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TOXICITY OF SOME PLANT EXTRACTS AGAINST VECTOR OF LYMPHATIC FILARIASIS, *CULEX PIPIENS*

By

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Abstract

Many insecticides are generally used as larvicides to control *Culex pipiens*, vector of lymphatic filariasis. This study was undertaken to evaluate the larvicidal activity of some potential larvicidal plants extracts against *C. pipiens* larvae. The toxic effects of both ethanolic and petroleum ether plant extracts were evaluated under laboratory conditions against 3rd instar larvae of *C. pipiens.* Forty ethanolic and petroleum ether extracts of 10 plants namely *Echinochloa stagninum*, *Phragmites australis*, *Eichhornia crassipes, Rhizophora mucronata*, *Cichorium intybus*, *Ocimum basilicum*, *Origanum majorana*, *Azadirachta indica*, *Rosmarinus officinalis* and *Nigella sativa*.

On the basis of LC_{50}, the toxic effect of the plant extracts tested varied depending on the plant species, part, solvent used in extraction and the extract concentrations. The petroleum ether extraction was more effective against mosquito as compared with ethanolic extraction. The most effective plant extract was *A. indica* followed by *Ph. australis*, *N. sativa*, *C. intybus, R. officinalis, O. basilicum, O. majorana*, *E. stagninum*, *Rh. Mucronata* and *E. crassipes.*

Keywords: Toxicity, LC_{50}, plant extracts, *Culex pipiens*.

Introduction

Mosquitoes act as vectors of different pathogens that cause dengue fever, yellow fever, malaria, lymphatic filariasis, Japanese encephalitis or other serious disease of humans (Service 1996). In Egypt, genus *Culex* has a very wide distribution (El-Bahnasawy*et al*, 2013a) and are the vector of Rift valley fever (Darwish and Hoogstraal, 1981), *Wuchereria bancrofti* (Gad *et al*, 1996) and Western Nile virus (El-Bahnasawr *et al*, 2013b).

The plant alkaloids have been found to affect physiological system in higher animals as well as in insects (Saxena and Tikku, 1990) particularly mosquitoes (Abdel-Hady *et al*, 2014), as well as antiprotozoan parasites (Abdel Hady *et al*, 2011). Thangam and Kathiresan (1988) have mentioned that these compounds in general are very toxic to insects and can be used as insecticides.

Some plants contain toxic principles can play a useful role in the control of vectors. Several wild plants extracts or isolated active compounds have been shown to act as potent acute or chronic insecticides (Sammour, 1996; Hussin and Shoukry, 1997, Emara *et al*, 2002; Assar and El-Sobky, 2003). Sukumar *et al*. (1991) reviewed the bioactivity observed for 344 plant species against mosquitoes. Some phytochemicals acted as general toxicants to all mosquitoes' stages, whereas others interfere with growth and reproduction.

The present study dealt with 40 extracts of 10 plants namely; *Echinochloa stagninum*, *Phragmites australis*, *Eichhornia crassipes, Rhizophora mucronata*, *Cichorium intybus*, *Ocimum basilicum*, *Origanum majorana*, *Azadirachta indica*, *Rosmarinus officinalis* and *Nigella sativa* in order to evaluate its toxicity against the 3rd larval instar of *C. pipiens*.

Materials and Methods

The selected plants their local and scientific names, habitat, location and collection site are given (Tab. 1).

Extraction of plant materials: The different plant parts were left to dry at room temperature (27-30ºC) for 5 to 8 days ac-

cording to the plant species and pulverized to powder separately in a hammer mill. The extraction was performed using 70% ethanol and petroleum ether solvents. One hundred grams of the powder from each plant part for each solvent were separately extracted five times with 300ml of aqueous 70% ethanol and petroleum ether at room temperature. After 24hr., the supernatants were decanted, filtrated through Whatman filter paper No. 5 and dried in a rotary evaporator at 40ºC for 2–3 hours for ethanol extract and 40–60 minutes for petroleum ether extract. Dry extracts were weighed, and kept at -4ºC till used for experiments.

In order to study the toxicity of the concerned plant extracts, the tested material of the ethanolic extracts was dissolved in 0.1ml of 70% ethanol, while the tested material of petroleum extracts was dissolved in 2 drop of Tween 80 as emulsifier to facilitate the dissolving of tested material in water. Different range of concentrations of each concerned extract was prepared in order to detect mortalities. All tested materials were performed in 100ml of dechlorinated tap water contained in 250ml plastic cups. Then, twenty five 3rd instar larvae were put immediately into plastic cups contained different concentrations of extracts. At least three replicates were usually used for each tested concentration. All plastic cups were incubated under controlled conditions at temperature of 27±2°C, relative humidity 70±10% & 12-12 light-dark regime. Mortality was recorded daily. Forty ethanolic and petroleum ether extracts for 20 parts of 10 plants were prepared for ethanolic and petroleum ether extracts to evaluate the toxicity against *C. pipiens*.

Larval mortality percent was estimated by using the following equation (Briggs, 1960): larval mortality % = A- B/A×100. Where: A = number of tested larvae, B = number of tested pupae.

Results

The toxic effect of ethanolic and petroleum ether extracts of the different plants were tested against the 3rd instar larvae of *C. pipiens* (Tab. 2) revealed:

1- Deccan grass; *Echinochloa stagninum*: a- Ethanolic extract of leaves: Larval mortality (100%) was at the highest concentration (150ppm). Meanwhile, the larval mortality % decreased to (9.3%) at the lowest concentration (10ppm) compared to 5.3% for the untreated larvae. b- Ethanolic extract of stems: Results presented indicated that the 100% larval mortality was caused by the concentration (3000ppm) and the lowest mortality 13.3% caused by the lowest concentration (125ppm) compared to 8.0% for the untreated larvae. c- Petroleum ether extract of leaves: The highest mortality (100%) was at the concentration (150ppm) and the lowest mortality was (12.0%) at the lowest concentration (10ppm). Meanwhile, at the concentrations: 125, 100, 75, 50 & 25ppm the mortality were 93.3, 81.3, 61.3, 54.7 and 37.3%; respectively compared to 0.0% for the control group. d- Petroleum ether extract of stems: The highest larval mortality (100%) was at the concentration 300 ppm and the lowest mortality percent (36.0%) was occurred at 25 ppm compared to 9.3% for the untreated larvae. Thus, the toxicity values of tested extracts of the different parts of *E. stagninum* based on Lc_{50} values were arranged in a descending order as follows: petroleum ether extracts > ethanolic extracts of the different plant parts.

2- Common reed; *Phragmites australis*: a- Ethanolic extract of leaves: The highest larval mortality (100%) was at the concentration (500ppm) and the lowest mortality (13.3%) occurred at the concentration (25ppm) compared to 0.0% for the untreated larvae. b- Ethanolic extract of stems: Results presented indicated that the highest larval mortality (100%) was at concentration (2000ppm) and the lowest mortality (33.2%) was at the lowest concentration (500ppm) compared to 9.3% for the untreated group. c- Petroleum ether extract of leaves: Larval mortality (100%) was at concentration (200ppm)

and the lowest mortality was (0.0%) at lowest concentration (10ppm). Meanwhile, at the concentrations: 150, 100, 75, 50 & 25ppm the mortality were 93.3, 85.3, 70.7, 42.7 & 13.3%; respectively compared to 0.0% for control group. d- Petroleum ether extract of stems: The highest larval mortality (100%) occurred at the highest concentration (100ppm), while the lowest mortality (28%) occurred at the lowest concentration (10ppm). Meanwhile, at concentrations: 75, 50, 40, 30 20 & 10ppm the mortality were 94.7, 85.2, 69.3, 64.0, 49.2 and 28.0%; respectively compared to 5.3% for control group. Thus, the toxicity values of tested extracts of the different parts of *Ph. australis* based on Lc_{50} values were arranged as: petroleum ether extracts > ethanolic extracts of the different plant parts.

3- Water Hyacinth; *Eichhornia crassipes*: a- Ethanolic extract of leaves: Larval mortality (100%) was at the highest concentration (3000ppm), and the lowest value (10.7%) occurred at lowest concentration (125ppm) compared to 0.0% for control group. b- Ethanolic extract of roots: The highest mortality (100%) was at concentration (1000ppm) and lowest mortality (4.0%) was at the concentration (100ppm) compared to 0.0% for the control. c- Petroleum ether extract of leaves: The highest mortality (100%) was at concentration (2000ppm) and lowest mortality was (13.3%) at the lowest concentration (50ppm). Meanwhile, at concentrations: 1500, 750, 500, 250 & 125ppm the mortality were 93.3, 78.8, 57.2, 41.2, 30.7 & 13.3%; respectively compared to 6.7% for control group. d- Petroleum ether extract of roots: Larval mortality (100%) was at concentration (500ppm), meanwhile the lowest value (5.2%) was at lowest concentration (10ppm) compared to 0.0% for control group. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *E. crassipes* based on Lc_{50} values were arranged as follows: roots > leaves.

4- Mangrove; *Rhizophora mucronata*: a- Ethanolic extract of leaves: Larval mortality (100%) was at the concentration (500ppm) and the lowest mortality (10.8%) occurred at the concentration (25ppm) compared to 5.2% for the control. b- Ethanolic extract of stems: Larval mortality (100%) occurred at the concentration (200ppm) and the lowest mortality (10.8%) occurred at the concentration (10ppm) compared to 0.0% for the control. c- Petroleum ether extract of leaves: The highest mortality (100%) was at the concentration (3000ppm) and the lowest mortality was (10.8%) at the lowest concentration (250ppm). Meanwhile, at the concentrations: 2000, 1500, 1000, 750 & 500ppm the mortality were 90.7, 73.3, 57.3, 42.7 and 25.3%; respectively compared to 5.2% for control group. d- Petroleum ether extract of stems: Larval mortality (100%) was at the highest concentration (150ppm), meanwhile lowest value (5.2%) occurred at lowest concentration (10ppm) compared to 0.0% for the control group. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *Rh. mucronata* based on Lc_{50} values were arranged as: stems > leaves.

5- Chicory; *Cichorium intybus*: a- Ethanolic extract of leaves: Larval mortality (100%) was at concentration (300ppm) and the lowest mortality was (13.3%) at lowest concentration (25ppm) compared to 10.7% for untreated larvae. b- Ethanolic extract of stems: Larval mortality (100%) was at concentration (1000ppm) and the lowest mortality (12.0%) was at the lowest concentration (100ppm) compared to 6.7% for untreated larvae. c- Petroleum ether extract of leaves: Larval mortality (100%) was at concentration (2500ppm) and lowest mortality (9.3%) was at (250ppm) compared to 5.3% for untreated larvae. d- Petroleum ether extract of stems: Larval mortality (100%) was recorded at concentration (100ppm)

and the lowest mortality was (22.7%) at the lowest concentration (5ppm). Meanwhile, at concentrations: 80, 60, 40, 20 & 10ppm the mortality were 92.2, 82.7, 65.3, 46.7 & 30.7%; respectively compared to 5.3% for control group. Thus, the toxicity values of tested extracts of the different parts of *C. intybus* based on Lc_{50} values varied.

6- Basil; *Ocimum basilicum*: a- Ethanolic extract of leaves: Highest concentration (500ppm) caused complete larval mortality; meanwhile lowest concentration (25ppm) caused larval mortality (21.3%). At concentrations: 400, 300, 200, 100 & 50ppm the mortality were 93.3, 81.3, 73.3, 62.67 & 36.0%; respectively compared to 4.0% for control group. b- Ethanolic extract of stems: Larval mortality (100%) was at the concentration (2000ppm) and the lowest mortality (29.3%) was at the lowest concentration (500ppm). While; at the concentrations: 1750, 1500, 1250, 1000 & 750ppm the mortality was 93.3, 82.7, 73.3, 61.3 and 58.7%; respectively, vs. 6.67% at the control group. c- Petroleum ether extract of leaves: Larval mortality (100%) was at the highest concentration (150ppm), while lowest value (12.0%) at the lowest concentration (10ppm). Larval mortality of control group was 6.7%. d- Petroleum ether extract of stems: Lsarval mortality (100%) was at concentration (1000ppm) and the lowest mortality (29.3%) was o at the lowest concentration (100ppm) compared to 6.7% for untreated larvae. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *O. basilicum* based on Lc_{50} values were arranged as: leaves > stems.

7- Marjoram; *Origanum majorana*: a- Ethanolic extract of leaves: Larval mortality (100%) was at the concentration (1000ppm), and lowest mortality (21.3%) was occurred at concentration (50ppm). While the concentrations 800, 600, 400, 200 & 100ppm induced mortality 94.7, 81.3, 68.0, 45.3 & 33.3%; respectively compared to 10.7% for the control group. b- Ethanolic extract of stems: Larval mortality increased by increasing the concentration of *O. majorana*. Larval mortality (100%) was at concentration (2000ppm), and the lowest mortality (29.3%) was at the concentration (25ppm) compared to 5.3% for the untreated group. c- Petroleum ether extract of leaves: Larval mortality (100%) was at the highest concentration (100ppm), while the lowest value (21.3%) was at the lowest concentration (20ppm). Larval mortality of control group was 5.3%. d- Petroleum ether extract of stems: Larval mortality (100%) was at the concentration (500ppm) and the lowest mortality (5.3%) was at the lowest concentration (10ppm) compared to 5.3% for the untreated larvae. Thus, the toxicity values of tested extracts of the different parts of *O. majorana* based on Lc_{50} values were arranged as: petroleum ether extracts > ethanolic extracts of the different plant parts.

8- Neem; *Azadirachta indica*: a- Ethanolic extract of leaves: The ethanolic extract of *A. indica* induced (100%) larval mortality at concentration (100ppm), while; at the lowest concentration (5ppm) larval mortality was (26.7%) compared to 6.7% for untreated group. b- Ethanolic extract of stems: Larval mortality (100%) was at highest concentration (500ppm). Meanwhile, larval mortality decreased (25.3%) at lowest concentration (25ppm) compared to 5.3% for untreated larvae. c- Petroleum ether extract of leaves: Larval mortality (100%) was at concentration (50ppm) and the lowest mortality (9.3%) was at (1ppm), compared to 5.3% for untreated group. d- Petroleum ether extract of stems: Larval mortality (100%) was at concentration (300ppm) and the lowest (10.7%) was at (25ppm). While, at 250, 200, 150, 100 & 50 ppm the mortality was 93.3, 81.3, 54.7, 41.3 & 25.3%; respectively, compared to 32.7% for control group. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *A. indica* based on Lc_{50} values were arranged

as: leaves > stems.

9- Rosemary; *Rosmarinus officinalis*: a- Ethanolic extract of leaves: Larval mortality (100%) was at concentration of (200ppm), and the mortality (12.0%) was at the lowest concentration of (10ppm). meanwhile, mortality was 94.7, 485.3, 53.3, 38.7 & 29.3% at the concentrations of 150, 100, 75, 50 & 25ppm respectively. Mortality in control group was 2.7%. b- Ethanolic extract of stems: Larval mortality (100%) was at concentration (2000ppm) and lowest one (18.7%) was at concentration (125ppm). While, at concentrations 1500, 1000, 750, 500 & 250ppm the mortality was 93.3, 84.0, 70.7, 54.7 & 34.7%; respectively compared to 2.7% for control group. c- Petroleum ether extract of leaves: Larval mortality (100%) was at concentration (150ppm) and lowest mortality (17.3%) was at concentration (5ppm). While; concentrations of 100, 75, 50, 25 & 10ppm caused mortality 90.7, 78.7, 58.7, 42.7 & 29.3%; respectively compared to 4.0% for control group. d- Petroleum ether extract of stems: Extract induced 16.0, 30.7, 54.7, 68.0, 86.7, 97.3 & 100% larval mortality at concentrations 250, 500, 1000, 1500, 2000, 2500 & 3000ppm; respectively compared to 6.7% for untreated group. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *R. officinalis* based on Lc_{50} values were arranged as: leaves > stems. 10- Blackseed; *Nigella sativa*: a- Ethanolic extract of leaves. Larval mortality increased as the concentration increased, it was 29.3, 37.3, 49.3, 61.3, 85.3, 94.7 & 100% at concentrations: 10, 25, 50, 75, 100, 125 & 150ppm; respectively compared to 4.0% for control group. b- Ethanolic extract of stems: Larval mortality (100%) was at concentration (2000ppm), while; lowest (25.3%) was at lowest concentration (125ppm), compared to 4.0% for control group. c- Petroleum ether extract of leaves: Larval mortality (100%) was at the concentration 60 ppm, and the lowest mortality (24.0%) was at the concentration 5ppm; respectively compared to 1.3% for untreated group. d- Petroleum ether extract of stems: Larval mortality (100%) was at concentration (1500ppm), and lowest mortality (24.0%) was at concentration (50ppm), compared to 2.7% for control group. Thus, the toxicity values of the tested ethanolic and petroleum ether extracts of different plant parts of *N. sativa* based on Lc_{50} values were arranged as: leaves > stems.

Toxicity values of tested extracts of the different plants parts based on Lc_{50} values were arranged in a descending order as: petroleum ether extracts > ethanolic extracts of the different plant parts

Table 1: Nomenclature, habitats and sources of used plants.

Common name	Scientific name	Habitat	Source of collection
Deccan grass	*Echinochloa stagninum*	Marshes, canal banks	Mansoura City,
Common reed	*Phragmites australis*	Swamps, edges of lakes & ponds	Mansoura City.
Water Hyacinth or Nile-lily	*Eichhornia crassipes*	Float on fresh water of lakes & rivers.	Kafr Elzayat, Gharbia G.
Mangrove	*Rhizophora mucronata*	Brackish & saline salts of shores and marshes.	5 Km south sunken ship, Hurgada.
Chicory	*Cichorium intybus*	A wild plant on roadsides.	3 Km west Elareesh, North Sinai G.
Basil	*Ocimum basilicum*	Cultivated in clay soil.	3 Km west Elareesh, North Sinai G.
Marjoram	*Origanum majorana*	A wild plant on roadsides.	Army garden 13 Km south Suez G.
Neem	*Azadirachta indica*	A woody, perennial herbs cultivated in clay soil.	3 Km west Elareesh, North Sinai G.
Rosemary	*Rosmarinus officinalis*	Desert lands	8 Km west Elareesh, North Sinai G.
Blackseed	*Nigella sativa*	All types of saline free lands.	3 Km west Elaresh, North Sinai G.

Table 2: LC_{50} of ethanolic/ petroleum ether extracts of different plants.

plants	Part	Extraction	$LC_{50\ (ppm)}$	Slope	Correlation coefficient
Echinochloa stagninum	Leaves	ethanolic	65.5	0.652	0.986
		Petroleum ether	54.81	0.594	0.953
	Stems	ethanolic	850.4	0.027	0.881
		Petroleum ether	55.67	0.233	0.952
Phragmites australis	Leaves	ethanolic	102.4	0.151	0.743
		Petroleum ether	72.3	0.531	0.836
	Stems	ethanolic	650.49	0.041	0.924
		Petroleum ether	20.45	0.750	0.880
Eichhornia crassipes	Leaves	Ethanolic	644.4	0.027	0.738
		Petroleum ether	513.7	0.041	0.863
	Roots	Ethanolic	425.12	0.107	0.738
		Petroleum ether	73.75	0.157	0.609
Rhizophora mucronata	Leaves	Ethanolic	208.17	0.216	0.956
		Petroleum ether	1091.6	0.032	0.900
	Stems	Ethanolic	55.96	0.441	0.886
		Petroleum ether	70.3	0.690	0.990
Cichorium intybus	Leaves	Ethanolic	115.3	0.282	0.947
		Petroleum ether	1074.4	0.040	0.950
	Stems	Ethanolic	345.26	0.093	0.896
		Petroleum ether	29.27	0.815	0.955
Ocimum basilicum	Leaves	Ethanolic	112.55	0.149	0.871
		Petroleum ether	50.72	0.611	0.932
	Stems	Ethanolic	763.02	0.043	0.944
		Petroleum ether	307.19	0.089	0.863
Origanum majorana	Leaves	Ethanolic	287.68	0.082	0.950
		Petroleum ether	45.94	1.046	0.987
	Stems	Ethanolic	837.11	0.045	0.982
		Petroleum ether	178.23	0.193	0.926
Azadirachta indica	Leaves	Ethanolic	27.72	0.753	0.969
		Petroleum ether	17.89	1.885	0.950
	Stems	Ethanolic	140.0	0.158	0.965
		Petroleum ether	129.43	0.333	0.979
Rosmarinus officinalis	Leaves	Ethanolic	68.39	0.478	0.900
		Petroleum ether	42.55	0.572	0.924
	Stems	Ethanolic	523.41	0.041	0.869
		Petroleum ether	1068.1	0.031	0.951
Nigella sativa	Leaves	Ethanolic	48.13	0.541	0.978
		Petroleum ether	22.69	1.505	0.966
	Stems	Ethanolic	556.9	0.042	0.914
		Petroleum ether	327.17	0.053	0.894

Discussion

In the present study, the plants used are eco-friendly, not toxic to human, with toxic effect depended on the plant species, plant part, extract dose, exposure time and the used solvent. The toxicity of ethanolic and petroleum ether extracts showed that the petroleum ether extract was more effective in promoting the toxicity against the different species of mosquito as compared to ethanol extract, this results agreed with Qiu *et al*. (1998) Tawatsin *et al*. (2001), Jeyabalan *et al*. (2003), and (Barnard and Xue, 2004). It was proved that crude or partially purified plant extracts was less expensive and highly effect for mosquitoes control rather than purified compounds or extracts (Jang *et al*, 2002; Cavalcanti *et al*, 2004).

The toxicity of the tested plant extracts against the larval instars was varied according to plant part used, solvent used in extraction and concentration of the extract. The larval mortality percent was increased by increasing extract concentration for all plant extracts tested. The toxicity values of tested ethanolic extracts of different plant parts based on Lc_{50} values were arranged in a descending order as follows: leaves > stems for: *A. indica* followed by *N. sativa, E. stagninum*, *R. officinalis, Ph. australis*, *O. basilicum* and *C. intybus;,* Contrary with those of *Rh. Mucronata* and *E. crassipe.*

The toxicity of petroleum ether extracts based on Lc_{50} was leaves > stems for: *A. indica* followed by *N. sativa*, *R. officinalis, O. majorana*, *O. basilicum* and *E. stagninum*; and stems > leaves for: *Ph. australis*, *C. intybus*, *Rh. Mucronata* and *E. crassipes.* The toxicity of petroleum ether extracts > ethanolic extracts of the different plants tested. These results are in consistent with the previously mentioned suggestions of Sukumar *et al*. (1991). Several plant extracts other than those used in the present study had been tested against different species of mosquitoes by many authors worldwide. The tested plant extracts on larval mortality of *C. pipiens* agreed with the results of Dharmshaktu *et al*. (1987), Jackson *et al*. (1990), Pushpalatha and Muthukrishnan (1995), Hamouda *et al*. (1996), Shalaby *et al*. (1998), Al-Dakhil and Morsy (1999), Masoud and Labib (2000), Ahmed *et al.* (2001), Redwan *et al*. (2002), Pelah *et al*. (2002), Jeyabalan *et al.* (2003) and Nathan *et al*. (2005a, b).

Using the water extract of *E. crassipes* against the 3rd instar larvae of *C. pipiens*, Assar and El- Sobky (2003) recorded a significant effect on the larval mortality at concentrations 1.0 and 2.0%. However, the present study showed that the ethanolic and petroleum ether extracts of this plant was more effective on larval mortality of *C. pipiens*, whereas ethanolic and petroleum ether extracts of *E. crassipes* roots caused 100% larval mortality at the concentrations of 1000 and 500ppm; respectively.

The mangrove plant species *Rh. mucronata* which used in extractions tested against the 3rd instar larvae of *C. pipiens* in the present investigation was tested against the larvae of different mosquito species by some other authors. Thangam and Kathiresan (1988) recorded larval toxicity when tested acetone extracts of the mangrove plant; *Rh. mucronata* against the 4th instar larvae of *A. stephensi*. The LD_{50} was 0.0 and 52.0ppm; respectively. On the other hand, Kabaru and Gichia (2001) tested ethanolic extracts of leaves, bark and stems from the mangrove tree, *Rh. mucronata* for toxicity against the 2nd instar larvae of *A. aegypti*. Stem wood extracts had low toxicity with Lc_{50} of 1003.4ppm, while leaf extract did not exhibit toxic effects at a concentration of 1000ppm. Such results may be incompatible with the obtained results, whereas the ethanolic extracts of *Rh. mucronata* leaves and stems caused 100% larval mortality at concentrations of 500 and 200ppm; respectively. Meanwhile, petroleum ether extracts of *Rh. mucronata* leaves and stems caused the 100% larval mortality at concentrations of 3000 and 150ppm; respectively.

The effects of aqueous extracts of *Azadirachta indica* seed kernel against *C. quinquefasciatus* larvae extracts was studied by Sagar and Sehgal (1996). They recorded that *A. indica* extract caused 100% mortality in the fourth instar larvae at the concentration 100ppm. Such results may be comparable with the obtained results, where the ethanolic and petroleum ether extracts of *A. indica* caused 100% larval mortality at concentrations of (100 & 50ppm) for leaves and (500 & 300 ppm) for stems; respectively.

The LC_{50} values of ethanolic and petroleum ether leaves extracts of *R. officinalis* (68.39 and 42.55ppm); respectively, was in agreement with those obtained by Khalaf (1999) who tested the toxicological

activity of *R. officinalis* leaves extract against *A. pharoensis* larvae. The data showed that, the LC_{50} value was 88ppm for *R. officinalis*.

It was observed that the toxicity values of the tested ethanolic extracts of different plant parts based on Lc_{50} values are arranged in a descending order as follows: leaves (Lc_{50} 65.5) > stems (Lc_{50} 850.4) for *E. stagninum*, leaves (Lc_{50} 102.4) > stems (Lc_{50} 650.49) for *Ph. australis*, roots (Lc_{50} 425.12) > leaves (Lc_{50} 644.4) for *E. crassipes,* stems (Lc_{50} 55.96) > leaves (Lc_{50} 208.17) for *Rh. mucronata*, leaves (Lc_{50} 115.3) > stems (Lc_{50} 345.26) for *C. intybus,* leaves (Lc_{50} 112.55) > stems (Lc_{50} 763.02) for *O. basilicum,* leaves (Lc_{50} 287.68) > stems (Lc_{50} 837.11) for *O. majorana,* leaves (Lc_{50} 27.72) > stems (Lc_{50} 140.0) for *A. indica,* leaves (Lc_{50} 68.39) > stems (Lc_{50} 523.41) for *R. officinalis* and leaves (Lc_{50} 48.13) > stems (Lc_{50} 557.9) for *N. sativa.*

Based on Lc_{50}, the toxicity values of the tested petroleum ether extracts of different plant parts are arranged in a descending order as follows: leaves (Lc_{50} 54.81) > stems (Lc_{50} 55.67) for *E. stagninum*, stems (Lc_{50} 20.45) > leaves (Lc_{50} 72.3) for *Ph. australis*, roots (Lc_{50} 73.75) > leaves (Lc_{50} 513.7) for *E. crassipes,* stems (Lc_{50} 70.3) > leaves (Lc_{50} 1091.6) for *Rh. mucronata*, stems (Lc_{50} 29.27) > leaves (Lc_{50} 1074.4) for *C. intybus,* leaves (Lc_{50} 50.72) > stems (Lc_{50} 307.19) for *O. basilicum,* leaves (Lc_{50} 45.94) > stems (Lc_{50} 178.23) for *O. majorana,* leaves (Lc_{50} 17.89) > stems (Lc_{50} 129.43) for *A. indica,* leaves (Lc_{50} 42.55) > stems (Lc_{50} 1068.1) for *R. officinalis* and leaves (Lc_{50} 22.69) > stems (Lc_{50} 327.17) for *N. sativa.*

Generally speaking, Egypt is rich with so many medicinal plants and herbs, which are the most potential resource of new therapeutic agents (El-Sherbini, *et al*, 2010) as well as insecticides (Morsy *et al*, 1998) and the control measures against the snails of medical and veterinary importance (Shoukry, 2006). . Generally, they are diverse, largely productive, biologically active and chemically unique; among their constituents "polyphenol compounds group" one of the main determinant factors in evaluating the pharmacological potentials i.e. polyphenols display an array of pharmacological properties such as antioxidant, immunostimulant, antitumor and antiparasitic effects (Chang *et al*, 2002). Numerous laboratory and field studies have established that various polyphenols have significant antioxidant activity because they act as free radical terminators (Sun *et al,* 2011).

Conclusion

No doubt, chemical insecticides or pesticides are risky to man, animals and environment. Meanwhile, the arthropodborne infectious diseases are big problem.

The outcome results showed experimentally the different plant extracts tested against the 3rd instar larvae of *C. pipiens* showed that the larvicidal activity of these extracts was dose dependent i.e. the larval mortality percent was increased by increasing the extract concentration. The toxicity of petroleum ether extracts > ethanolic extracts of the different plants tested.

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