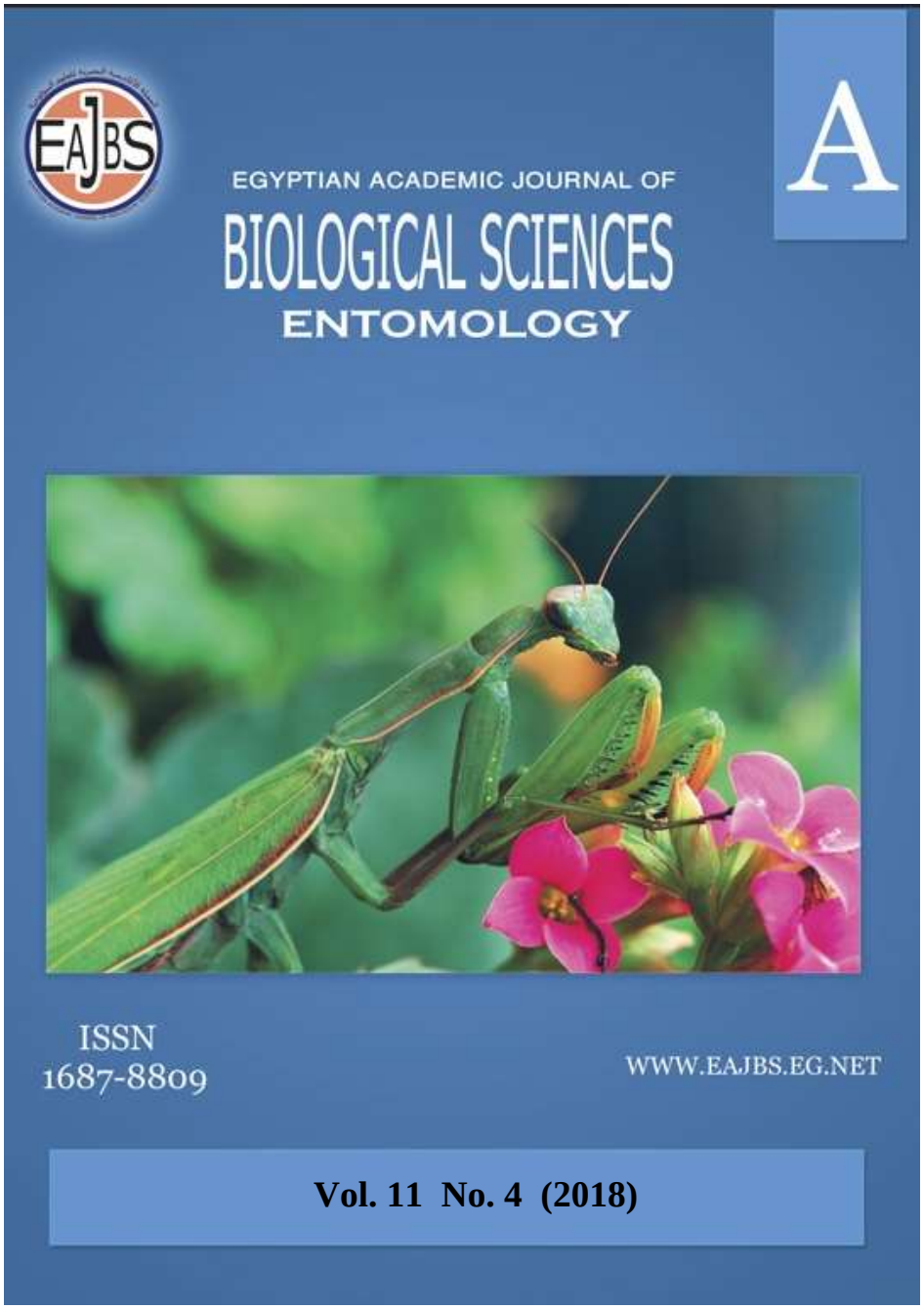

Egyptian Academic Journal of Biological Sciences is the official English language journal of the Egyptian Society for Biological Sciences, Department of Entomology, Faculty of Sciences Ain Shams University.
Entomology Journal publishes original research papers and reviews from any entomological discipline or from directly allied fields in ecology, behavioral biology, physiology, biochemistry, development, genetics, systematics, morphology, evolution, control of insects, arachnids, and general entomology.
www.eajbs.eg.net

Citation: *Egypt. Acad. J. Biolog. Sci. (A. Entomology) Vol. 11(4)pp: 83- 88 (2018)*

Egypt. Acad. J. Biolog. Sci., 11(4): 83– 88 (2018)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687- 8809
www.eajbs.eg.net

Population Fluctuations of The Phytophagous Mite, *Oligonychus mangiferus* and its Predator on Mango Trees in Ismailia Governorate, Egypt

Neivin A.H. Hussian[1], Hamdy M. El-Sharabasy[2], Ahmed H. AboGhalia[3] and Maha F.M. Soliman[3]

1-Plant protection Research Institute, Agricultural Research Center, Dokki, Egypt.
2-Plant protection Department, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt.
3-Zoology Department, Faculty of Science, Suez Canal University, Egypt
Corresponding Authors E-mail: ahaboghalia@yahoo.com - maha_soliman@hotmail.com.

ARTICLE INFO
Article History
Received:19/6/2018
Accepted:24/7/2018

Keywords:
Mites, *Oligonychus mangiferus*, *Amblyseius swirskii*, mango, temperature, relative humidity, abundance.

ABSTRACT

Seasonal abundance of the phytophagous mite *Oligonychus mangiferus* and its predator *Amblyseius swirskii* associated with mango orchard trees was investigated at the experimental farm of the agriculture faculty of the Suez Canal University, Ismailia, Egypt**.** This study was carried out during two successive years from October 2014 to September 2016. Results showed that the temperature and moisture R.H.% were significantly affected the mean abundance of the phytophagous mite *O. mangiferus* and its predator *A. swirskii* associated with mango orchard trees. The highest mean abundance of *O. mangiferus* was recorded in the summer season (2.96 ± 0.6 indv./leaf) and (1.33 ± 0.05 indv./leaf) for *A. swirskii*, respectively in the first year (from October 2014 to September 2015). On the other hand, the lowest mean abundance was recorded in the autumn (0.6 ± 0.11) for *O. mangiferus*, (0.23 ± 0.09 indv./leaf) for *A. swirskii*. The mean abundance of *O. mangiferus* populations increased to (3.43 ± 0.7 indv./leaf) in the second year of study in contrast to the populations of its predator. The results stated that the temperature had a significant effect on the population abundance of the phytophagous mite, *O. mangiferus* and its predator while the relative humidity had a negative effect on both populations.

INTRODUCTION

Mango is one of the most nutritionally rich fruits, with a distinctive flavor, smell and taste, especially Egyptian mango is a unique fruit, with an incomparable tropical delicacy. The mango was first brought to Egypt from Sri Lanka. The fruits cultivated by Sri Lankan farmers are, in turn, derived from Indian varieties. Mangoes grow in areas with high humidity, like coastal areas, such as the Nile Delta. They grow best in tropical regions. Ismailia is the main mango-growing area, known for producing the finest mangoes. The soil and climate of Ismailia are especially favorable for the cultivation of Egyptian mangoes. The city of "Beauty and Enrichment" includes vast areas of fertile agricultural land, producing the most famous Ismailia mangoes. The mites (Acari) are important pests of mango in most

of the tropical regions of the world and have long been recognized as affecting mango quality and yield, especially when conditions are optimum and their populations explode. The most of species feeding on plant belong to the obligate plant parasitic Eriophyoidea (gall mites, bud mites, erinose mites, rust mites) and Tetranychoidea (false spider mites, spider mites), while a number of species belong to other lineages. (Eupodoidae, Tarsonemidae and single oribatid mites) (Al-Azzazy, 2005; Sarwar, 2014; Sarwar *et al.*, 2013, 2015; Shah *et al.*, 2014). Spider mites within the genus *Oligonychus*, generally *Oligonychus mangiferus* (Rhaman and Sapra) infest mango orchards in the specific countries. Nourishing is mainly restricted on the upper area of leaf, alongside the midrib and later on alongside the secondary veins. The areas alongside the veins grow into reddish-brown. Destruction of plants commonly by means of the spider mites is perceived starting from October through February resulting in a decrease of photosynthesis activity equal to 30%. *Oligonychus mangiferus* was collected from mango trees, *Mangifera indica* in Ismailia Governorate, (Zaher *et al.*, 1982). The predatory mites associated with phytophagous mite's infestations considered as natural biological control agents to a wide range of economically injurious pests infecting different fruits and crops. They are well known to be capable of regulating and balancing the population of different pests as well as help to gain product free from toxic to keep human health and save the environment from pollution (Taha *et al.*, 2006).

The present work aimed to study the population fluctuations of the phytophagous mite *Oligonychus mangiferus* and its predator *Amblyseius swirskii* associated with mango orchard trees at the experimental farm of the agriculture faculty of the Suez Canal University, Ismailia.

MATERIALS AND METHODS

Mean seasonal abundance of the phytophagous mite *Oligonychus mangiferus* and its predator *Amblyseius swirskii* with mango trees was studied during two successive years, from October 2014 to September 2016, at the experimental farm of the agriculture faculty of the Suez Canal University, Ismailia, Egypt. In orchard, 30 mango leaves were picked out monthly at regular intervals all over the two successive years of the study. After that, leaves were kept in tightly paper bags, and then transferred to the laboratory for examination. Mites were counted for the upper and lower surfaces of each leaf by using stereomicroscope. The densities of mites were assessed as total number per 30 leaves. According to Kumar *et al.* (2015), the total numbers of adult mite stages were counted in 2.5 cm^2 area of the leaf underside. While, the predatory mites were counted in the whole leaf area as reported by Poe (1980). Daily mean, maximum and minimum temperature (°C) and mean relative humidity (R.H. %) was obtained from the central laboratory for Agricultural Climate, Agricultural Research Center, Ministry of Agriculture and Land Reclamation.

Statistical Analysis

The Mean abundance (±SE) of the individuals per leaf was calculated. Analysis of variance followed was applied for studying the significant differences regarding the effects of temperature and relative humidity R.H.% on the abundance of the spider mite and its predators.

RESULTS AND DISCUSSIONS

Mean abundance (±SE) of *O. mangiferus* and its predator *A. swirskii* on mango trees during two successive years, from October 2014 to September 2016, at the experimental farm of the agriculture faculty of the Suez Canal University, Ismailia, are shown in Tables (1, 2) and Figures (1, 2).

Table (1): The seasonal mean abundance (± SE) of *O. mangiferus* and its predator *A. swirskii* associated with mango trees from October 2014 to September 2015.

First year				
Species	**Autumn**	**Winter**	**Spring**	**Summer**
Oligonychus mangiferous	0.6 ± 0.11	0.83 ± 0.18	1.53 ±0.3	2.96 ± 0.6
Amblyseius swirskii	0.23 ± 0.09	0.4 ± 0.15	0.7 ± 0.28	1.33 ± 0.05

Table (2): The seasonal mean abundance (± SE) of *O. mangiferus* and its predator *A. swirskii* associated with mango trees from October 2015 to September 2016.

Second year				
Species	**Autumn**	**Winter**	**Spring**	**Summer**
Oligonychus mangiferous	0.7 ± 0.1	0.96 ± 0.2	1.76 ±0.3	3.43 ± 0.7
Amblyseius swirskii	0.03 ± 0.0	0.33 ± 0.0	0.43 ± 0.28	0.51 ± 0.1

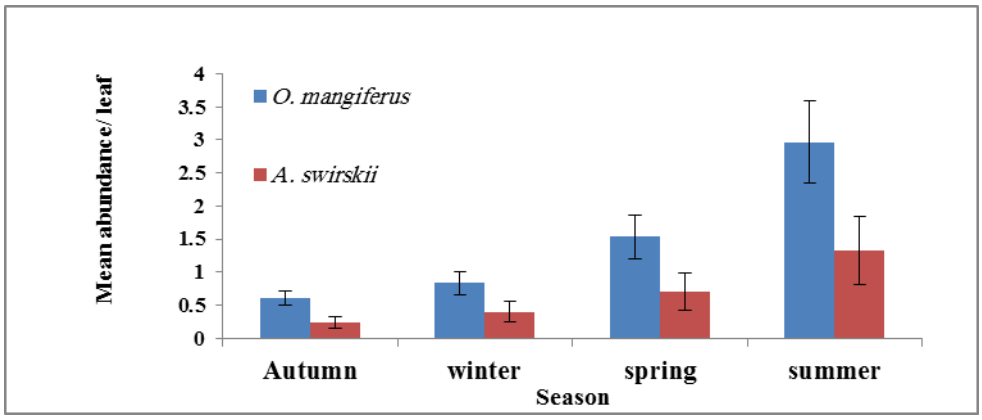

Fig.1. The seasonal mean abundance (± SE) of *O. mangiferus* and its predator *A. swirskii* associated on mango trees from October 2014 to September 2015.

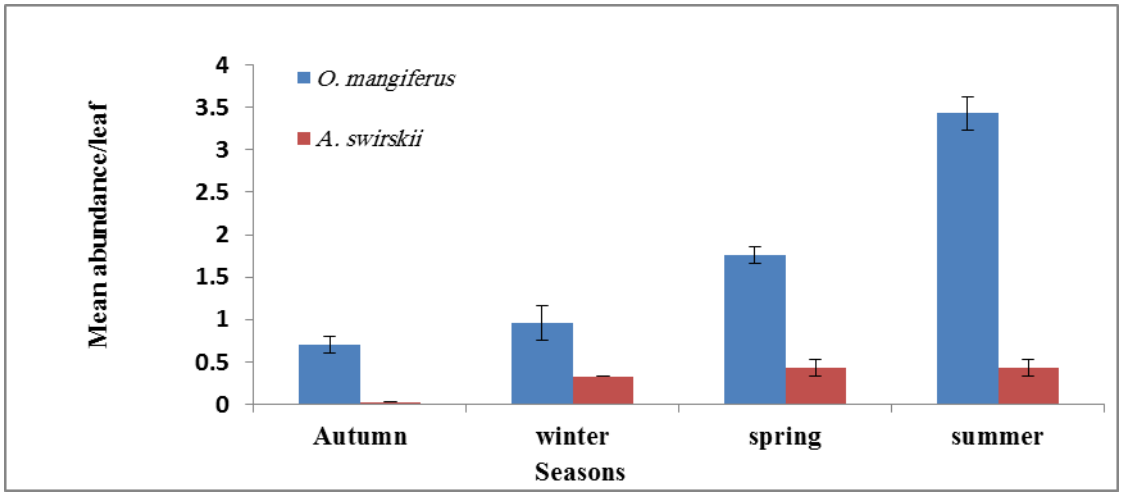

Fig.2. The seasonal mean abundance (± SE) of *O. mangiferus* and its predator *A. swirskii* associated on mango trees from October 2015 to September 2016.

Results showed the presence of *O. mangiferus* during the two successive years of the study in the experimental farm of the agriculture faculty of the Suez Canal University, Ismailia, Egypt. In the first year of study, extended from October 2014 to September 2015, the highest mean abundance of *O. mangiferus* was 2.96 ± 0.6 recorded in summer and the lowest population was recorded in autumn (0.6 ± 0.11). In the second year, extended from October 2015 to September 2016, the mean abundance of *O. mangiferus* increased to 3.43 ± 0.7 in the summer season but decreased to 0.7 ± 0.1 & 0.96 ± 0.2 during autumn and winter seasons. So the highest population abundance was noticed in the summer season during the study period. This relationship between weather parameters and the seasonal population abundance of *O. mangiferus*, as increasing mean temperature stimulated the population increase of *O. mangiferus*. This finding was in line with Zaher and Osman (1970) found that population density of *Oligonychus mangiferus* increased gradually to reach its maximum density during warm and hot months of spring, summer. While relative humidity had a negative effect on their population, many studies had revealed that photoperiod length and temperature are closely related to phytophagous population increases (Fujimoto and Takafuji, 1986). Studies on *Oligonychus* sp. (Banks) life tables showed faster development of these mites as soon as temperature became higher (Wermelinger, 1990). On the other hand, the high humidity has a negative effect on the survival of the active stages of phytophagous mites, which tolerate 60-80 % R.H. (Perring *et al.*, 1984). For the predator species *Amblyseius swirskii*, it was the most dominant species among predacious mites which infect mango trees. Abou-Awad *et al.* (1992) investigated the phytoseiid mite *A. swirskii* (Athias-Henriot) which was the most commonly encountered predator associated with this pest. Their mean abundance increased during summer and decreased during autumn in the first year but it disappeared in autumn in the second year of study. Results in Table (2) and Figure (2) stated that its highest mean abundance was recorded during summer (1.33 ± 0.05) and the lowest mean abundance was recorded in autumn (0.23 ± 0.09). In the second year, its highest mean abundance was 0.51 ± 0.1 during summer but it disappeared during autumn. Zaher and Osman (1970) found that *Amblyseius hutu* had two peaks in March and in September and October on mango leaves. These results are similar to Zaki (1992) who estimated that predaceous mites occur in moderate population throughout autumn and summer. El-Halawany (2001) found that the predatory mite

A. swirskii had one annual peak in July. Mohamed and Nabil (2014) reported that the predator *Amblyseius swirskii* is the more abundant among other predaceous mites occur on mango trees. While Kandeel *et al.* (1986) estimated that this predator was the most dominant on citrus trees and feed on phytophagous mites and crawlers of scale insects. Finally, these phytophagous mites may regard as food supplementation to natural enemies has been shown to enhance conservation of predators in the crop and to increase the efficiency of pest control (Messelink *et al.*, 2014). This phytoseiid predatory mite, which has become a crucial tool in many integrated pest management strategies (Calvo *et al.*, 2011). In conclusion, the result of the present study stated that air temperature and relative humidity had a significant effect on the increase or decrease of the phytophagous and predaceous mites.

REFERENCES

Abou-Awad, B. A., Reda, A. S. and El Sawi, S. A., 1992. Effect of artificial and natural diets on the development and reproduction of two phytoseiid mites *Amblyseius gossipi* and *Amblyseius swirskii* (Acari: Phytoseiidae). Insect Sci. Applic., 13: 441-445.

Al-Azzazy, M. M. 2005. Integrated management of mites infesting mango trees. Faculty of Agriculture, Assiut University, Egypt: 322 pp.

Calvo, F., Bolckmans, K. and Belda, J. 2011. Control of *Bemisia tabaci* and *Frankliniella occidentalis* in cucumber by *Amblyseius swirskii*. BioControl, 56: 185–192.

El-Halawany, A. S. 2001. Studies on some mite species infesting some fruit trees. Doctoral dissertation, Zagazig University. 240pp.

Fujimoto, H. and Takafuji, A. 1986. Photoperiodic sensivity of various stages of the diapausing strain of the Citrus Red Mite, *Panonychus citri* (McGregor) (Acarina, Tetranychidae). Appl. Entomol. Zool., 21(4): 582-588.

Kandeel, M. M., Rakha, M. A. and El-Halawany, M. E. 1986. Citrus mites in Egypt. Egypt J. Product & Dev., 1(1): 55-80.

Kumar, D., Raghuraman, M. and Singh, J. 2015. Population dynamics of spider mite, *Tetranychus urticae* Koch on okra in relation to abiotic factors of Varanasi region. J. Agrometeorol., 17: 102-106.

Messelink, G. J., Bennison, J., Alomar, O., Ingegno, B. L., Tavella, L., Shipp, L., Palevsky, E. and Wäckers, F. L. 2014. Approaches to conserving natural enemy populations in greenhouse crops: current methods and future prospects. BioControl, 59, 377–393.

Mohamed, O. M. and Nabil, M. H. 2014. Survey and biological studies on mite species and scale insects inhabiting mango trees at Sharkia Governorate, Egypt. J. Entomol., 11(4): 210-217.

Perring, T., Holtzer, T., Kalisch, J. and Norman, J. 1984. Temperature and humidity effects on ovipositional rates fecundity, and longevity of adult female Banks Grass Mites (Acari: Tetranychidae). Ann. entomol. Soc. Am., 77: 581-586.

Poe, S. L. 1980. Sampling mites on soybean. In: Kogan, M. & Hezrog, D.C. (eds) Sampling methods in soybean entomology. Springer-Verlag, New York, pp. 312-323.

Sarwar, M. 2014. Some Insect Pests (Arthropoda: Insecta) of Summer Vegetables, Their Identification, Occurrence, Damage and Adoption of Management Practices. International Journal of Sustainable Agricultural Research, 1(4): 108-117.

Sarwar, M., Ahmad, N., Rashid, A. and Shah, S.M.M. 2015. Valuation of gamma

irradiation for proficient production of parasitoids (Hymenoptera: Chalcididae & Eucoilidae) in the management of the peach fruit-fly, *Bactrocera zonata* (Saunders). International Journal of Pest Management, p. 1-9

Sarwar, M., Hamed, M., Rasool, B., Yousaf, M. and Hussain, M. 2013. Host preference and performance of fruit flies *Bactrocera zonata* (Saunders) and *Bactrocera cucurbitae* (Coquillett) (Diptera: Tephritidae) for various fruits and vegetables. International Journal of Scientific Research in Environmental Sciences, 1(8): 188-194.

Shah, S. M., Ahmad, N., Sarwar, M. and Tofique, M. 2014. Rearing of *Bactrocera zonata* (Diptera: Tephritidae) for parasitoids production and managing techniques for fruit flies in mango orchards. International Journal of Tropical Insect Science, 34(S1): 108-113.

Taha, H. A., Mowafi, M. H. and Azouz H. A., 2006. Influence of temperature on developmental stages and life table parameters of the predatory mite, *Neoseiulus neoreticultus* Yousef and El-Borollosy (Acarina: Phytoseiidae: Gamasida). J. Agric. Sci. Mansoura Univ., 31: 493-500.

Wermelinger, B., Baumgartener, J., Zahner, P. and Deluccm, V. 1990. Environmental factors affecting the life tables of *Tetranychus urticae* Koch (Acarina). I. Temperature. Mitt. Schweiz. Entomol. Ges., 63: 55-62.

Zaher, M. A., Gomaa, E. A. and El-Enany, M.A. 1982. Spider mites of Egypt (Acari : Tetranychidae). Inter. J. of Acarol., 8(2): 91-114.

Zaher, M. A. and Osman, A. A. 1970. Population studies on mites associated with mango trees in Egypt (Acarina). J. Bull. de la Soc. Entomol. d'Egypte. 54: 141-148.

Zaki, A.M. 1992. Population dynamics of mites associated with some stone fruit in Menofia, Egypt. Acta Phytopath. et Entomol. Hungarica, 27(1-4): 679-685.

ARABIC SUMMERY

التذبذبات العددية لأكاروس المانجو الأحمر، الأوليجونيكس مانجيفرس و مفترسه الأمبيليسيس سوريسكى المصاحبة لأشجار المانجو بمحافظة الإسماعيلية، مصر

نيفين عبدالله حامد[١]، حمدى محمود الشرباصى[٢]، أحمد حسن أبوغالية[٣]، مها فريد سليمان[٣].

١- معهد بحوث وقاية نباتات، مركز البحوث الزراعية، الدقى، الجيزه.

٢- قسم وقاية النبات، كلية الزراعة، جامعة قناة السويس، الأسماعيلية.

٣- قسم علم حيوان، كلية العلوم، جامعة قناة السويس، الأسماعيلية.

تم دراسة متوسط التعداد الموسمى لأكاروس المانجو الأحمر، الأوليجونيكس مانجيفرس ومفترسه الأمبيليسيس سوريسكى المصاحبة لأشجار المانجو بمزرعة كلية الزراعة بجامعة قناة السويس، الإسماعيلية، مصر. أجريت هذه الدراسة خلال عامين فى الفترة من أكتوبر ٢٠١٤ م إلى سبتمبر ٢٠١٦م. أشارت النتائج الى أن درجات الحرارة والرطوبة تؤثر (بشكل معنوى) على تعداد أكاروس المانجو الأحمر، (الأوليجونيكس مانجيفرس) و مفترسه (الأمبيليسيس سوريسكى) المتواجدين على أشجار المانجو. كما أشارت النتائج الى أن أعلى تعداد لأكاروس المانجو الأحمرقد سجل فى فصل الصيف بقيمة (٠،٦ ± ٢،٩٦فرد/ورقة) و (٠،٠٥ ± ١،٣٣ فرد/ورقة) للأمبيليسيس سوريسكى فى السنة الأولى من الدراسة (من أكتوبر٢٠١٤م إلى سبتمبر ٢٠١٥م) وعلى الجانب الأخر كان أقل تعداد للأوليجونيكس مانجيفرس سجل فى فصل الخريف بقيمة (٠،١١ ± ٠،٦ فرد/ورقة) وللأمبيليسيس سوريسكى (٠،٠٩± ٠،٢٣ فرد/ورقة) متوسط تعداد أكاروس المانجو ارتفع إلى (٠،٧ ± ٣،٤٣ فرد/ورقة) فى السنة الثانية من الدراسة على عكس المفترس (الأمبيليسيس سوريسكى). وأخيراً ، أظهرت النتائج أن درجات الحرارة قد أثرت معنويا على تعداد الأكاروس النباتى (الأوليجونيكس مانجيفرس) ومفترسه بينما الرطوبة النسبية كان لها تأثير عكسى على تعداد هذه الأكاروسات.