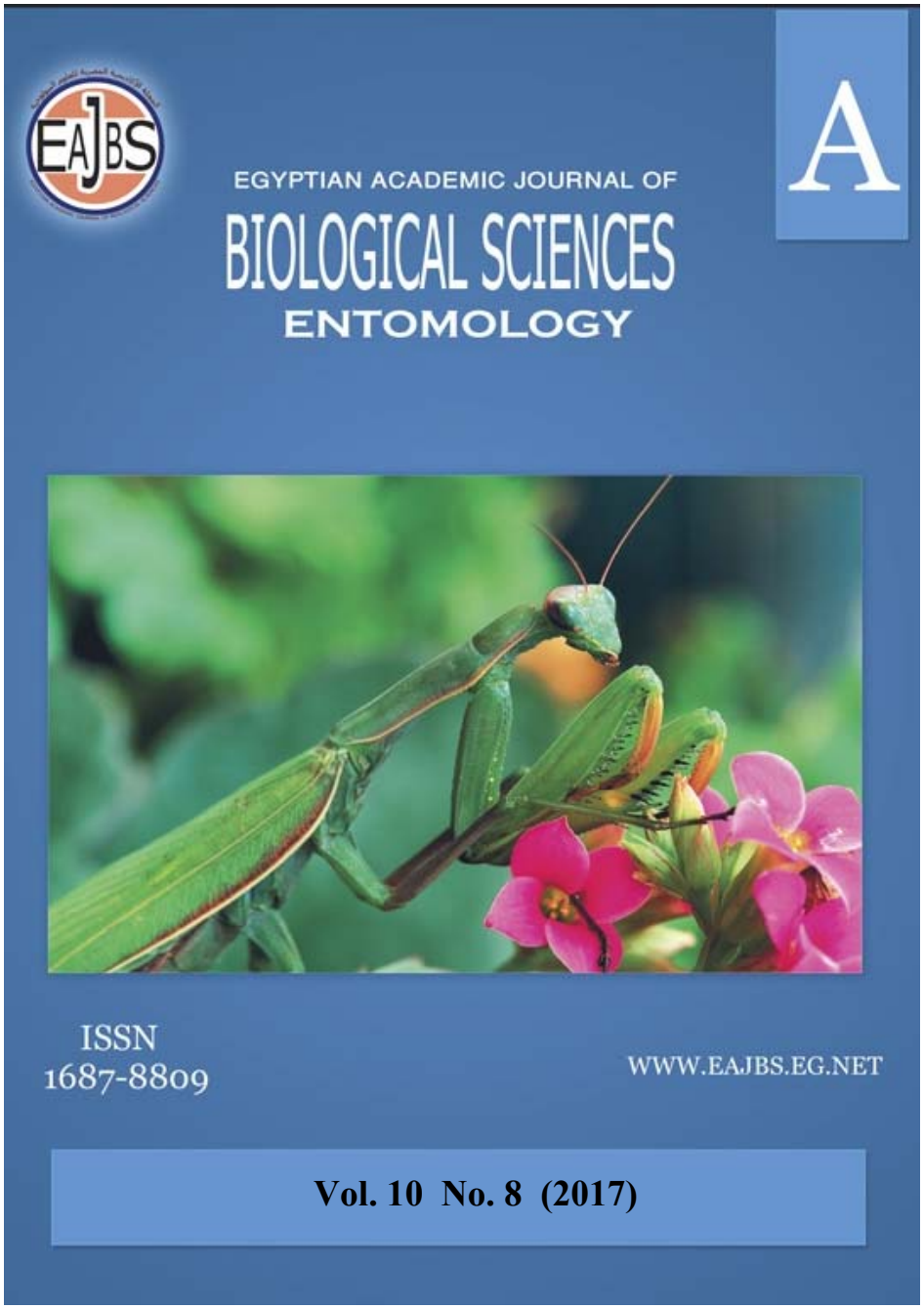

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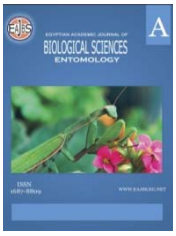

Control of Some Piercing Sucking Pests Infesting Cucumber by Many Botanical Oil and Synthetic Insecticides and Economically Feasibility to Control.

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economically

ABSTRACT

Experimental area was carried out at faculty of Moshothor Agricultural, Banha University, Qalubiya Governorate, under open field conditions during April 2015 and 2016, respectively. This study aim to evaluating the efficacy of some plant extracts and chemical insecticides against sucking pests encompass (the whitefly, *Bemisia tabaci*, the thrips, *Thrips tabaci*, the aphid, *Aphis gossypii* in addition to the spider mite, *Tetranychus urticae* on Cucumber (*Cucumis sativus* L) and Economic feasibility to pests control under field condition. The results revealed that there are significant differences between using three systemic insecticides and five botanical oils on population density of whitefly, thrips and spider mite without aphid, wherever the tested compounds cause reduction to these pests. It is clear from the previous view that each of the treatment Final oil and garlic Oil extraction economically feasible compared to experiments either (thiamethoxam, imidacloprid , acetamiprid, rosemarie oil, sesame oil, lemon oil and control) as each pound investor in them achieves profit of each of them, respectively approximately 3.7, 2.9 pounds.

Recommendation: the paper recommendation by using five botanical oils to reduce population of whitefly, thrips, aphid and red mite without any pesticides.

INTRODUCTION

Cucumber fruits are extremely beneficial for overall health, especially during the summer since they are mostly made of water and important nutrients that are essential for the human body. Cucumber is a very good source of vitamins A, C, K, and B 6, also, contain potassium, pantothenic acid, magnesium, phosphorus, copper and manganese (Vimala *et al.,* 1999). The cucumber fruits contain ascorbic acid and caffeic acid to reduce skin irritation and swollen (Okonmah, 2011). Cucumber (*Cucumis sativus L*) is one of the annual plants in the Cucurbitaceous family that has been cultivated by man for over 3,000 years (Adetula and Denton, 2003; Okonmah, 2011). However, intensive use of synthetic insecticides to control insect pests had led to many problems such as pest resistance and resurgence, adverse effects on non-target organisms including humans, natural enemies and negative environmental impacts (Ecobichon, 2001). These effects have provided the impetus for the development of alternatives used, from it botanical insecticides. Use of botanical insecticides is one of plant protection alternatives, generally considered as safe for the environment and health (Pavela, 2007; Dubey, 2010).

Significant efforts are thus devoted at present to searching for new alternative , highly efficient plant extracts, which would be suitable for the development of botanical insecticides (Dubey, 2010; Pavela, 2010b). Studies on toxic compounds extracted from plants are very important to determine the further direction of research and development of new botanical insecticides. Botanical insecticides provide the higher chance of being friendly on non-target organisms, predominantly to natural enemies of the pests, which are important from the environmental point of view (Kaushik*et al*., 2009; Pavela, 2010b; Rattan, 2010). Sap sucking pests (spider mite, aphids, whitefly and trips) are global plant pests that have caused enormous losses in crop production, mainly in Cucurbitaceae, Fabaceae and Solanaceae (Oliveira *et al.* 2001). These pests are native to Southern Asia but currently distributed worldwide, particularly in tropical regions (Brown and Bird, 1992). And widely spread attacking a wide variety of agricultural crops and causing considerable damage by feeding on phloem sap, and the large amounts of sticky honeydew produced can lower the rate of leaf photosynthesis, either directly by sucking plant juice or indirectly as vector transmitting plant diseases (Carter1990). This study aim to evaluating the efficacy of some plant extracts and chemical insecticides against sucking pests encompass (the whitefly, *Bemisia tabaci*, the thrips*, Thrips tabaci,* the aphid*, Aphis gossypii* in addition to the spider mite, *Tetranychus urticae* on Cucumber (*Cucumis sativus L*) and Economic feasibility to pest control under field condition.

MATERIALS AND METHODS

Experimental design:

Experimental area was carried out at faculty of Moshothor Agricultural, Banha University, Qalubiya Governorate, under open field conditions during April 2015 and 2016, respectively. The cucumber plants (*Cucumis sativus L*) were planting in the soil at 1st of April and leave in the ground until 15th of June during two successive seasons, respectively. Sample of 10 leaves/ replicate were collected randomly at early morning per weekly until the harvest. Beginning control process when appeared the pests on cucumber plants leaves. The treatments were nine treatments (three systemic pesticides, five botanical oils and control (sprayed with water alone) the treatments show in (Table 1). The treatments were distributed on experimental area, each treatment repeats three times.

Table 1: Insecticides and botanical oils with their trade name, active ingredient and rate of application.

Trade Name	Common Name	Rate / L Water
Actara 25 WG	thiamethoxam	350 gm./ Fad.
Confidor 20% SL	imidacloprid	30 cm / 100L
Mospilan 20 SP	acetamiprid	25gm./100 L
Lemon oil	lemon oil	5cm/ 1 L.
Garlic Oil extraction	garlic Oil extraction	5cm/ 1 L.
Final oil	final oil	5cm/ 1 L.
Rosemarie oil	rosemarie oil	5cm/ 1 L.
Sesame oil	sesame oil	5cm/ 1 L.

One-meter wide border was left between the blocks. Block size was six rows of six-meter length in a Randomized Complete Block Design. A knapsack sprayer (10 litter) was used, filled with that prepared concentration just before each treatment. Spraying started when the infestation was more than 5 % in the plant leaves, the

samples were collected before spray and after 24 h., 3 days, 7 days and 14 days from spray. The leaf samples were collected per plot and put on paper bags thenceforth transferred to the laboratory examine and count of eggs, stages of insects and movable stages of spider mite. The agriculture practices were carried out according to recommendation of Egypt agriculture ministry. The sucking pests , the whitefly, *Bemisia tabaci*, the thrips, *Thrips tabaci*, the aphid, *Aphis gossypii* and spider mite, *Tetranychus urticae* infesting Cucumber, (*Cucumis sativus L.*) during 2015- 2016 seasons . Reduction percentage was determined using Henderson and Tilton (1955). Final data were analyzed with (SAS, 1999) and appropriate error terms for the F tests of interactions were calculated separately. Comparisons of means were performed using the Duncan's multiple range test (= 0.05). The mean of sucking insect pests populations from sprayed plots were considered to be an indirect reflection of efficacy of different botanicals.

Sources data and Research method:

Researcher depends on the adopted methods of descriptive and quantitative analyses were averages important relevant research topic of economic and technical variables account. In addition to, the use of the most important indicators and standards of productivity and economic efficiency to identify the productivity and economic efficiency of the various transactions to harvest cucumber plant, as was the use of analysis of variance, using statistical analysis software (SPSS).Also, researcher based on research on two types of data are secondary data published by the Ministry of Agriculture and land reclamation, some research relevant to the subject find The second type of data that the study relied on for so basically they are the primary data collected through a field experiment for the cucumber crop, during the 2015 production season and production in 2016 season.

RESULTS AND DISCUSSION

Evaluating the efficacy of some chemical insecticides and botanical oils were sprayed against sucking pests , the whitefly, *Bemisia tabaci*, the thrips, *Thrips tabaci*, the aphid, *Aphis gossypii* and the spider mite *Tetranychus urticae*, on Cucumber, (*Cucumis sativus L*)in open field. The results revealed that there were significant differences between using three systemic insecticides and five botanical oils on population densities of some pests. But the results revealed that not significant differences between using three systemic insecticides and five botanical oils on population densities of aphid.

Whitefly, *Bemisia tabaci*:

Data revealed that in Table (2) comparing the mean reduction percentages in population of *B. tabaci* nymphs after applications of eight compounds, the data clear that the treatments can be arranged in descending orders as follows: Rosemarie oil, Final oil, Acetamiprid, Lemon oil, Imidacloprid, Sesame oil, garlic Oil extraction and Thiamethoxam, with reduction percentage of 100, 99, 99, 98, 92, 91, 90 and 74, respectively. According to statistical analysis the mean of reduction percentage to *B. tabaci* counts after spraying, divided into two groups (F value = 3 .24*, L.S.D. = 14.43).

Table 2: Mean reduction percentage of *B. tabaci* alive nymphs/ leaf on cucumber plants at Qalubiya Governorate during 2015 and 2016.

Treatments	Pre-treat.	Initial	Residual effect (reduction % after spraying)			
		After 24 hours	After 3 Das	After 7 Das	After 14 Das	Mean reduction %
Thiamethoxam	27	64	92	62	68	74 B
Imidaclopride	28	62	95	91	89	92 A
Acetamiprid	33	61	98	95	100	98 A
Lemon oil	39	49	100	98	100	99 A
garlic Oil extraction	42	53	78	100	92	90 A
Final oil	31	62	97	100	100	99 A
Rosemarie oil	28	59	100	100	100	100 A
Sesame oil	34	59	95	76	100	91 A

F value = 3 .24 * L.S.D. = 14.43

Aphid, *Aphis gossypii* :

Data in Table (3), the results of statistical analysis show that not significant between each treatments, the mean reduction percentages in population of *Aphis gossypii* nymphs after applications of eight compounds it is clear that the eight control agents can be arranged in descending orders as follows: Sesame oil, Thiamethoxam, Lemon oil, Rosemarie oil, garlic Oil extraction, Imidacloprid, Acetamiprid and Final oil with mean reduction of 100, 100, 100, 98, 98, 98, 95 and 92 for the eight agents, respectively. According to the mean of reduction percentage in *A. gossypii* counts after treatment, the compounds insignificantly (F value= 1.10insig.)

Table 3: Mean reduction percentage of *A. gossypii* alive nymphs/ leaf on cucumber plants at Qalubiya Governorate during 2015 and 2016.

Treatments	Pre-treat.	Initial	Residual effect(reduction % after spraying)			
		After 24 hours	After 3 Das	After 7 Das	After 14 Das	Average
Thiamethoxam	30	100	100	100	100	100 A
Imidaclopride	29	84	93	100	100	98 A
Acetamiprid	38	94	86	98	100	95 A
Lemon oil	33	90	100	100	100	100 A
garlic Oil extraction	19	94	97	97	100	98 A
Final oil	24	100	80	98	97	92 A
Rosemarie oil	20	100	94	100	100	98 A
Sesame oil	35	100	100	100	100	100 A

F. value = 1.10 insig.

Thrips, *Thrips tabaci*

Data in Table (4) and from statistical analysis the data show that the mean reduction percentages in population of *Thrips tabaci* nymphs after application of eight compounds divided into three groups, the first group A include acetamiprid, garlic Oil extraction, the second group, Thiamethoxam, Final oil, Lemon oil, Imidacloprid and Rosemarie oil while the third group include sesame oil with mean reduction of 92, 92, 88, 86, 85, 77, 67 and 64, respectively.

Table 4: Mean reduction percentage of Thrips, *Thrips tabaci* alive nymphs/ leaf on cucumber plants at Qalubiya Governorate on 2015 and 2016.

Treatments	Pre-treat.	Initial	Residual effect(reduction % after spraying)			
		After 24 hours	After 3 Das	After 7 Das	After 14 Das	Average
Thiamethoxam	22	69	78	88	100	88 AB
Imidacloprid	31	98	88	74	69	77 AB
Acetamiprid	19	88	78	98	100	92 A
Lemon oil	17	54	60	100	96	85 AB
garlic Oil extraction	24	79	92	96	89	92 A
Final oil	25	94	80	91	87	86 AB
Rosemarie oil	22	96	95	62	45	67 AB
Sesame oil	29	98	79	64	50	64 B

F value = 2.62* L.S.D. = 25.6

Spidermite, *Tetranychus urticae* :

Data in Table (5) show that the mean reduction percentages of *Tetranychus urticae* movable stage after applications of eight compounds it is clear that the eight control agents can be arranged in descending orders as follows: Lemon oil, Imidacloprid, Rosemarie oil, Acetamiprid, Thiamethoxam, Final oil, garlic Oil extraction and Sesame oil with mean reduction of 99, 97, 96, 95, 94, 93, 89.and 86 for the eight agents, respectively .

According to the mean of reduction percentage *T. urticae* counts after treatment, the compounds could be divided three groups (F value = 2.98* L. S. D = 8.66)

Table 5: Mean reduction percentage of *T. Urticae* alive movable stage/ leaf on cucumber plants at Qalubiya Governorate during 2015 and 2016.

Treatments	Pre-treat.	Initial	Residual effect(reduction % after spraying)			
		After 24 hours	After 3 Das	After 7 Das	After 14 Das	Average
Thiamethoxam	50	89	94	95	92	94 ABC
Imidacloprid	55	94	92	98	100	97 AB
Acetamiprid	48	67	94	95	96	95 AB
Lemon oil	55	91	98	98	100	99 A
garlic Oil extraction	41	97	98	88	83	89 BC
Final oil	39	93	92	95	93	93 ABC
Rosemarie oil	56	69	97	98	93	96 AB
Sesame oil	59	71	76	85	97	86 C

F value = 2.98* L.S.D = 8.66

The results are in agreement with those obtained by Abbassey *et al.* (2009), Ahmed *et al.* (2014), Akram *et. al.* (2010), Maha (2011),Qamar *et al.* (2016), Shalaby (2004) and Vimala *et al.* (1999).

Results of Economic Evaluation:

Table 6.indicate that the average productivity of cucumber plant reached a maximum of approximately 20 tons / Faddan for the experiment treatment Lemon oil, reaching minimum about 17tons / Faddan with the control. The average total costs reached maximum about 6149 pounds per Faddan to experiment treatment especially acetamiprid but the lowest amounted were about 5000 pounds per faddan with the check treatment, also, total revenue above to experiment treatment acetamiprid about 12000 pounds per faddan,while total revenue was decreased to10200pounds / Faddan for control, and the net return about 6706 pounds / Faddan and about 279 pounds / Qirats a maximum of experiment treatment final. While its lowest level was approximately6046 pounds / faddan and about 252 pounds /Qiratsat acetamiprid treatment, and appreciated the benefits relative to the costs (CBR).

These results in Table 6 show benefits/ costs wherever, Final oil and garlic Oil extraction treatments was the best of which was about 2.3, while acetamipridtreatment was the least and that about 1.9, and calculates the return Pound investor for that class data to suggest that reached its peak in the transaction experiment Final oil and garlic Oil extraction which amounted to about 3.7 means that every pound investor achieves a profit estimated at 3.7 pounds, while as much as its lowest level at about 2.9 to the experiment of treatment acetamiprid which it means that every pound invested in that experiment to achieve an additional profit of about 2.9 pounds, it is clear from the previous view that each of the treatment Final oil and garlic oil extraction economically feasible compared to experiments either (Thiamethoxam, imidacloprid , acetamiprid, rosemarie oil, sesame oil, lemon oil and control) as each pound investor in them achieves profit of each of them, respectively approximately 3.7, 2.9 pounds.

Table 6: Economic evaluation indicators associated of cucumber and cucumber yield of faddan.

Terms	Thiamethoxam	Imidacloprid	Acetamiprid	Rosemarie oil	Sesame oil	Final oil	Garlic Oil extraction	Lemon oil	Control
Average productivity ton/fad	19.6	19.7	20	19.8	19.7	19.8	19.7	19.5	17
Total costs (L.E)	5714	5834	6194	5426	5294	5174	5174	5294	5000
Average price L.E per tone	600	600	600	600	600	600	600	600	600
Total return (L.E)	11760	11820	12000	11880	11820	11880	11820	11700	10200
Net Return per Fedden (L.E)	6046	5986	5806	6454	6526	6706	6646	6406	5200
Net Return per Qiraat (L.E)	252	249	242	269	272	279	277	267	217
Benefits / costs ratio (CBR)	2.1	2.0	1.9	2.2	2.2	2.3	2.3	2.2	2.04
Return pound	3.2	3.1	2.9	3.5	3.6	3.7	3.7	3.6	3.4

REFERENCES

Abbassey, M. A.; S. A. Mostafa; M. A. Mostafa; A. H. Mangound and S. A. Osman (2009). Evaluation of certain chemicals and biochemical compounds on red spider mite, *Tetranychus urticae* Koch (Acarina: Tetranychidae) infesting cotton plants, Egypt. J. Agric. Res., 87 (1): 61-70

Adetula O. and L. Denton (2003). Performance of vegetative and yield accessions of cucumber (Cucumis sativus L.) Horticultural Society of Nigeria (HORTSON) Proceedings of 21st annual conference 10-13.

Ahmed M. F. K. and Gamilah and Aml A. Fouad (2014). Economic analysis of production determinates of summer potatoes in Alexandria Governorate. Egyptian Journal Of Agricultural Economics, Vol (24), NO. (4):1897-1914.

Akram, W.H.A.; k., A. Hafeez ; F. H. Bilal; Y.K. Kim and J.J. Lee (2010). Potential of citrus seed extracts against dengue fever mosquitoe, *Aedes albopictus* (SKUSE) (Culicidae: Diptera). Pak. J. Bot., 42: 3343-3348

Brown, J.K. and J. Bird, (1992). Whitefly-transmitted geminiviruses and associated disorders in the Americas and the Caribbean Basin. Plant Disease, 76: 220-225.

Dubey NK.; Shukla R; Kumar A; Singh P and Prakash B. (2010). Global scenario on the application of natural products in integrated pest management programmes. In: Dubey, N. K. (ed.) Natural products in plant pest management. CAB International, UK, pp. 1-20.

Ecobichon, D.J. (2001). Pesticide use in developing countries. Toxicology, 160, pp. 27-33.

Henderson, C.F. and E.W. Tilton (1955). Tests with acaricides against the brown wheat mite. J. Econ.Entomol., 48: 157-161.

Kaushik G, Satya S, Naik SN (2009). Food processing a tool to pesticide residue dissipation-A review. Food Res. Int., 42: 26-40.

Maha, S. El-Ghanam (2011). Ecological studies on certain cucumber insect pests and their control with non-traditional means. Ph. D. thesis, Fac. Agric. Moshtohor, Zagazig Univ., pp: 395.

Okonmah, L.U. (2011). Effects of different types of staking and their cost effectiveness on

the growth, yield and yield components of cucumber (*Cumumis sativus* L). Int. J. of Agric. Sci., 1 (5): 290- 295.

Oliveira, M. R.V.; T. J. Henneberry and P. Anderson (2001). History, current status, and collaborative research projects for *Bemisia tabaci.* Crop Protection, 20: 709-723.

Pavela R (2007). Possibilities of botanical insecticide exploitation in plant protection. Pest Technol., 1: 47-52

Pavela R (2010b). Natural products as allelochemicals in pest management. In: Dubey, N. K. (ed.) Natural products in plant pest management. CAB International, UK, pp. 134-148

Qamar Z.1.; N. Mohammad; S. A. Khan and S. Ahmad (2016). Effect of Insecticides on the Population of Aphids, Natural Enemies and Yield Components of Wheat Pakistan J. Zool., 48(6): 1839-1848.

Rattan R S. (2010). Mechanism of action of insecticidal secondary metabolites of plant origin. Crop Prot., 29(9): 913-920.

SAS Institute (1999). SAS User's guide: Statistics SAS Inst., Cary, N.C.

Shalaby, S. H. (2004). Studies on the efficiency of some new pest control measures against certain pests of common bean. Ph. D. thesis, Fac. Agric. Moshtohor, Zagazig Univ., 265 pp.

Vimala, P.; C.C. Ting; H. Salbiah; B. Ibrahim and L. Ismail (1999). Biomass production and nutrient yields of four green manures and their effects on the yield of cucumber. J. Tropical Agric and Food Sci., 27:47-55. www.capmas.gov.eg

Yin GH, Dang YL (2008). Optimization of extraction technology of the Lyciumbarbarum polysaccharides by Box–Behnken statistical design. Carbohyd Polym 74:603–610.

ARABIC SUMMARY

مكافحة بعض الافات الثاقبة الماصة التى تصيب نباتات الخيار باستخدام العديد من الزيوت النباتية والمبيدات المخلقة والجدوى الاقتصادية للمكافحة

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نفذت التجربة الحقلية في مزرعة التجارب بمشتهر التابعه لكلية الزراعة جامعه بنها فى محافظه القليوبية تحت ظروف الحقل المفتوحخلال الموسمين 2015 ، 2016 على التوالى . تهدف الدراسة الى تقييم فاعلية بعض المبيدات و الزيوت الطبيعة النباتية على الافات الثاقبة الماصة والتى تشمل الذبابة البيضاء *Bemisia tabaci*، التربس (*Thrips tabaci*)، المن (*Aphis gossypii*) بالإضافة إلى العنكبوت الاحمر (*Tetranychus urticae*) التى تصيب نباتات الخيار (*Cucumis sativa* L.) والجدوى الاقتصادية للمكافحة تحت ظروف الحقل. استخدم تسع معاملات منه (ثلاث مبيدات حشرية ، خمسة زيوت طبيعية نباتية ومقارنه تم رشها بالماء فقط). أظهرت نتائج التحليل الإحصائي وجود فروق معنوية بين استخدام مبيدات الافات و استخدام زيوت النباتات (مستخلصات) على الكثافة العددية للافات فى كلا الموسمين. كما اوضحت النتائج ان التجربة المعاملة بزيت الشبت والتجربة المعاملة بزيت الجرجير ذات جدوي اقتصادية مقارنة بالتجارب الأخري (Thiamethoxam - Imidaclopride - Acetamiprid - زيت روزمارى - زيت سمسم - زيت ليمون)، حيث أن كل جنيه مستثمر فيهم يحقق ربح بلغ لكل منهم علي الترتيب حوالي 3.7، 2.9 جنيه.