبذب تعداد أكاروس الموالح الأحمر *Panonychus citri* على بعض أنواع من أشجار الموالح  
في محافظة الجيزة في مصر

عادل أمين محمد عبدالله

قسم بحوث أكاروس الفاكهة - معهد بحوث وقاية النباتات - مركز البحوث الزراعية

دراسة تذبذب أعداد أكاروس الموالح الأحمر *Panonychus citri* خلال سنتين متتاليتين على ثلاث أنواع من أشجار الموالح في محافظة الجيزة وهي أشجار الليمون الاضاليا وأشجار البرتقال السكرى وأشجار البرتقال أبو سره . سجلت النتائج المتحصل عليها وجود علاقة عكسية بين تعداد أكاروس الموالح الأحمر و متوسط درجات الحرارة بينما كانت العلاقة طردية مع متوسط الرطوبة النسبية على الليمون في حين كانت العلاقة عكسية بين تعداد الأفراد وكل من متوسط درجة الحرارة و متوسط الرطوبة النسبية على كل من البرتقال السكرى والبرتقال ابو سره . وسجل اقصى تعداد للافه الاكاروسية خلال شهر مارس على أشجار الليمون بيما كانت في شهر ابريل على أشجار البرتقال السكرى وأشجار أبو سره خلال سنتين الدراسة .