

## **EFFICACY OF CERTAIN COMPOUNDS AGAINST SOME PESTS INFESTING SQUASH PLANTS, *Cucurbita pepo* L.**

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### **ABSTRACT**

The objective of this study was conducted to evaluate the efficacy of four compounds ; achook 0.15% (Azadirachtin) ; cloves-oil (*Syzygium aromaticum*) ; Plant extracts damaseia (*Ambrosia maritima*) and selecron 72.0% EC. (Profenofos) for controlling some squash plants pests; whitefly, *Bemisia tabaci* (Genn.); *Aphis gossypii* (Glover.), as well as its effects on squash leaves chlorophyll contents.

Obtained results cleared that cloves oil exhibited the highest reduction percentages of *A. gossypii* (97.0 and 796.9) followed by damaseia extract (94.2 & 95.1), achook 0.15 % (93.0 & 92.3), while, selecron was the lowest one (89.7 and 788.2) after five days of treatment during 2011 and 2012 seasons. While, whitefly reduction percentages after five days of treatment showed that damaseia extract exhibited the highest reduction (100 and 100) and (98.2 and 100) of both adult and immature stages , followed by selecron 72.0% (100 & 89.7) and (97.5 & 85.0), cloves oil (97.5 & 91.2) , (96.3 & 89.4) and achook 0.15% (95.2 & 83.2), (90.9 & 82.3) during the two seasons respectively.

Squash leaves chlorophyll (a, b) was the highest with cloves oil treatment, followed by damaseia extract, while it was lowest with both achook and selecron treatments.

### **INTRODUCTION**

In Egypt squash (*Cucurbita pepo* L.) as infested with different pests which cause considerable damage in both quantity and quality of the fruits. Some of the species are known to be a great economic importance as *Bemisia tabaci* (Genn.); *Aphis gossypii* (Glover.) Bachatly (1992); Aslam, and Gebara (1995). They cause many indirect damages by transmitting several microorganisms such as viral and fungal pathogens. The extensive and unwise use of chemicals led to environmental pollution that caused many problems to the ecosystem, mainly to fish, animal welfare and man Madanlar *et al* (2002). This study aimed to evaluate the efficacy of certain compounds as Profenofos (selecron 72% EC); Azadirachtin (achook 0.15%) ; The natural oil, Cloves-oil and Plant extracts damaseia against some pests infesting Squash plants, the whitefly, *Bemisia tabaci* (Genn.) and *Aphis gossypii* (Glover.) and its effect on chlorophyll a, b contents, of squash leaves ..

### **MATERIALS AND METHODS**

Experiments were carried out on the following squash pests: The whitefly, *Bemisia tabaci* (Genn.) (Hemiptera - Homoptera - Aleyrodidae), (Immature stages and adult); *Aphis gossypii* (Glover.) (Hemiptera-Homoptera - Aphididae).

**Chemical compounds tested:**

1-The organophosphorus compound, Profenofos(Selecron72%EC), produced by Novartis Company Switzerland.

**Chemical name:** O-(4-bromo-2-chlorophenyl)-5-ethyl-S- Propylphosphorothioate.

It was applied at rate namely 187.5 ml / 100 L water.

2-The botanical insecticides: Azadirachtin 1500 ppm (Achook 0.15%) [neem kernel based EC containing Azadirachtin 0.15%ww (1500ppm), *Azadirachta indica* A., Fam: Meliaceae]. Produced by Bahar Agrochem and Foods Pvt. Ltd., India.

Achook 0.15% application rate was also 187.5 ml / 100 L water.

3-The natural oil, Cloves-oil was bought from the local market and applied at 250 ml / 100 L water.

Scientific Name *Syzygium aromaticum*, English name: Cloves-oil (Family Myrtaceae). Tested Part was Eugenol.

4- Plant extracts damaseia (Family Compositae , *Ambrosia maritima* ) applied at 300 ml / 100 L water.

An area of the experiment was divided into 5 equal plots of about 80m<sup>2</sup> each, (plot divided into four replicates),. The experimental replicates were arranged in complete randomized design with four replicates for each treatment at krrdasa district- Giza Governorate. All agricultural practices were run in the experiment except for the studied variant. By using a knapsack sprayer (20 liters);the sprayer was filled with the prepared concentrations just before each treatment. The squash plants were sprayed in the application on October 15<sup>th</sup> and 6<sup>th</sup> for successive seasons of 2011 and 2012. Inspection of plants was carried out before spraying and after 2, 3, 5, 7, and 14 days from application to investigate the effect of the different treatments on the reduction percentages of aphid and whitefly pests.

Direct count (4 replicates were inspected ) of the whitefly adults numbers was done in the field on random samples of 10 leaves from each replicate; then these samples were picked out, put in paper bags and transferred to the laboratory to calculate the numbers of *A. gossypii* (nymphs and adults); and adults ;immature stages of *B. tabaci*

Effect of the compounds on chlorophyll contents of squash leaves.

Chlorophyll content of squash leaves was determined before treatment and at 2, 3, 5,7and 14 days post treatment in the field using chlorophyll meter (Minolta SPAD-502).

The statistical analysis (ANOVA and Simple correlation) of the obtained data were performed by using SAS program (SAS Institute, 1988) which run under Windows

The percentage of population reduction (% mortality) was calculated according the equation of Henderson and Tilton (1955) as follow:

$$\text{Reduction \%} = 1 - \left[ \left( \frac{C_b}{C_a} \right) \cdot \left( \frac{T_a}{T_b} \right) \right] \times 100$$

Where:

T= Number of alive insect individuals in treatment.

C= Number of alive insect individuals in control.

a= Number of alive insect individuals after treatment.

b=Number of alive insect individuals before treatment.

## RESULTS

### 1-Efficacy the different compounds against aphid *Aphis gossypii*(Glover):

Obtained data in Table (1) show that cloves oil exhibited the highest reduction percentages of *A.gossypii* (97.0 &96.9) followed by damaseia extract (94.2 &95.1) ,achook 0.15 % (93.0 &92.3), while, selecron was the lowest one (89.7 &88.2) after five days of treatment during 2011 and 2012 seasons respect.

The residual toxicity of various compounds calculated from the efficacy of different treatments after 7 and 14 days against *A.gossypii*, cleared that achook (Azadirchtin )gave the highest residual effect of aphid insects (96.2) followed by damaseia extract (92.8 ) ,cloves oil (92.0) and selecron (59.4) during 2011 season. While during 2012 season the reduction percentages of aphid insects population were (93.8, 92.8,92.2 and 57.7%) for achook ,cloves oil , plant Extract damaseia, and Selecron, respectively.

The aforementioned results proved that cloves oil was the highest effective compounds after five days, while, selecron was the lowest one. On the other hand achook was the highest residual effect after 14 days, followed by cloves oil, damaseia and selecron during the season 2012.

### 2- Efficacy of different compounds against adult and immature stages of whitefly *Bemisia tabaci* (Genn.):

Residual toxicity of various insecticides was calculated from the efficacy of various treatments at 7 and 14 days in Table (1)Data revealed that the reduction rates of *A. gossypii* were (96.2, 92.0, 92.6, and 59.4%) for various insecticides, respectively, in the first season.

Previous results proved that at the application rate of achook, plant extract damaseia and cloves oil were the most effective compounds; followed by selecron insecticides was the least effective compounds under study.

Results in Table (1) revealed that the reduction rates of *A. gossypii* per 40 leaves was obviously reduced average toxicity after 5 days from treatment (92.3, 96.9, 95.1 and 88.2 %) for Achook ,cloves oil , plant extract damaseia, and selecron, respectively in the second season..

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T1

Residual toxicity of various insecticides in Table (1) revealed that the reduction rates of *A. gossypii* were (93.8, 92.8, 92.2, and 57.7%) for various insecticides, respectively, in the second season.

Previous results proved that at the application rate clove oil was the most effective compounds after 5 days; followed by plant extract and achook ,while selecron the least effective compound under study.

Obtained data in Table (2) revealed that both damaseia and selecron exhibited the highest reduction percentages of adult stages of whitefly 100 %, followed by cloves oil 97.5% while achook was the lowest 94.6 %. On the other hand damaseia extract kill 100 % of immatures ,followed by cloves oil 91.2 %,selecron 89.7 % and achook 83.2 % during the season 2011.

Residual toxicity of various compounds was calculated from the efficiency of different treatments after 7 and 14 days .As shown in Table (2) data cleared that the reduction percentages of *B. tabaci* adults and immatures were (66.2,100;), (100.0,65.9) ; (100.0, 62.7)and (100.0,42.3%) for achook, cloves oil ,damaseia extract and selecron during season 2011, respectively.

As shown in Table (3) data cleared that damaseia extract exhibited the highest reduction percentages of both adults and immatures (98.2 &100.0), followed by selecron (97.5 &85.0) ,cloves oil (96.3 & 89.8) and achook (96.9 & 82.3) respectively.

Residual toxicity of various insecticides was calculated from the efficacy of different treatments at 7 and 14 days in Table (3). Obtained results showed that the reduction percentages of *B. tabaci* adults and immature were (86.2 & 97.4 ),(100.0 & 98.4). (100.0 & 88.5 ) and ( 100.0 & 37.1 ) % for the aforementioned compounds respectively. These agree with that obtained by Buter and Henneberry (1991).and Lopez-Diaz, and Estrada-Ortiz (2005).

### **3- Effect of different compounds on squash leaves chlorophyll a,b contents:**

Table (4) showed that chlorophyll a, b were highest with cloves oil treatment, (50.8 and 50.7 unite), followed by damaseia extract (48.1 & 46.1 unite),achook (43.3 & 44.9) and selecron(43.2 & 42.4 ) during seasons 2011 and 2012 respectively. These result coincided with those obtained Buntin *et al* (1993) and Han *et al* (2004) .

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**Table (4): Effect of some compounds on chlorophyll content (Units) of Squash leaves during 2011 and 2012 seasons.**

Treatment	Rat/100L Water	First season Mean no.	Second season Mean no.
Achook 0.15% EC (Azadirachtin)	187.5 mL	43.3	44.9
Cloves oil ( <i>Syzygium aromaticum</i> )	250 mL	50.8	50.7
Plant Extract damaseia ( <i>Ambrosia maritima</i> )	300 mL	48.1	46.1
Selecron 72% EC (Profenofos)	187.5 mL	43.2	42.4
Control	--	48.5	49.5

## REFERENECS

- Aslam, M.; F. Gebara (1995): Host plant preference of vegetable by cotton whitefly, *Bemisia tabaci* (Genn.). Pakistan J. Zoo. 27(3): 269-272.
- Bachatly, M. A. (1992): Infestation level and control of aphids and whiteflies on squash, cucumber and melon and incidence of associated viral diseases. Ph. D. Thesis, Fac. Of. Agric. El-Fayoum, cairo Univ., Egypt, 123pp.
- Buntin, G. D; D. A. Gilbertz and R. D. Oetting (1993): Chlorophyll loss and gas exchange in tomato leaves after feeding injury by *Bemisia tabaci* (Homoptera: Aleyrodidae). J. Econo. Entomo. 86(2): 517-522.
- Buter, G. D. Jr. and T.J. Henneberry (1991): Effect of oil sprays on sweet potato whitefly and phytotoxicity on watermelons, squash and cucumbers. Southwestern-Entomologist. 16(1): 63-72.
- Han S.; G. Zhou and C. Huang (2004): Effect of *Bemisia tabaci* on content of chlorophyll in different parts of Weifang green-radish. China-Vegetables. (1): 41-42.
- Henderson, C. F. and Tilton, E. W. (1955): Test with acaricides against the brown white mite. J. Econo. Entomo., 48: 157-161.
- Lopez-Diaz, M. T. and J. Estrada-Ortiz (2005): The neem bioinsecticides in pest insects control in economics crops. La Habana (Cuba). Revista-de-la-Facultad- de-Ciencias-Agrarias,-Univ.Nacional-de-Cuyo. 37(2): 41-49.
- Madanlar, N.; Z. Yoldas; E. Durmusoglu and A. Gul (2002): Investigations on the natural pesticides against pests in vegetable greenhouses in Izmir (Turkey). Turkiye-Entomoloji-Dergisi. 26(3): 181-195.
- SAS institute (1988): SAS / Stat user's guide, 6.03 ed. SAS institute, Cary, NC.



### كفاءة بعض المركبات ضد بعض الافات التى تصيب نبات الكوسة

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اجريت هذه التجربة فى قرية كرداسة فى محافظة الجيزة لتقييم كفاءة المركبات أشك (النيم) وزيت القرنفل ومستخلص الدمسيسة ومبيد السليكرون ضد حشرات من القطن والحشرات الكاملة والاطوار الغير كاملة للذبابة البيضاء التى تصيب نباتات الكوسة خلال موسمين 2011 و2012 وتأثير هذه المركبات على مكونات الكلورفيل اوب .  
أظهرت نتائج المعاملة ببعض المركبات مثل مركب النيم (أشك) وزيت القرنفل ومستخلص الدمسيسة ومبيد السليكرون ضد حشرتى من القطن والذبابة البيضاء وتأثيرها على مكونات الكلوروفيل اوب على نبات الكوسة خلال سنتين 2011 و2012 .  
أوضحت النتائج أن معدل سمية الانخفاض بعد 5 أيام من المعاملة ضد حشرة المن (93 و97 و94.2 و 89.7%) و(94.3 و96.9 و95.1 و88.2%) مع أشوك وزيت القرنفل والمستخلص النباتى الدمسيسة ومبيد السليكرون على التوالي خلال السنتين وايضا معدل سمية الانخفاض بعد 5 أيام من المعاملة ضد حشرة الذبابة البيضاء(98.2 و97.5 و83.2 و91.2، 100، 100%) مع أشوك وزيت القرنفل والمستخلص النباتى الدمسيسة ومبيد السليكرون على التوالي خلال السنة الأولى .  
أظهرت نتائج المعاملة بالزيت النباتى الطبيعي القرنفل بعد 5 أيام أعلى نتائج (98.1 و96.8%) و(100 و100%) ضد حشرتى المن والذبابة البيضاء على نبات الكوسة .  
و أظهرت نتائج تحليل مكون الكلورفيل اوب مع الزيت النباتى القرنفل أعلى معنوية مع المقارنة بينمعام المعاملة أشك ومبيد السليكرون كانت أقل معنوية مع المقارنة.

قام بتحكيم البحث

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مركز البحوث الزراعيه



**Table (2): Effect of various treatments against *Bemisia tabaci* (Genn.) adults and immature infesting squash plants in 2011 season at Giza Governorate.**

Treatments	Stage	Rate/100L Water	No. of insects Pre-Spray	Average No. Individuals / 40 leaves and percent reduction at indicated periods (days)						
				2	3	5	Average toxicity after 5 days	7	14	Residual toxicity
Achook 0.15% EC (Azadirchitin)	A	187.5 Cm	58	1.0 (90.3)	1 (95.2)	0.0 (98.4)	0.6 (94.6)	0.0 (100)	20.0 (32.4)	10.0 (66.2)
	Imm		67	12 (71.7)	12 (77.8)	0.0 (100)	8.0 (83.2)	0 (100)	0 (100)	0.0 (100.0)
Cloves oil ( <i>Syzygium aromaticum</i> )	A	250Cm	62	2.0 (95.0)	1.0 (97.4)	0.0 (100.0)	1.0 (97.5)	0 (100)	0 (100)	0.0 (100.0)
	Imm		86	12 (73.6)	0.0 (100)	0.0 (100)	4.0 (91.2)	30 (31.9)	0 (100)	15.0 (65.9)
Plant Extract damaseia ( <i>Ambrosia maritima</i> )	A	300Cm	37	0.0 (100)	0.0 (100)	0.0 (100)	0.0 (100.0)	0 (100)	0 (100)	0.0 (100.0)
	Imm		64	0.0 (100)	0.0 (100)	0.0 (100)	0.0 (100.0)	0 (100)	28 (25.3)	14.0 (62.7)
Selecron 72% EC (Profenofos)	A	187.5 Cm	33	0.0 (100)	0.0 (100)	0.0 (100)	0.0 (100.0)	0 (100)	0 (100)	0.0 (100.0)
	Imm		45	0.0 (100)	10.0 (77.9)	4.0 (92.7)	4.6 (89.7)	10 (56.6)	19.0 (27.9)	14.5 (42.3)
Control	A	--	102	65	63	55	64.7	59	52	55.5
	Imm	--	123	78	99	117	98	63	72	67.5

%Reduction rates are given in brackets.

Residual toxicity was calculated from the efficacy of the different treatments at 7 and 14 days.

**Table (3): Effect of various treatments against *Bemisia tabaci* (Genn.) adults and immature infesting squash plants in 2012 season at Giza Governorate.**

Treatments	Stage	Rate/100L Water	No. of insects Pre-Spray	Average No. Individuals / 40 leaves and percent reduction at indicated periods (days)						
				2	3	5	Average toxicity after 5 days	7	14	Residual toxicity
Achook 0.15% EC (Azadirachtin)	A	187.5 Cm	55	3.0 (96.4)	4 (88.6)	3.0 (90.8)	3.3 (90.9)	2.0 (95.1)	8.0 (77.3)	5.0 (86.2)
	Imm		74	10 (77.0)	11 (81.0)	5.0 (89.0)	5.7 (82.3)	2.0 (97.3)	2.0 (97.5)	2.0 (97.4)
Cloves oil ( <i>Syzygium aromaticum</i> )	A	250Cm	69	2.0 (95.6)	1.0 (97.7)	1.0 (95.6)	1.3 (96.3)	0 (100)	0 (100)	0.0 (100.0)
	Imm		94	6 (82.5)	3.0 (85.6)	3.0 (86.2)	7.5 (84.8)	3 (96.8)	0 (100)	1.5 (98.4)
Plant Extract damaseia ( <i>Ambrosia maritima</i> )	A	300Cm	57	1.0 (97.4)	1.0 (97.3)	0.0 (100.0)	0.6 (98.2)	0 (100)	0 (100)	0.0 (100.0)
	Imm		85	0.0 (100)	0.0 (100)	0.0 (100.0)	0.0 (100.0)	2.0 (97.9)	21.0 (79)	11.5 (88.5)
Selecron 72% EC (Profenofos)	A	187.5 Cm	49	0.0 (95.0)	0.0 (97.5)	0.0 (100)	8.0 (97.5.0)	0 (100)	0 (100)	0.0 (100.0)
	Imm		58	0.0 (80.0)	11.0 (85.0)	15.0 (90.0)	8.7 (85.0)	20.0 (46.2)	19.0 (27.9)	19.5 (37.1)
Control	A	--	89	59	57	53	56.3	66	61.5	61.5
	Imm	--	78	66	58	66	63.3	78	80.5	80.5

%Reduction rates are given in brackets.

Residual toxicity was calculated from the efficacy of the different treatments at 7 and 14 days.





**Table (1): Effect of various treatments against *Aphis gossypii* (clover.) infesting squash plants at Giza Governorate. Average No. Individuals / 40 leaves and percent reduction at indicated periods (days**

Treatment	Rat/100L Water	season	No. of insects Pre-Spray	)						Residual toxicity
				2	3	5	Average toxicity after 5 days	7	14	
Achook 0.15% EC (Azadirachtin)	187.5 Cm	2011	112	14 (90.9)	11 (92.5)	5 (95.6)	15 (93.0)	4 (96.05)	3 (96.4)	3.5 (96.2)
		2012	25	2 (92.6)	0.0 (100)	4 (90.2)	1 (92.3)	2 (93.4)	2 (94.3)	2 (93.8)
Cloves oil ( <i>Syzygium aromaticum</i> )	250Cm	2011	156	11 (94.9)	4 (98.1)	3 (98.1)	9 (97.0)	8 (94.3)	12 (89.7)	10 (92.0)
		2012	30	2 (93.8)	0.0 (100)	1 (96.8)	1 (96.9)	1 (97.3)	5 (88.2)	3 (92.8)
Plant Extract <i>damaseia</i> ( <i>Ambrosia maritima</i> )	300Cm	2011	112	12 (92.2)	2 (95.2)	5 (95.6)	6.3 (94.2)	9 (91.12)	5 (94.06)	5.5 (92.6)
		2012	39	3 (92.8)	0.0 (100)	2 (92.4)	1.6 (95.1)	4 (91.6)	4 (92.7)	4 (92.2)
Selecron 72% EC (Profenofos)	187.5 Cm	2011	166	7 (95.43)	4 (96.6)	26 (77.1)	12.3 (89.7)	36 (64.5)	38 (54.4)	37 (59.4)
		2012	17	0.0 (100)	0.0 (100)	6 (64.7)	1.3 (88.2)	8 (61.4)	11 (54.0)	9.5 (57.7)
Control		2011	168	230	220	170	206.7	152	125	138.5
		2012	64	69	67	64	66.7	78	90	84

Residual toxicity was calculated from the efficacy of the different treatments at 7 and 14 days. %Reduction rates are given in brackets.

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