EGYPTIAN ACADEMIC JOURNAL OF
BIOLOGICAL SCIENCES
ENTOMOLOGY

A

ISSN
1687-8809

WWW.EAJBS.EG.NET

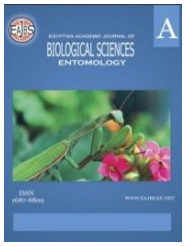
Vol. 13 No. 3 (2020)

Citation: *Egypt. Acad. J. Biolog. Sci. (A. Entomology) Vol. 13(3) pp: 237-242(2020)*

Egypt. Acad. J. Biolog. Sci., 13(3):237-242 (2020)

Egyptian Academic Journal of Biological Sciences
A. Entomology

ISSN 1687- 8809
http://eajbsa.journals.ekb.eg/



Cucumber Plant Mites: Survey and Capacity of Certain Pesticides against the amplest one, *Tetranychus urticae* Koch, in Assiut area, Upper Egypt

Tarek M. Abo-Elmaged
Plant Protection Department, Faculty of Agriculture, Assiut University, Assiut 71526 Egypt
Email: tarek.adam@agr.au.edu.eg

ARTICLE INFO
Article History
Received:17/6/2020
Accepted:22/9/2020

Keywords:
Acari, *T. urticae*, pesticides, cucumber plants, control.

ABSTRACT

The trials were carried out on cucumber plants during spring plantation of 2017 season the Faculty of Agriculture Farm, Assiut University to survey the mite species inhabiting cucumber plants and the associated predators, and to evaluate certain acaricides against the most abundant one, *Tetranychus urticae* Koch. In general, 11 arthropod species belong to 9 families and 4 orders, other than predatory true spiders were surveyed from cucumber plants. The mite species inhabiting cucumber plants were *Polyphagotarsonemus latus* (Banks), *Tetranychus urticae* Koch, *Tetranychus cucurbitcearum* (Sayed), *Pronematus* sp. and *Tydes* sp**.** and five predatory species. The pesticides used in the experiment were thiamethoxam 20% WP, acetamiprid 20%, SP dinotefuran 20% SC, *methomyl 90%* SP, and buprofezin 25% SC. The high percentage reduction was 95.38 for buprofezin after ten days. The highest average of reducing *T. urticae* was for *methomyl* (85.18) and buprofezin 25*%* (84.08), while the lowest average of reducing *T. urticae* was for acetamiprid (42.66). The general reduction of *T. urticae* was 73.46 and 75.84 for thiamethoxam and for dinotefuran, respectively. Since these pesticides are used on all sucking pests, the experiment gave good results to control *T. urticae* associated with other harmful pests.
.

INTRODUCTION

Mites are considered to be major pests of vegetable crops. *Tetranychus urticae* Koch (Acari: Tetranychidae) is the most important mite attacking cucumber plants. Several mite species were noticed to be associated with cucumber in many regions of the world. The family Tetranychidae includes several injuriously significant species of which *Tetranychus urticae* is the most important species on cucumber plants (Mckinlay *et al*.,1992). In Egypt, cucumbers were shown to be infested by different tetranychid mites (Zaher *et al*.,1982). Usually, these cucumber plants are liable to be infested by several tetranychid mite species specially *Tetranychus* spp. (Ahmed 2003, and Abo El-Saad, 2015). The effects of acaricides on *T. urticae* are being extensively studied and its resistance to new pesticides is regularly monitored (Castagnoli *et al*., 2005). Regarding pesticide activity of chemical agents, Speed (chlorphenapyr 24G/L) was the most potent chemical agent for eliminating mites. Resistance development to existing classes of pesticides and the increasing public concern over environmental pollution and health hazards created by synthetic pesticides generate a great need for new classes of pesticide agents with higher activity against the mites and

environmental quality. lots of crops must be sheltered with synthetic acaricides during the hot and dry seasons that help extreme outbreaks of spider mites (Antonious *et al*., 2006 and Shibuya 2020). This study is considered important from an applied point of view in controlling spider mites in the timing of the *T. urticae* population density.

MATERIALS AND METHODS

This work was conducted in the Experimental Farm of the Faculty of Agriculture, Assiut University during 2017 season on cucumber plants. The trial was done in an area of Ca. 1/4 feddan. Each plot was 1/400 of feddan.

Two sampling methods, sweep net and leaf sampling techniques, were used to survey mites and the associated natural enemies dwelling cucumber plants. A standard sweeping net (35 cm. diam.) as described by Borror *et al.* (1979) was used. Samples of double sweeps and 5 leaves in cucumber plants were taken weekly at random. Then, samples were taken into the laboratory and were examined by a stereomicroscope.

The effect of some pesticides against *T. urticae* infesting cucumber plants was studied. Five compounds were used as shown in Table (1). Three replicates of cucumber plants were used for each compound in addition to the non-sprayed plots (control). The direct count was used to count the number of *T. urticae.* Samples were examined before spray (April 21, 2017) and consequently after 1,3,5,7.10,15 and 21days post-treatment.

Table 1: Descriptions of the selected insecticides used against *T. urticae*

Chemical name and formulation	Trade name	Field rate	Source	Chemical class
Thiamethoxam 20% WP	Actara®	240cm3/fadden	Syngenta Agro	Neonicotinoid
Acetamiprid 20% SP	Mospilan®	25g/50Lw	Nippon Soda Company Ltd., Tokyo, Japan	Neonicotinoid
Dinotefuran 20% SC	Ochin®	125g/100Lw		Neonicotinoid
Methomyl 90% SP	Lannate®	300g/fadden	Du Pont, USA	Carbamate
Buprofezin 25 SC	*Applaud*®	150cm3/fadden	Dow Agro Sciences	Insect growth regulator (IGR)

The percentage of reduction in the population density of *T. urticae* was computed according to the formula given by Mulla *et al*. (1971).

$\%\ \text{reduction} = 100 - [(C_1/T_1) \times (T_2/C_2) \times 100]$

where,

C_1 = pre-treatment population density in control habitat.

C_2 = post-treatment population density in control habitat.

T_1 = pre-treatment population density in treated units.

T_2 = post-treatment population density in treated units

RESULTS AND DISCUSSION

Survey of Mites and the Associated Natural Enemies Dwelling Cucumber Plants:

Using different sampling methods enabled us to collect and to identify the most important mites and the associated natural enemies dwelling cucumber plants. Via sweeping and direct count methods, 11 arthropod species belong to 9 families and 4 orders, other than

predatory true spiders were collected from cucumber plants (Table 2). The most common mite species dwelling cucumber was *Polyphagotarsonemus latus* (Banks), *Tetranychus urticae* Koch, *Tetranychus cucurbitcearum, Pronematus* sp. and *Tydes* sp. and five predatory species, *Labidura riparia* Pall., *Chrysoperla carnea* (Steph.), *Pheropsophus africanus* (Dejean), *Coccinella undecimpunctata* L., and *Paederus alferii* Koch. The collected predatory species was observed as rare as a low presence (Table 2).

Table 2: list of mites and the associated natural enemies dwelling cucumber plants in Assiut region during 2017 season.

Order	Family	Scientific name	Common name	Notes
Acari	Tarsonemidae	*Polyphagotarsonemus latus* (Banks)	Broad mite	**L**
	Tetranychidae	*Tetranychus urticae* Koch	Two-spotted spider mite	**L**
		Tetranychus cucurbitcearum (Sayed)		**L**
	Iolinidae	*Pronematus* sp.		**L**
	Tydidae	*Tydes* sp.		**L**
Natural enemies				
Dermaptera	Labiduridae	*Labidura riparia* Pall.	Giant earwig	**T**
Neuroptera	Chrysopidae	*Chrysoperla carnea* (Steph.)	Lace wing	**T**
Coleoptera	Carabidae	*Pheropsophus africanus* (Dejean)	Bombardier beetles	**L, T**
	Coccinellidae	*Coccinella undecimpunctata* L.	eleven-spotted lady beetle	**L, T**
	Staphylinidae	*Paederus alferii* Koch	Rove beetles	**T**
True spider		Unidentified species	True spider	**T**

Notes: L= Leaves sampling
T= Trap sampling

Nahar (2005) conducted an extensive survey and recorded high numbers of *T. urticae* in April and August. In general, the present results agree with those of El-Maghraby *et al.* (1994), Ali 1995, and Bachatly and Sedrak (1997) in which they found that *C. undecimpunctata, Ch. carnea,* and *Syrphus corollae* F. are the most common predator species associated with the cucumber mites. Younes *et al*. (2010) surveyed pests and their natural enemies on six cantaloupe *Cucumis melo* L. varieties in Qaha region, Qualyobia Governorate, Egypt. They add that there are 12 species of true spiders (Araneida) belonging to 9 families and the most abundant species was *Thanatus albini* Audouins (Fam. Philodromidae). Also, they suggested that true spiders can play an important and vital role as biological control agents against pests recorded in the study. Gameel (2013) surveyed the arthropods associated with cucurbit crops during 2011 and 2012 growing seasons at the New Valley in Egypt. His study indicated that there are 28 insect species belong to 25 genera under 20 families of 9 orders. In addition to the *T. urticae* and some unidentified species of the true spiders belong to family Phalangidae. Also, the common associated natural enemies dwelling cucurbit fields are *C. septempunctata* L., *Ch. carnea* Steph., and *C. undecimpuctata aegyptiaca* Reiche. Shalaby *et al*. (2013) found that the main pests of cucumber are *T. urticae* (Koch). However, cucumber plants in the early planting date are attacked by the highest population of *Bemisia tabaci* (Gennadius), while the highest populations of *Aphis gossypii* Glover, and *T. urticae* are recorded in late planting date. Kanika *et al*. (2014) evaluated the damage potential of two-spotted spider mite (*T. urticae*) on cucumber (*Cucumis sativus* L.). The results showed that the maximum population developed in plants with the highest initial infestation density is 20 mites/ grown up leaf (5.57mites/ sq. cm leaf), followed by 4.82, 4.17 and 3.10 mites/ sq. cm leaf on plants containing 15, 10 and 5 mites/grown up leaf as the initial inoculums.

Effectiveness of Some Pesticides against *T. urticae*:

Evaluation of some pesticides against *T. urticae* infested cucumber plants under field

conditions was tabulated in Table 3 indicating the reduction in *T. urticae* population after 1, 3, 5, 7, 10, 15, and 21 days, respectively, post-treatment. The highest average effect of the tested pesticides encountered after 5, 7, 10, 15 days, while the lowest percentage reduction in *T. urticae* population occurred after 1, 3, and 21 days for all pesticides. The high percentage reduction was 91.98, 78.50, 89.96, 94.48, and 95.38 for thiamethoxam 20% after ten days, acetamiprid 20% after five days, dinotefuran 20% after 15 days, *methomyl 90%* after five days, and for buprofezin 25% after ten days, respectively. Generally, the highest average of reducing *T. urticae* was for *methomyl 90%* (85.18) and buprofezin 25% (84.08), while the lowest average of reducing *T. urticae* was for acetamiprid 20% (42.66). The general reduction of *T. urticae* was 73.46 and 75.84 for thiamethoxam 20% and for dinotefuran 20%, respectively (Table 3 and Fig. 1).

Table 3. The ability of the tested compounds in reducing *T. urticae* numbers during 2017 cucumber growing season in Assiut area.

Treatment	Reduction percent of spider mites/plant Day(s) after treatment							
	1	3	5	7	10	15	21	Average
Thiamethoxam 20% WP	50.81	52.73	87.82	68.39	91.98	85.87	58.65	73.46
Acetamiprid 20% SP	15.16	7.95	78.50	42.78	70.33	64.69	19.18	42.66
Dinotefuran 20% SC	58.38	60.70	89.52	83.42	88.28	89.96	60.66	75.84
Methomyl 90% SP	64.48	77.42	94.48	94.25	93.29	94.07	78.27	85.18
Buprofezin 25% SC	58.60	72.97	97.45	90.72	95.38	89.82	83.34	84.08

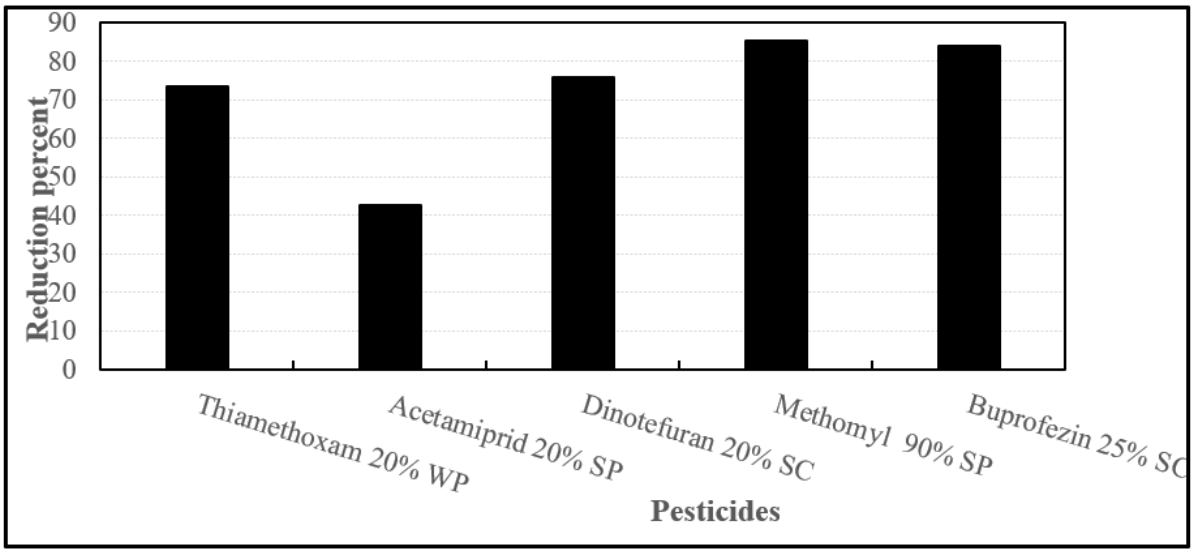


Fig. 1: The average reduction percentage of spider mites/plant of the tested compounds against *T. urticae* numbers during 2017 cucumber growing season in Assiut area.

Pesticide applications were often compulsory to reduce spider mite populations to acceptable levels, even after predator release (Helle and Sabelis 1985). Control of *T. urticae* on host plants still largely depends on the use of synthetic pesticides (Van leeuwer *et al.*, 2010). Hassan and Hamad-Ameen (2019) found that regarding the acaricidal activity of chemical agents, Speed (active ingredient was chlorphenapyr 24G/L) was the most potent chemical agent for the elimination of the mites. Saleh *et al.* (2019) tested certain acaricides against *T. urticae* under field conditions. He reported that the reduction averages are 77.1, 58.8, and 44.4%, in the first season (2016) and 71.47, 64.5, and 53.6% in the second season (2017) for abamectin 1.8% EC, fenpyroximate, and hexythiazox, respectively on eggplant and on the other hand, buprofezin, chlorfenapyr, and abamectin 5% show a significant reduction in the population of *T. urticae* on pepper plant, in the first and second seasons (2016, 2017) which recorded 71.5, 64.16 and 59.88%, 77.8, 66.85 and 66.4%, respectively. Acetamiprid 20 SP was highly effective against sucking pests viz., aphid, leafhopper, whitefly, and thrips. The level of toxicity of acetamiprid 20 SP to predaceous spiders and coccinellids increased with an increase in the dose (Kanna 2006).

Acknowledgements

The author deeply thanks Prof. Dr. Sayed, A. Eraky, Prof. Dr. Ahamed I. Farghal and Dr. Ibrahim A. Mohamed, Department of Plant Protection, Faculty of Agriculture, Assiut University, for their help to improve the manuscript.

REFERENCES

Abou El-Saad, A.K. (2015). Incidence of some piercing-sucking pests and their natural enemies on watermelon in Assiut Governorate. *Journal of Plant Protection and Pathology, Mansoura Univ.,* 6(2): 389-398.

Ahmed, N.F.R. (2003). Studies on arthropods inhabiting cucurbits and beans. M.Sc. Faculty of Agriculture, Cairo University.

Ali, N.A.H. (1995). Studies on resistance of some vegetables hosts to certain major arthropod pests. Ph.D. Thesis, Faculty of Agriculture, Assuit University.255pp.

Antonious G. F., Meyer J. C. and Snyder J. C. (2006). Toxicity and Repellency of Hot Pepper Extracts to Spider Mite, *Tetranychus urticae* Koch. *Journal of Environmental Science and Health,* Part B, 41:1383–1391.

Bachatly, M.A. and R.A. Sedrak (1997). Estimation of predator populations in a squash field under chemical spraying conditions against aphid infestation. *Egyptian Journal Agriculture Research*,75: 83-95.

Castagnoli, M., Liquori M., Simoni S. and Duso. C. (2005). Toxicity of some insecticides to *Tetranychus urticae, Neoseiulus californicus and Tydeus californicus. Biocontrol*,50(4): p. 611-622.

El-Maghraby, M. M.; El-Zohori, M.M. and Hassanein, S.S. (1994). Relationship between insect predators and pests associated with different varieties of squash and cucumber cultivated in the newly reclaimed sandy areas of El-Khattara district, Egypt. *Ibid.*, 21:969-975.

Gameel, S.M.M. (2013). Species composition of piercing-sucking arthropod pests and associated natural enemies inhabiting cucurbit fields at the New valley in Egypt. *Egyptian Academic Journal of Biological Sciences. A. Entomology* Vol.6(2): 73–79.

Helle, W. and Sabelis, M.W. (1985). Spider mites: Their biology, natural enemies and control. Volume 1 Part A. Elsevier, Amsterdam. 406pp.

Hassan O. O. and Hamad-Ameen K. A. (2019). Population dynamic of *Tetranychus urticae* on cucumber in Erbil region with study of the effects three different miticides on *T.urticae*, *Journal of Physics: Conference Series*, 1294 (2019) 092044.

Kanika T., Gulati R. and Geroh M. (2014). Damage potential of *Tetranychus urticae* Koch to cucumber fruit and foliage: Effect of initial infestation density. *Journal of Applied and Natural Science*, 6 (1): 170-176.

Kanna S. S. (2006). Evaluation of Acetamiprid 20 SP Against Sucking Pest Complex in Cotton. M.Sc. Thesis Department of Agricultural Entomology Centre for Plant Protection Sturdies Tamil Nadu Agricultural University. ID.No.03-803-003.

Mckinlay R. G., Spaull A. M. and Straub R. W. (1992). Pests of Solanaceuos crops In: Mckinlay, G.R. (ed) Vegetable crops pests. CRC Press Institute Boston,USA. 263-323 pp.

Mulla, M.S., R.L. Norland, D.M. Fanara, H.A. Darwazeh, and D.W. Mc-Kean. (1971). Control of chironomid midges in recreational lakes. *Journal of Economic Entomology*, 64: 300-307.

Nahar, N. (2005). Integrated management of two sportted spider mite infesting beans. Ph.D thesis. Rajshahi University, Banglaesh. 157 pp.

Saleh M.M., Aioub A. A., Shalaby A.A. and Hendawy M. A. (2019). Efficiency of some Acaricides on the two Spotted Spider Mite *Tetranychus urticae* Koch., Infesting Eggplant and Pepper under Laboratory and Field Conditions. *Zagazig Journal of Agriculture Research*, Vol. 46 No. (5): 1377-1386

Shalaby, F.F.; F.A. Ali; A.A. Hafez and Hayam M. Saad. (2013). Planting date in relation to insect and animal pests attacking cucumber plants under protected cultivation at Giza Governorate. *Egyptian Journal of Agriculture Research*, 91 (4): 1347-1460.

Shibuya T., Iwahashi Y., Suzuki T., Endo R. and Hirai N. (2020). Light intensity influences feeding and fecundity of *Tetranychus urticae* (Acari: Tetranychidae) through the responses of host *Cucumis sativus* leaves. *Experimental and Applied Acarology*, 81:163–172

Van Leeuwen T., Vontas J., Tsagkarakou A., Dermauw W. and Tirry L. (2010). Acaricide resistance mechanisms in the two-spotted spider mite *Tetranychus urticae* and other important Acari: A review. *Insect Biochemistry Molecular Biology*, 40:563–572.

Younes, M.W.F.; I.I.A. El-Sebaey; A.R.I. Hanafy and Y.N.M. Abd-Allah (2010). Survey of pests and their natural enemies on six cantaloupe *Cucumis Melo* L. varieties in Qaha Region, Qualyobia Governorate, Egypt., 88:739-754.

Zaher, M. A.; Gomaa, E. A. and El-Enany, M. A. (1982). Spider mites of Egypt (Acari: Tetranychidae). *International Journal of Acarology*, 8 (2): 91-114.