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EFFICIENCY OF CERTAIN PLANT EXTRARACTS ON *Aphis craccivoa* koch. AND *Chrysoperla carnea* (STEPH) IN SOUTHERN VALLEY, EGYPT.

El-Arnaouty, S. A.*; E. A. Eweis* and H. A. Haddad**

*** Dept. Economic Entomology and pesticides, Fac. Agric., Cairo Univ.**

**** Center of Bio-Organic Agricultural Services, Aswan, Egypt**

ABSTRACT

Two plants; *Hyoscyamus muticus* and *Ambrosia maritime* were chosen in order to investigate the toxticty of their leave, stem, flower or root extracts (using ethanol, acetone, chloroform and hexane) to nymph and adults of *Aphis craccivora* and its predator *Chrysoperla carnea*. The plant extracts were treated using direct spraying on infested bean seedlings. The results showed that for the two plant species, high concentration of leave extract in ethanol and acetone gave a high mortality rate after 24 and 48 h. For the flower extracts, high concentration in ethanol and chloroform resulted as well in high mortality rate of the pest after 24 and 48 h. As far as the root extracts are concerned only *H.muticus* at a high concentration in ethanol gave high mortality rate after 24 and 48 h. For the stem extracts, only *H.muticus,* at a high concentration in hexane resulted in a high mortality rate after 24 and 48 h. Moreover these high plant extract concentration were not detrimental *Ch. carnea* and thus can be considered as safe adjuvant in the prospect of integrated pest control.

Keywords: Plant extract, *Aphis craccivora* Koch*, Chrysoperla carnea* (Steph.)

INTRODUCTION

The relations between human and plant have been very close throughout the development of human cultures. The future use of plants as source of new biodynamic compounds such as pesticides (insecticides, antimicrobial ….etc), is an important area of research nowadays. Many farmers in developing countries do not have the resources to purchase and apply expensive synthetic pesticides. On the other hand, biological control, in the form of locally abundant natural enemies, together with the preparation of plant extracts from trees growing naturally in the surrounding area, have little to no cost, and are therefore uniquely suited to low-input integrated pest management systems. Those extracts could be integrate especially with predators to the fight against pests (ElArnaouty, *et al.,* 2003).

Today there are trend of the world to clean crops and reduce the use of chemical pesticides, so there must be safe and effective alternatives. Possibility makes use of wild medicinal and aromatic plants as alternatives to chemical pesticides.

El-Gougary (1998) studied the acetone/ethanol, petroleum-ether, ether and chloroform extracts of *Atriplex halimus*. He found that they were toxic to 4th-instar larvae of *Culex pipiens* with LC_{50} values of 115, 36, 54 and 48 ppm, respectively. Ether and petroleum-ether extracts of *A. halimus* showed strong aphicidal activity against *Aphis gossypii* Glov. with LC_{50} values of 0.059 and 0.085 ppm, respectively. Only the ethanol extracts were found to be toxic to *Spodoptera littoralis* (Baird.) with LD_{50} value of 5.6 mg/larva. All of

the tested extracts were non toxic to *Tribolium castaneum*. Synergism studies using pirimiphos-methyl and chlorpyrifos-methyl revealed that the petroleum-ether and ethanol extracts of Atriplex strongly synergized the toxicity of the 2 insecticides in *T. castaneum*.

Hewage *et al.,* (1997) evaluated a wide range of solvent extracts prepared from different parts of SriLankan medicinal plants (101 extracts from 55 plants) for insecticidal activity against *Aphis craccivora* Koch. and *Plutella xylostella*. The 94 plant extracts tested for insecticidal activity against *A. craccivora*, *Costus specious* caused the greatest (90%).The 23 extracts tested for activity against *P. xylostella*, *Pleiospermium alatum* caused also a greatest mortality (93.33%).

The aim of our study is to test some plant extracts originated in the desert of southern valley to be used for controlling insect pests, as alternatives to chemical insecticides. Integration between the use of predators and plant extracts against aphids at the same site was targeted.

MATERIALS AND METHODS

Two plant samples *Hyoscyamus muticus* and *Ambrosia maritima* were collected from the region of Nasser Lake Aswan Governorate and identified via herbarium of flora at the horticulture research institute, Ministry of Agriculture. The roots stems, leaves and flowers were tested.

Table (1): Taxonomical status and origin of two plants under investigation.

Latin Name	Class	Order	Family	English Name	Arabic Name	Part Used
Hyoscyamus muticus	Asterids	Solanales	Solanaceae	Hyoscyamus	سكران	leaves , stems , flowers and roots
*Ambrosia maritime,*L	Asterids	Asterales	Compositae	Damsisa	دمسيسة	Leaves and flowers

Preparation of plant samples:

All the collected plant samples were cleaned, air dried in the shade and then grinded to fine powder before extraction. Extraction detection and gravimetrical determination of crude sesquiterpene lactones were carried out. The air dried material (300g) was soaked in acetone, ethanol, hexane and chloroform at room temperature. The aqueous cloudy solution was filtered through acelite pad, and was concentrated under vacuum. The residue was extracted three times with equal volumes of all solvents and the extracts were dried over anhydrous sodium sulphate and evaporated. The residue was mainly sesquiterpene lactones. The crude sesquiterpene lactones was weighted and its percentage in the dry plant material was calculated. The "STL" residue was completed to define volume with distilled solvents and stored in a deep freezer at – 20 °C for subsequent work.

Plant extracts was prepared from various parts of the plants by non-polar, and polar solvents (acetone, hexane, ethanol and chlorophorm) according to A-O-A-C (1990). Three concentrations of *H. muticus* leaves

extract (0.5 and1.0 and 2.0%) were used. Fresh L_2 *Chrysoperla carnea* larvae were treated using 35 replicates directly . Every replicate consisted of one larva reared individually in small transparent boxes and 35 replicates (control) were treated by water. The larvae were fed on eggs of *Corcyra cephalonica* until adult emergence. Daily mortality, duration of pupal stage, weight, emergence rate and sex ratio were recorded. All tests were carried out at 25°C and 65%R.H. and 16 h day length.

Four concentrations (0.5, 1.0, 1.5and 2.0%) from plant extracts of *H. muticus*, extracted from leaves, roots and flowers using ethanol were used. Stems were extracted using hexan. *A. maritime* leaves and flowers were extracted by acetone and chloroform, respectively. Each concentrate was devided into 5 replicates, every replicate consisted of faba bean plant infested with *A. craccivora* (100 aphid / replicate).All replicates were kept at 25°C and 65%R.H. and 16 hours day length. 5 replicates were used as control. After 24 and 48 hours mortality rate was estimated.

RESULTS AND DISCUSSION

Table (2): Values of medium lethal concentrations (LC_{50}) of plants extracts using different solvents.

LC_{50} mg/cm^2 / Plant extracts	Solvents			
	Acetone	Ethanol	Hexane	Chloroform
Hyoscyamus	0.715	0.780	0.631	0.811
Damsisa	1.150	-	-	1.225

LC_{50} mg / cm^2

The results in table (2), display the values of (LC_{50}) for plants extracts useing different solvents such as acetone, ethanol and hexane, (non polar) chloroform. *Hyoscyamus* and Damsisa in solvents acetone and chloroform were toxic.

Solvent hexane plants extracts revealed high toxic effects on *A. craccivora* in *H. maticus* acetone, ethanol and chloroform, respectively, while 0.631 mg / cm^2 in damasisa revealed high toxic effects on *A.craccivora* in acetone and chloroform, respectively. All concentrations used for LC_{50} of the tested plants extracts agree with Soliman, *et al.,* 2005.

Impact of *Hyoscyamus muticus* leaves extract on *Chrysoperla carnea*

To treat *Ch. Carnea*, plant extract of *H. muticus* leaves was obtained using 2% acetone. Resulting mortality was 68.57%. Average durations of larvae in the second, third instars and pupal stage were 0.6, 5.3 and 7.1 days, respectively. Average pupal weight was 0.009 mg, adult emergence rate was 28.57% and sex ratio of female was 60% while mortality was 37.1%. Average durations of larvae in the second, third instars and pupal stage were 0.9, 5.8 and 8.3 days with control, respectively.The average weight of pupal stage was 0.009 mg, adult emergence rate 62.9% and sex ratio of female 77.3% in control.

At the concentration 1.5%, mortality was 77,.1% the average durations of larvae in the second, third instars and pupal stage were (0.94, 6.6 and 9.7 days), respectively. The average weight of pupal stage was 0.007mg, adult emergence rate was 22.9% and sex ratio of female was 37.5% while mortality was 48.57%, the average durations of larvae in the second, third instars and pupal stage were (1, 6.7 and 9 days) respectively while the average weight of pupal stage was 0.006 mg, adult emergence rate 51.4% and sex ratio of female 50% in control.

At the concentration 1%, mortality was 51.4%, the average durations of larvae in the second, third instars and pupal stage were (1.3, 4.8 and 8.4 days), respectively. The average weight of pupal stage was 0.008 mg, adult emergence rate 48.57% and sex ratio of female 58.8%,while mortality was 17.1% and the average durations of larvae in the second, third instars and pupal stage were (1.3, 6.2 and 8.2 days), respectively. The average weight of pupal stage was 0.009 mg, adult emergence rate 82.86% and sex ratio of female was 44.82% in the control (able 3).

Table (3): Effect of *Hyoscyamus maticus* different concentrations leaves extract on *Ch. carnea*.

Criteria		Treatment (Concentrations)					
		1.0	Control	1.5	Control	2.0	Control
Durations (Days)	L_2	1.3	1.3	0.94	1	0.6	0.9
	L_3	4.8	6.2	6.6	6.7	5.3	5.8
	Pupal stage	8.4	8.2	9.7	9	7.1	8.3
Weight	Pupal stage	0.008	0.009	0.007	0.006	0.009	0.009
Total Mortality%		51.4	17.1	77.1	48.57	68.57	37.1
Emergence%		48.57	82.86	22.6	51.4	28.57	62.9
Sex Ratio of female%		58.8	44.82	37.5	50	60	77.3

In conclusion, *H. muticus* leaves extract different concentrations (1.0, 1.5 and 2.0%), extracted by acetone effected *Ch. carnea* mortality, emergence rate and sex ratio.

Impact of *Hyoscyamus muticus* leaves extract on *Aphis craccivora*.

Treatment *A. craccivora* with the plant extract of *H. muticus* leaves was extracted by ethanol, the in concentrations (0.5, 1.0, 1.5 and 2.0%) resulted to mortality rate was (46, 48, 56 and 75%), respectively after 24 h, while mortality was 3% in the control. After 48h, mortality was (62, 91, 80 and 96%), respectively, while it was 7% in the control (table 4).

Table (4): Effect of different concentrations *Hyoscyamus maticus* leaves extract on *A. craccivora.*

Time (hrs)	24 h					48 h				
	Concentration (ml)					Concentration (ml)				
Treatment	0.5	1.0	1.5	2.0	Control	0.5	1.0	1.5	2.0	Control
Mortality rate%	46	48	56	75	3	62	91	80	96	7

Significant difference (P ≤ 0.01)

In conclusion, *H. muticus* leave extract, extracted by ethanol was highly efficient on *A. craccivora* mortality after 24 and 48 h.

The results agree with many previous studies on the effect of solanasea plant extracts on aphid. Soliman *et.al.,* (2005) studied crude extracts of wild plant species against cotton aphid, *Aphis gossypii*. Extracts were obtained by extracting fresh plants successively with solvents of variable polarities (hexane, diethyl ether, ethyl acetate, acetone and ethanol). Among 125 solvent extracts, hexane, diethyl ether, and ethyl acetate extracts of *H. muticus*, acetone extract of *Verbascum sinuatum* and ethanol extract of *Rumex dentatus* gave high toxicity against *A. gossypii*. LC_{50} values were 0.727, 0.883, 1.013, 0.805 and 1.143 mg/cm^2, respectively. A total of 19 plant hexane extracts induced high toxic effect (LC_{50} ranged between 0.727 and 7.481 mg/cm^2) against *A. gossypii*. A total of 22 plant diethyl ether extracts also showed high toxic effects towards the tested insect ($LC_{50's}$ ranged from 0.883 to 10.00 mg/cm^2). Based on the LC_{50} value, 21 plant ethyl acetate extracts exhibited potent activity to *A. gossypii* (LC_{50} values ranged between 1.013 and 10.857 mg/cm^2). A total of 22 acetone extracts revealed high toxic effects (LC_{50} values ranged from 0.805 to 9.377 mg/cm^2) to the tested pest. A total of 24 tested plant ethanol extracts also exhibited potent activity to *A. gossypii* (LC_{50} values ranged between 1.143 and 8.727 mg/cm^2). The ethanol plant extracts proved superior efficiency against *A. gossypii* followed by acetone, hexane, ethyl acetate and finally diethyl ether plant extracts.

In field trial was carried out in Nagpur, Maharashtra, India, in 1991-1994 to test plant extracts for the control of aphids on safflower. A total of 16 treatments were tested. Extracts of *Azadirachta indica, Pongamia glabra* [*P. pinnata*], *Ipomoea carnea* and *Nicotiana tabacum* were compared with endosulfan and phosphamidon. Leaf extracts of *N. tabacum* and *I. carnea* were equally effective as the insecticides (Kulat,-S-S *et.al*, 1998).

Table (5): Effect of crude sesquiterpene lactones extracts (leaves) on *A. craccivora*.

Treatment / Plants	Solvent	Time (hrs)	Concentrations/ml				
			0.5	1.0	0.5	2.0	Control
			Mortality rate %				
Hyoscyamus	Ethanol	24h	46±1.8	48±1.5	56±1.2	75±1.4	11±1.5
		48h	62±1.5	91±0.6	80±2.2	96±0.2	37±2.1
Damsisa	Aceton	24h	2±0.4	1±0.2	7±0.2	8±0.2	6±1
		48h	4±0.4	6±0.4	15±0.8	16±0.8	10±0.5

Values ± SE
Significant difference (P ≤ 0.01)

Data in table (5) effect of *Hyoscyamus* leaves (ethanol) on *A.craccivora*. After 24 hrs, highly significant effect by concentration 2.0, 1.5, 1.0 and 0.5 was recorded. After 48 hrs, no significant effect was found. Obtained results agree with the data of Soliman *et al*. (2005).

Table (6): Effect of crude sesquiterpene lactones extracts (roots and flowers) on Aphis craccivora directly mortality.

Treatment / Plants	Part plant	Solvent	Time (hrs)	Concentrations/ml				
				0.5	1.0	1.5	2.0	Control
				Mortality rate %				
Hyoscyamus	Roots	Ethanol	24h	10±0.5	44±1.7	33±0.8	43±2	10±1.2
			48h	21±0.8	55±1.1	46±0.8	56±1.8	11±0.9
	Flowers	Ethanol	24h	27±0.8	38±1.4	65±0.9	78±0.7	1±0.2
			48h	45±2	69±1	77±0.5	88±0.6	2±0.2
Damsisa	Flowers	Chloroform	24h	6±0.2	7±0.2	7±0.5	8±0.5	11±1
			48h	9±0.2	16±0.2	20±0.7	24±0.8	22±1.4

Values ± SE
Significant difference (P ≤ 0.01), no significant (P ± 0.05)

Results in table (6) roots and flowers *H. muitcus* ethanol effects on *A. craccivora.* After 24 hrs, the concentrations 1.0, 1.5 and 2.0% showed significant differences. No significant differences (P ≤ 0.05). After 48 hrs, were found. Obtained results flower Damsisa (acetone) after 24 hrs from treatment showed no significant (P ≤ 0.05) while after 48 hrs, significant P ≤ 0.1 at the concentrations 0.5, 1.0, 1.5 and control.

Results in table (7) summariZe stem extract of *H. muitcus* at concentrations 0.5, 1.0, 1.5, 2.0 on *A. craccivora* had highest effect after 24 and 48 hrs.

The data agree with the results of EL-arnaouty *et al*; (2003) on the safe level of plant extract on *Ch. carnea* and effects on *A. craccivora* at the different concentrations. Efficient of plants extracts *H. muitcus* and *A. maritime* of on *A. craccivora* increased after 48 hrs and 24 hrs.

Table (7): Effect of crude sesquiterpene lactones extracts (stems) on

Treatment / Plant	Solvent	Time (hrs)	Concentrations/ml				
			0.5	1.0	1.5	2.0	Control
			Mortality rate %				
Hyoscyamus	Hexan	24h	19±0.7	62±1.2	55±1.9	65±1.9	0±0
		48h	52±2.3	73±0.7	69±1.4	74±1	10±0.7

Aphis craccivora directly mortality.

Values ± SE
Significant difference (P ≤ 0.01)

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تاثير بعض المستخلصات النباتية على من البقوليات واسد المن الاخضر بجنوب الوادى مصر

سيد أشرف الارناؤوطى* ، عصام الدين عبد الرؤوف عويس* و حمادة أحمد حداد**

*** قسم الحشرات الاقتصادية والمبيدات – كلية الزراعة – جامعة القاهرة**

**** مركز خدمات الزراعة الحيوية – اسوان – مصر**

يستهدف هذا البحث تحديد كفاءة مستخلص أوراق السكران والدمسيسه(الايثانول والاسيتون)على التوالى على الحوريات والحشرات الكاملة لمن الفول. وتمت معاملة الحوريات والحشرات الكاملة لمن الفول عن طريق الرش المباشر لبادرات الفول المصابة وتم اخذ القراءات بعد 24و48 ساعة من المعاملة أظهرت النتائج تاثير مستخلصى السكران والدمسيسه على ارتفاع نسبة موت الحوريات والحشرات الكاملة لمن الفول حيث ان نسبة الموت بعد 24 ساعة من المعاملة بتركيز 2 ٪ كانت 75٪ بينما كانت 10٪ فى المقارنة وكانت 96٪ بعد 48 ساعة من المعاملة بينما كانت فى المقارنة 37٪ بينما فى مستخلص اوراق الدمسيسه (الاسيتون)بعد 24 ساعه من المعامله عند تركيز2٪ نسبه الموت 8٪ بينما بعد 48 ساعه نسبه الموت 16٪ على التوالى ويزداد التاثير على المن بعد 24 ساعه من المعامله،درس تاثير مستخلص جذور وازهار السكران وازهار الدمسيسه بعد 24 ساعه من المعامله لمن الفول بلغت نسبه الموت عند تركيز 2٪ 43٪ وازدادت الى 88٪ بعد 48 ساعه، يظهر تاثير مستخلص ازهار الدمسيسه بتركيز 2٪ نسب الموت تصل الى 8٪ وتزداد الى 24٪ بعد 48 ساعه ويظهر واضحا تاثير التركيزات العاليه لمستخلص السكران والدمسيسه، يظهر تاثير مستخلص سيقان السكران بتركيز 2٪ نسبة الموت 65٪ بعد 24 ساعه ويزداد الى 74٪ بعد 48 ساعه من المعامله، يتضح ظهور تاثير مذيبات الايثانول فى الاستخلاص ثم الهكسان والاسيتون على الترتيب تنازلى فى التاثير على حشرة المن ومدى الامان على المفترس اسد المن، يتضح مدى امان مستخلص نبات السكران والدمسيسه لاجزاء النبات (اوراق) على يرقات وعذارى والحشره الكامله لاسد المن بالتعريض المباشر وله تاثير بالتركيزات العاليه وكلما قل التركيز اتضح مدى الامان للاعداء الحيويه.

قام بتحكيم البحث

أ.د / عبد البديع عبد الحميد غانم — كلية الزراعة – جامعة المنصورة

أ.د / احمد حسين الهنيدى — مركز البحوث الزراعية