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Efficiency of Certain Evaluated Pesticides and Phytochemicals on the Inspected Aphids (*A. gossypii*) on Growing Cucumber Plants in Greenhouse and Market

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ABSTRACT

The present research was carried out during winter and spring growing seasons of 2014 for controlling the aphid attacking the cultivated cucumber in greenhouse. In the spring season of 2014, azadirachtin was evaluated against the aphid and compare with the tested essential oils, while in the winter season azadirachtin was compared with two insecticides (abamectin and pyrethrin). Metalaxyl as a fungicide was applied during the both growing seasons as a protective agent against the downy mildew. The results showed that onion oil and red basil oil were the most effective treatments throughout the test period of spring season in reducing the number of aphid giving the highest general mean of reduction percentages, 73.8%, 68.85%, respectively, but in winter season, azadirachtin and abamectin were the most effective treatment throughout the test period in reducing the number of aphid giving the same highest general mean of residual reduction percentage (74.17% and 74.15%), respectively, while Pyrethrin showed a reduction of 72.40%. The residues of the applied pesticides, were determined in the collected samples of commercial and experimental cucumber fruits. The results showed that the detected amount of carbohydrates; potassium and vitamin C were high in the sample of experimental cucumber fruits (prince variety), where the lower detected ones were recorded in commercial cucumber fruits (mixed varieties). Moreover, it was found that commercial cucumber fruits contained higher amount of the pesticide residues of propamocarb (a carbamate fungicide) (0.53 ppm) and iprodione (a carbamate fungicide) (0.19 ppm) which are greatly dangerous to human health. It is noticed that the Egyptian farmers are using so much pesticides and therefore, it is important to advise the farmers about the type of pesticides and the rate they are applying via safe recommendations.

Keywords: *Cucumis sativus* L., *Aphis gossypii*, Azadirachtin, Essential oils.

INTRODUCTION

Cucumber (*Cucumis sativus* L.) is considered as one of the most important vegetable crops that can be cultivated under greenhouse conditions and open fields in Egypt (Maklad *et al.*, 2012). Ordinary, the cultivated cucumber plants in greenhouses during autumn and spring seasons are likely to be attacked by many harmful and destructive sucking insects and animal pests (mites), which cause qualitative and quantitative reduction of yield (El-Khayat *et al*., 2010). The melon aphid, *Aphis gossypii* Glover (Hemiptera: Aphididae) has become a serious pest of wide spectrum of crops and is considered to be a potential vector of numerous plant pathogenic viruses worldwide (Lokeshwari, *et al* 2014).

Cucumber is eaten and consumed as fresh fruit due to their nutritional value. Cucumber fruits contain protein; carbohydrate, vitamin A, C and E and they are rich in beta-carotene which is important for ensuring vitamin A adequacy in the human diet (Trumbo *et al*., 2001). Vitamins C and E and carotenoids are well-recognized as antioxidants (Bello *et al.,* 2014), in addition carotenoids are also known to have anti-cancer properties (Donaldson, 2004). Chemical and natural pesticides are being used for controlling numerous pests attacking cucumber either in field or in green houses (Aldeghairi *et al*., 2013 and Li *et al*., 2014).

Kyuheon *et al.* (2004) applied Bionatrol® with an air blast sprayer at concentrations of 0.3% and 0.2% and found that all insect populations were reduced by 88-95%.

The present investigation aims to study the efficacy of the tested pesticides on the prevalent aphid. Also, the study concerned with the determination of pesticides residues on fruits and certain phyto-chemical compound of the fruits (vitamins; carbohydrates; potassium and fibers) in the collected fruits of the green house as compared with these collected samples of cucumber fruits from markets.

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MATERIALS AND METHODS

1. Greenhouse experiment

Experiments were carried out during the spring and winter seasons of 2014 in the constructed green house at the farm of the Faculty of Agriculture (Saba-Basha), Abis, Alexandria governorate, Egypt. The cucumber plants (*Cucumis sativus* L.) (Prince Variety) was cultivated at the first week of September, 2014 as winter crop.

The agricultural practices during the season of 2014 were performed according to the recommendations of the Egyptian Ministry of Agriculture. Treatments were arranged in a complete randomized block design with three replicates for each treatment.

Insecticides used

1. **Achook® 0.15%** EC **(azadirachtin):** It is a botanical insecticide extracted from the neem tree, *Azadirachta indica*.
2. **Vertemic® %1.8 EC (abamectin):** An insecticide derived from streptomyces avermitilis as soil microorganisms and modified from avermectins.
3. **Pyrethrin ® (a natural pyrethrin):** It is a botanical insecticide derived from chrysanthemum flowers which most commonly found in Australia and Africa. It works by altering nerve function, which causes paralysis in target insect pests, eventually resulting in death.
4. **Ridomil® (metalaxyl)**: It is a systemic fungicide with protective and curative action, absorbed through the leaves, stems, and roots. It was applied to protect cucumber from the downy mildew.

3.2. The tested essential oils

The used essential oils against the pests attacking cucumber in the greenhouse were Camphor (*Eucalyptus globules*), Onion (*Allium cepa*) and Basil (*Ocimum basilcum*).

1. Camphor (*Eucalyptus globules*)

Leaves of camphor are containing tannins and associated acids, flavonoid pigments, eucalyptin, volatile oil containing cineole (known as eucalyptol), geraniol, alpha-pinene, terpineol, lemonene, phellendrene, cymene, piperitone, hyperoside, quercetin, quercetrin, rutin, monoterpenes, sesquiterpenes, resins and waxes.

2. Onion (*Allium cepa*)

Allium species, especially *Allium* vegetables, are characterized by their rich content of thiosulfinates and other organosulfur compounds, such as the well known lachrymatory factor. The thiosulfinates or alkane (ene) thial-Soxide are formed by the action of the enzyme alliinase (E.C. 4.4.1.4) from their respective S-alk(en)yl cysteine sulfoxides which are the main responsible of onion flavor and produce the eye-irritating compounds that induce lachrimation. However, depending on the *Allium* species, and under different conditions, thiosulfinates can decompose to form additional sulfur constituents, including diallyl, methyl allyl, and diethyl mono-, di-, tri-, tetra-, penta-, and hexasulfides, vinyldithiins, and (E)- and (Z)-ajoene.

3. Common basil (*Ocimum basilcum*)

Common basil (*Ocimum basilicum* L.), (Fam Lamiaceae) is an annual herb which grows in several regions around the world. Among more than 150 species of the genus *Ocimum,* basil is the major essential oil crop which is cultivated commercially in many countries (Sajjadi, 2006). Traditionally, basil has been extensively utilized in food as a flavoring agent, and in perfumery and medical industries (Telci, *et al*. 2006). The leaves and flowering tops of the plant are perceived as carminative, galactogogue, stomachic and antispasmodic in folk medicine (Sajjadi, 2006). However, recently the potential uses of O. basilicum essential oil, particularly as antimicrobial and antioxidant agents have also been investigated (Wannissorn *et al*., 2005). The *O. basilicum* essential oils exhibited a wide and varying array of chemical compounds, depending on variations in chemotypes, leaf and flower colors, aroma and origin of the plants (Sajjadi, 2006).

The application rates of the evaluated pesticides are shown in Table (1). The tested compounds were supplied by the Ministry of Agriculture, Egypt.

Table1. The rates of the tested compounds applied during the winter season of 2014

Tasted compounds	Common name	Formulation	Application rate / liter(ml) water
Achook®	Azadirachtin	EC*	2.5
Vertemic® % 1.8	Abamectin	EC	1.5
Pyrethrin®	Pyrethrin	EC	2
Ridomil®	Metalaxyl	WP**	1.5 g
Onion oil	-	-	2
Camphor oil	-	-	2
Red basil oil	-	-	2

EC* = Emulsifiable Concentrate and WP** = Wettable Powder

Experimentation

The evaluated compounds were sprayed for controlling the aphid. Plants were sprayed using a Knapsack sprayer (20 l), at the rate shown in Table (1). In the spring season of 2014, azadirachtin was evaluated against the aphid and compare with the tested essential oils, while in the winter season azadirachtin was compared with two insecticides (abamectin and pyrethrin). Metalaxyl as a fungicide was applied during both the growing seasons as a protective agent against the downy mildew. Mean numbers of aphid were calculated before and after pesticidal application. The infestation reduction percentage was calculated according to henderson and tilton (1955).

A sample of 2 kg of cucumber fruits were collected from plants as they were of age of 60-65 days from each treatment. The samples were transferred to the laboratory for determining the residues at the Central Laboratory of Pesticides Residues Analysis of Pesticides and Heavy Metals in Food, Giza, Egypt and another sample of 2 kg cucumber fruits of same plants were also taken to determine their chemical components (protein; carbohydrates; fibers; vitamins A and C and potassium K) at the Unit of Analysis and Scientific Service, Faculty of Agriculture, Alexandria University.

Meanwhile, another samples of cucumber fruits were collected from the local market to determine the possible occurring of pesticides residues to be compared with the treated cucumber collected from greenhouse.

RESULTS AND DISCUSSION

1. Spring plantaion (season 2014).

Azadirachtin and certain essential oils (onion oil, basil oil and camphor oil), were evaluated to show their effect on aphid *Aphis gosypii.* Perusal data in Table (2) revealed that all tasted treatments reduced the number of aphid as compared with those numbers of the untreated plots. The used treatments induced different reduction percentages. The superior treatment after three days was onion oil which gave a reduction percentage of 67.46%followed by camphor oil (60.17%), red basil oil (56.94%) and Achook® (2.20%).

After one week post- treatment, red basil oil was the superior giving high reduction percentage of 80.85% followed by onion oil (80.23%), camphor oil (73.15%) and Achook® (49.23%).

In this concept, the general mean of biological performance percentage throughout the whole inspection period (3, 7) showed that onion oil and red basil oil were the most effective treatments throughout the test period in reducing the number of aphid giving the highest general mean of reduction percentages, 73.8%, 68.85%, respectively. Azadirachtin (Achook®) treatment caused moderate general mean of residual reduction percentage estimated by 25.7%.

(Adriaan, *et al*, 1994) reported that the aphid *Aphis gossypii* Glover is generally seen as a highly polyphagous species with mainly parthenogenetic reproduction.

2. Winter plantaion (season 2014).

In fact, aphids become important pest problems in vegetables worldwide. The severity has increased because many species become resistant to existing insecticides (Srikanth, 1988). This has resulted in intensive spray program with mainly broad spectrum insecticides, and beneficial organisms were adversely affected. In this cases selective insecticide are essential and the tested mentioned compounds (Table 1) have been new answer to meet the control of aphids in cucumber program managment.

The presented data in Table (3) revealed that all tested treatments reduced number of aphid *Aphis gossypii* to be less than that of the untreated plots. The used treatments induced different reduction percentage after three days where abamectin gave the highest reduction estimated by 73.3%, followed by azadirachtin (71.4%) and pyrthrin (66.6%).

After five days post treatment, pyrthrin was the superior giving the highest residual reduction percentage of 77.7%, followed by azadirachtin (71.4%) and abamectin (60.00%).

After one week post- treatment, the residual reduction percentage showed again that the superior compound was abamectin recording 90.00% followed by azadrachtin (85.75%) and pyrthrin (75.00%).

After ten days post treatment, abamectin was in the 1st rank in reducing the infestation of aphid giving a reduction of 73.3%, pyrthrin came in 2nd rank (70.3%) and the last one was azadrachtin (68.2%).

In this concept, the general mean of reduction percentage throughout the whole infestation period (3, 5, 7 and 10 days) showed that Azadirachtin and Abamectin were the most effective treatment throughout the test period in reducing the number of aphid giving the same highest general mean of residual reduction percentage 74.17% and 74.15% respecting,while Pyrthrin showed a reduction (72.40%).

It was noticed that the mean numbers of aphid during the spring season was higher than those detected during winter season.

Table 2. Efficacy of certain tested compounds against aphid, *Aphis gossypii* infesting cucumber plants, (*Cucumis sativus* L.) during the spring season of 2014

Treatment	Pre-treatment	Reduction % after				General mean of Infestation Reduction (%)
		3 day		7 day		
	A*	A	R** (%)	A	R (%)	
Azadirachtin	447.0	553.0	2.20	278.0	49.23	25.7[c]***
Onion oil	475.0	187.0	67.46	115.0	80.23	73.8[a]
Camphor oil	523.0	252.0	60.17	172.0	73.15	66.6[b]
Red basil oil	405.0	211.0	56.94	95.0	80.85	68.85[ab]
Untreated Check	400.0	484.0	00.00	490	00.00	0.00[b]
LSD 0.05	-	-	-	-	-	34.6

*A: mean number of Aphid individuals /leaf ,
**R: reduction percentage of infestation after insecticide application,
*** Means followed by the same letter(s) in each column are not significantly different at $P \leq 0.05$ level.

Table 3. Efficacy of certain treatments on Aphid, *Aphis gossypii* infesting cucumber plants, (*Cucumis sativus* L.) during the second season of 2014

Treatments	Pre-treatment	% Infestation Reduction after								General mean Infestation Reduction%
		3 day		5 day		7 day		10 day		
		A*	R** (%)	A	R (%)	A	R (%)	A	R (%)	
Azadirachtin	7.0	3.0	71.4	3.0	71.4	2.0	85.7	5.0	68.2	74.17[a]***
Abamectin	5.0	2.0	73.3	3.0	60	1.0	90	3.0	73.3	74.15[a]
Pyrthrin	6.0	3.0	66.6	2.0	77.7	3.0	75	4.0	70.3	72.40 [a]
Untreated Check	4.0	6.0	0.00	6.0	0.00	8.0	0.00	9.0	0.00	0.00[b]
L.S.D $_{0.05}$	-	-	-	-	-	-	-	-	-	10.78

*A: mean number of aphid individual / leaf.
**R: reduction percentage of infestation after insecticide application.
*** Means followed by the same letter(s) in each column are not significantly different at $P \leq 0.05$ level.

As clearly shown in Table (4), the phytochemical components of analyzed cucumber fruits showed great differences between the tested cucumber variety "Prince" and the sample of cucumber fruits collected from the local market. For example, the highest mean values of vitamin C; potassium K and carbohydrates were 550 mg / 100 g; 2779 mg / 100 g and 4.1496 % for prince cucumber, in respect as compared with the parallel measurement of the market cucumber indicated 300 mg / 100 g; 2427 mg / 100 g and 2.2871 % for vitamins C; potassium K and carbohydrates, in respectively.

Similarly, the lower contents of ash; moisture content; protein; fat and fiber showed lower percentages of 0.449 mg / 100 g; 93.664 mg / 100 g; 1.0559 mg / 100 g; 0.1203 mg / 100 g and 0.5112 % for Prince cucumber and 0.5377 mg / 100 g; 95.5819 mg / 100 g; 1.0245 mg / 100 g; 0.1105 mg / 100 g and 0.4488 % for market cucumber, respectively.

The obtained results were in accordance with those of Zheng *et al.* (2011) they found that tomatoes contains of vitamin C was 352.7 mg / kg. Shah and Xian (2013) stated that the information for understanding whitefly population dynamics and dispersal among different crop systems were important and affected by elements composition of cucumber plants. Also, Dehghani and Ahmadi (2013) studied the effect of abamectin and neem oil on the whitefly on cucumber plants and mentioned that these chemicals appeared to be potentially safe insecticides in an environment for controlling this pest in integrated pest management program.

Also, from Table (5), it could be seen that these are differences between the assigned residues of pesticides in commercial and experimental cucumber fruits. The commercial cucumber fruits revealed high residues of propamocarb (0.53); thiophanate–methyle (0.04) and iprodion (0.19).

It could be said that the Egyptian farmers are using pesticides so many pesticides on cucumber which it is their dangerous risk on human health. Similar results were obtained by Gafar *et al.* (2010 and 2011) on some other vegetables using the same pesticides and doses.

Table 4. The detected chemical components of the tested and market cucumber fruits

Source of sample	Carbohydrates %	Fiber %	Fat %	Protein %	Moisture %	Ash%	K mg\kg	Vit. A mg\100 g	Vit. C mg\100 g
Green house	4.1496	0.5112	0.1203	1.0559	93.664	0.499	2779	44.68	550
Market	2.2871	0.4488	0.1105	1.0245	95.5819	0.5377	2427	52.36	300

Table 5. The determined pesticide residues in the tested and market samples of cucumber

Pesticide	Assigned residue mg\kg	ADI*
	Market sampled fruits	
Propargite	0.01	0.15
Propamocarb	0.53	0.1
Metalaxyl	0.01	0.03
Cyprodinil	0.01	0.03
Thiophanate -methyl	0.04	0.02
Carbendazim	0.02	0.03
Iprodione	0.19	0.06
Fludioxonil	0.01	0.033
	Experimentel treated fruits	
Piperonyl butoxide	0.03	0.2
Abamectin	0.03	0.0001
Metalaxyl	<1OQ	0.03
Azadirachtin (Achook®)	-	-
Pyrethrin	-	-

***** Food and Agriculture Organization Statistics Division.

Also Abdel-Gawad (2001) reported that pesticides affected crop growth and reduced its yield and quality due to their phytotoxicity and also due to their effects on soil fertility and salinity as stated by Lang and Cai (2009). Moreover, Bartha *et al*. (1967) and Mallik and Tesfai (1985) reported similar effects of pesticides on plant growth and soil. Also, Farenhorst (2006) and Ferencz and Balog (2010) reported that most soils under field and vegetable crops and forests were contaminated with pesticides residues. Pimentel (2005) stated that without pesticides application the loss of fruits, vegetables and cereals from pest injury would reach 78%; 54% and 32%, respectively. Crop loss from pests declines to 35% to 42% when pesticides are used. Never the less, pesticides might have their adverse effect on environment, biological agents and human health.

REFERENCES

Adriaan, G. J., T. T. Wouter and P. W. F. DeVrijer 1994. Host Races of *Aphis gossypii* (Homoptera: Aphididae) on Cucumber and Chrysanthemum. Entomol. Society of America 23.5 PG.1235-1240.

Abdel-Gawad, A. A. 2001. Effect of Sevin® on growth of carrot. Cairo Univ. Dar Elthgafa Press, Cairo, Egypt.

Aldeghairi, M. A., M. A. El-Meleigi, N. F. A. Baky and G. H. Ibrahim 2013. The entomopathogenic fungus *Cladosporium* sp. as a candidate biocontrol agent against the sweetpotato whitefly, *Bemisia tabaci* in Saudi Arabia. Recent advances in biofertilizers and biofungicides (PGPR) for sustainable agriculture. Proceedings of 3rd Asian Conf. on Plant Growth-Promoting Rhizobacteria (PGPR) and other Microbials, Manila, Philippines, 21-24 April, 2013, 532-563.

Bartha, R., R. P. Lanzilotta and D. Pramer 1967. Stability and effects of some pesticides in soil. Appl. Environ. Microbiol., 15: 167.

Bello, M. O., G. Owoeye, M. Abdul Hammed and T. A. Yekeen 2014. Characterization of gourd fruits (Cucurbitaceae) for dietary values and anti-nutrient constituents. Res. J. Pharmaceutical, Biol. Chem., 5(4): 416-224.

Dehghani, M. and K. Ahmadi 2013. Influence of some plant extracts and commercial insecticides on the eggs of *Trialeurodes vaporariorum* Westwood (Homoptera: Aleyrodidae). Arch. Phytopathol. Plant Protection, 46(10): 1127-1135.

Donaldson, M. S. 2004. Nutrition and cancer: a review of the evidence for an anti-cancer diet. Nutr. J., 3:19.

El-Khayat, E. F., F.A. El-Lakwah, G. H. H. Rady, Mona M. A. Ghallab and B. S. Wahba 2010. Impact of planting dates on infestation of cowpea plants with some pests. E. J. Agric. Res., 88(4): 1107-1120.

Farenhorst, A. 2006. Importance of soil organic matter fractions in soil-landscape and regional assessments of pesticide sorption and leaching in soil. Soil Sci. Soc. Am. J. 70(3): 1005-1012.

Ferencz, L. and A, Balog. 2010. A pesticide survey in soil, water and foodstuffs from central Romania. Carpathian J. Earth Environ. Sci., 5(1): 111-118.

Gafar, M. O., Y. M. Dagash, M. Mustafa and O. M. Alzen 2010. The residual effect of malathion (organophosphate) and sevin (carbamate) application on sugar beet (chenpodiaceae) growth. J. Sci. and Technol., 11(2): 427-435.

Gafar, M. O., Y. M. I. Dagash, A. Z. Elhag and Y. O. Hassan 2011. Residual effect of malathion (organophosphate) and sevin (carbamate) application on potato (*Solanum tuberosum*). Amer. J. Exper. Agric., 1(4): 226-230.

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

Lang, M. and Z. Cai 2009. Effects of chlorothalonil and carbendazim on nitrification and denitrification in soils. J. Environ. Sci., 21(4): 458-467.

Li, Y. F., Z. S. Ting, Q. Y. Chuan; Z. S. Qing, G. Z. Lin, D. Z. Hong and P. W. Liang 2014. Identification of plant chemicals attracting and repelling whiteflies. Arthropod - Plant Interactions, 8(3): 183-190.

Lokeshwari, D., N. K. Krishna Kumar and H. Manjunatha 2014. Color Polymorphism does not Affect Species Diagnosis of the Melon Aphid, *Aphis gossypii* (Hemiptera: Aphididae). Florida Entomologist 97(3):1199-1207.

Maklad, Amna M. H.; S. M. Abolmaaty; M. K. Hassanein and N. Y. Abd El-Ghafar 2012. Impact of type of greenhouse cover sheets on certain major cucumber pests under protected cultivation. New York Sci. J., 5(7): 19-24.

Mallik, M. A. B. and K. Tesfai 1985. Pesticidal effects on soybean rhizobic symbiosis. Plant and Soil, 85: 33-41.

Pimentel, D. 2005. Environmental and economic costs of the application of pesticides primarily in the United States. Environ. Develop. Sustain, 7: 229–252.

Srikanth, J. and N. H.Lakkundi 1988. Instar period, fecundity and longevity of cowpea aphid, *Aphis craccivora* Koch on seven leguminous hosts. J. Aphidol., 2:1-2.

Shah, M. M. R. and L. T. Xian 2013. Feeding experience of *Bemisia tabaci* (Hemiptera: Aleyrodidae) affects their performance on different host plants. PLoS ONE, 8(10): e77368.

Sajjadi, S. E. 2006 Analysis of the essential oils of two cultivated basil (Ocimum basilicum L.) from Iran. DARU Journal of Pharmaceutical Sciences Vol(14) Issue 3 P.128-130.

Telci, I., E. Bayram, G. Yılmaz, B. Avcı 2006 Variability in essential oil composition of Turkish basils (Ocimum basilicum L.). Biochemical Systema. and Eco. 34 (6): 489-497.

Trumbo, P. A. A., S. Yates and S. M. Poos 2001. Dietary reference intakes: Vitamin A, vitamin K, arsenic, boron, chromium, copper, iodine, iron, manganese, molybdenum, nickel, silicon, vanadium, and zinc. Washington, DC: The National Academies Press, 119 p.

Wannissorn, B., S. Jarikasem, T. Siriwangchai, S. Thubthimthed 2005 Antibacterial properties of essential oils from Thai medicinal plants. Fitoterapia. 76(2):233-6.

Zheng, J. R., W. HuiLi and W. JiaMing 2011. Breeding of 'Hangza No.401' - a new tomato cultivar with good quality and disease resistance. J. Anhui Agri. Univ., 38(1): 110-117.

الملخص العربي

تقدير متبقيات المبيدات والمركبات الكيميائية النباتية فى ثمار الخيار من الصوب المعاملة والاسواق

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أجريت الدراسة الحالية فى موسمي شتاء وربيع عام ٢٠١٤ بغرض مكافحة حشرة المن التى تهاجم خيار الصوب وذلك باستخدام بعض المركبات المستعملة كمبيدات (أزديراختين - أباامكتين – البيرثرين الطبيعي) هذا بالإضافة إلى المبيد الفطرى ميتالاكسيل. كما تم تقييم بعض الزيوت النباتية ودراسة تأثير وكفاءة المركبات المختبرة علي تعداد وتواجد المن وقد اظهرت النتائج ان زيت البصل وزيت الريحان الاحمر لهما التأثير الاكبر بنسبة ٧٣,٨% و٦٨,٨٥%. وايضا في الموسم الشتوي كان مبيد ايبامكتين ومبيد الازديراختين لهما التأثير الاكبر بنسبة ٧٤,١٧% و٧٤,١٥% بينما جاء بعدهم البيرثرين بنسبة ٧٢,٤٠%. وقد تم تقدير بعض المركبات الكيميائية النباتية ومتبقيات المبيدات فى عينات ثمار الخيار المسوقة والتى تم شراؤها من السوق المحلى بمحافظة الأسكندرية بالمقارنة مع ثمار الخيار المعاملة بالمبيدات والتى تم تجميعها من الصوبة بعد نهاية التجربة الحالية. وقد إتضح أن خيار التجربة (صنف برنس) أعلى في محتواه من البوتاسيوم والكربوهيدرات وفيتامين سي بالمقارنة مع خيار السوق(خليط اصناف مختلفة) كما اتضح أيضاً أن خيار السوق يحتوى على متبقيات مبيدات عالية من مبيد البروباموكارب (٠,١٩ جزء فى المليون) ومبيد أبرودين(٠,٥٣ جزء فى المليون)، علاوة على خطورة التأثير التراكمي للمركبات ثيوفانات ميثيل والبروبرجيت والكاربندازيم التى تم تقدير متبقياتها فى الخيار المسوق ومما يشكل خطورة بالغة على الإنسان المستهلك. كما يوضح أيضاً أن المزارع المصرى يسرف ويستخدم العديد من المبيدات ولابد من التوصية بنصح المزارع باتباع توصيات وزارة الزراعة المصرية فى هذا الشأن وبالذات علي تلك الخضروات التي تسوق مباشرة بعد الرش.