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EFFICACY OF WATER AND ALCOHOLIC LEAF EXTRACTS OF *IBICELLA LUTEA* (STEPF.) AGAINST DIFFERENT STAGES OF CITRUS WHITEFLY *ALEUROCLAVA JASMINI* TAKAHASHI IN IRAQ

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ABSTRACT

Water (cold and hot) and alcoholic (hexan and methyl alcohol) extracts of *Ibicella lutea* (Satpf.) leaves in different concentrations (20, 40, 60, 80 and 100%) were a evaluated against egg, nymph and adult stages of *Aleuroclava jasmini* Takahashi. A positive relationship existed between mortality and concentration for all insect stages. Boiled water extracts were more effective than the cold water extract. Larval mortality at 100% concentration was 35.4% for boiled water extract and 22.2 % for cold water extract. Methyl alcohol extract was more effective than hexane extract which exhibited 56.7 and 34.9% larval mortality, respectively, at 100% concentration.

Keywords: *Aleuroclava jasmini*, *Ibicella lutea*, plant extracts

INTRODUCTION

Chemical insecticides enhance the agricultural yield, (Al-Adeel and Kamel, 1997). But blind and indiscriminate use of these insecticides definitely leads to pollution that affect the health of human, animals, plants as well as of the other beneficial organisms. High use of these insecticides caused resistant development in insects to these insecticides. This necessitates for the researchers to find new methods and new techniques for controlling different pests without using chemical pesticides. One of these new methods is the use of the botanical insecticides (Volkonsky, 2001; Al-Rubaie, 2005). This method is cheap, renders no residue and does not pollute the environment (Al-Jorani and Saghab, 2004). The current study focused on one of the important wild plants *Ibicella lutea* Stapf. (Martyniaceae), which is a highly distributed in Iraq. The goal of this study was to evaluate the water and alcoholic extracts of *I. lutea* on different stages of *Aleuroclava jasmini* Takahas which is considered as one of the important and key pests on citrus in Iraq and causes high losses in yield every year (Al-Jobory, 2002; Al-Jbory *et al.*, 2009). Citrus in Iraq is considered very important crops which is cultivated at the North and middle areas of Iraq at thousands hectares (Yousif and Hameed, 2004). Iraqi government imports different insecticides of millions of dollars yearly without any benefit. The use of botanical insecticides is considered as environment friendly methods which can be used as one of the integrated pest management parameters for controlling different agricultural pests.

MATERIALAND METHODS

Sample preparation

Ibicella lutea was collected from cucumber, eggplant and potato fields from different areas of Baghdad during spring season, 2010. Some of the collected plants were sent to Plants Museum of the Department of Plant Protection, College of Agriculture, University of Baghdad, for classification. After confirmation that these samples were of *I. lutea,* plant, the leaves of the collected plant were dried under the Lab. Conditions for one week. The dried leaves were then crushed by hand. The crushed leaves were converted to fine powder by using electrical machine (Perten, Italy made). The fine power was used for the extraction process.

Preparation of pest culture

The adults of *A. jasmini* were collected with aspirator from the citrus trees of the citrus orchard at Baghdad city during May,

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2010. The adults were reared on seedlings of citrus kept in growth chamber (28 ± 1 °C and 65 ± 5% RH & full dark).

Preparation of water extract

For water extractions (hot and cold water extractions), 1000 g of *I. lutea* leaves powder was put in 1000 ml glass flask. After this, 700 ml of distilled water was added and mixed by using hot plate stirrer for 30 minutes. The mixture was left for 20 minutes and then it was purified by using muslin cloth as a first step and then by Buchner funnel and wattman paper No.2 with vacuum. The mixture was then concentrated by using rotary vacuum evaporator at 60 -65 °C. The same process was repeated under the same conditions but with the replacement of the cold water with hot water (40-45 °C). The final extract was weighed. The samples were poured in 100 ml vials with tight sec row covers, labeled and preserved in refrigerator (5-10 °C) for the next experiments.

Preparation of alcoholic extractions

Ethanol 80% and N. Hexane were used as chemical solvents for the alcoholic extractions as ethanol 80% was considered as polar solvent while N. Hexane as non-polar solvent. Hundred (100) gram of the leave powder was weighed and put in glass flask (1000 ml). To this flask, 500 ml of ethanol 80% was added. The mixture was homogenized by hot plate stirrer for 30 minutes and kept for 20 minutes. The mixture was then purified by using muslin cloth as first step and by using Buchner funnel and wattman paper No .2 with vacuum. The mixture was concentrated with rotary vacuum evaporator at 40-45 °C. The mixture was converted to sticky liquid. The sticky liquid (Ethanol extraction) was distributed in glass dishes, put in the oven at 40-45 °C for expulsion of the ethanol and converted to powder. The same process was repeated under the same conditions with N. Hexane. The final samples was weighed and preserved in refrigerator. Five concentrations (20, 40, 60, 80 and 100%) were prepared for all types of extractions (water and alcoholic extractions) to perform experiments for different pest stages.

Evaluation of extracts against eggs

Four Pyrex dishes (Replicates) for one concentration of each extract were prepared after sterilization in oven for 2 hours at 150 °C. Each replicate contained fresh citrus leaves which contained 200 eggs (800 eggs for 4 replicates). Similarly a control dish containing 200 eggs was prepared. This experiment was repeated for all types of the water and alcoholic extracts as well their concentrations. All the samples were labeled and incubated at 28 ± 1 °C and 65 ± 5% rh. The samples were observed daily to record the mortality percentage due to the effect of the extracts.

Evaluation of extracts against nymphs

Pyrex dishes (replicates), each containing 200 nymphs, were prepared in the same way as described previously for eggs with a control. This experiment was repeated for all concentrations and types of the extracts. All the dishes were labeled and incubated under the same conditions of the eggs experiment. The nymphs were observed daily to determine the mortality percentage of the citrus fly nymphs.

Evaluation of extracts against adults

Small plastic pots (4 plastic pots for each concentration) were prepared. Each plastic pot contained citrus seedling and was covered with muslin cloth. In each pot, 30 adults (15 males and 15 females), were released. The experimental procedure performed for eggs and nymphs was repeated for adults for all concentrations and types of extracts. The pots were monitored daily to determine mortality percentage of the adults.

Statistical analysis

Completely Randomized Design with four repeats was used for all the experiments. The data were analyzed by Duncan Multiple Range test at probability level of 5%.

RESULTS AND DISCUSSIONS

Effect of water extracts

Many researchers pointed that the *I. lutea* leaves have some natural active compounds like alkaloids and phenols (Al-Mansoor, 2005). The results showed that mortality percentage of all stages varied for each type of extraction (hot & cold water) as well as for each concentration. The results also showed that the nymph (especially first stage) and adults were more sensitive than the eggs to all extracts (Table 1). More sensitivity of adults and nymphs over eggs is attributed to flying nature of the adults and mobility of the nymphs (first stage) as this mobility behavior of these stage increases the chances of exposure of these stages to the water extractions which deferentially increased the mortality percentage. The extracts in the hot water was more effective in comparison with the cold water extract. The mortality percentage of the nymphs due to exposure of hot water extract was 35.4% at 100% concentration while it was 47.8% for the adults at 100% concentration in hot water extract. The mortality was 22.2 and 33.1% for the nymphs and adults, respectively when exposed to cold water extract at 100% concentration (Table 1). More effectiveness of hot water extracts may also be attributed to the fact that hot water can inhibit the mechanism of certain plant enzymes which have the ability to decompose second active compounds or convert them to non- toxic compounds in the plant (Harborn, 2002). The results of present study agreed with the results of Al-Mansoor (2005), who reported that the hot water extract was more effective than cold water extract against nymph and adults of whitefly *Bemisia tabaci* Genn.

Effect of alcoholic extracts

The results showed that the ethanol leaf extract was more effective than N.hexane leaf extract because ethanol leaf extract explained 56.7 and 56.3% mortality in nymphs and adults of *A. jasmini* at the 100% concentration, respectively, while hexane leaf extract caused 34.9 and 40.1% mortality in nymphs and adults, respectively at same concentration

(Table 2). The results showed that the secondary active compounds of *I. lutea* are polar and well extracted by using ethanol solvent. Also high mortality of the nymphs of the pest in this case, may be due to the effect of these compounds on the mid gut or on the epithelial cells of the nymphs, which definitely lead to the poisoning of nymphs and causing the mortality (Worth, 1973; Al-Mansoor, 2005). The results also revealed that there was direct correlation between concentration and mortality for each type of extraction. The nymphs mortality ranged from 12 to 34.9% for concentrations range of 20-100 % when N.hexane solvent was used for leaves extractions while 19.1 to 56.7% mortality was achieved in nymphs when ethanol solvent were used for extractions. The results of the current study agreed with those of Al- Mansoor, (2005) and Susan *et al*. (2010), who confirmed that the ethanol leaves extract of *I. lutea* were more active than N.hexane leaves extract against nymphs and adults of the whitefly *B. tabaci*. The results of this study (Table 2) also agreed with those of Volkonsky (2001), who recorded high mortality percentage for the nymphs and adults (54.1and 77.3% respectively) at 100% concentration when leaves extract of *Myrtus common* L. was obtained with ethanol solvent. Finally it can be conclude that *I. lutea* which grow naturally in different areas of Iraq can easily be used as new line for agricultural pests control in integrated pest management programme.

Table 1

Effect of water extracts of *Ibicella lutea* leaves extract (boiled and cold water) on percentage mortality of the different life stages of *Aleuroclava jasmini*.

Concentrations ('%)	Mortality (%)					
	Adults		Nymphs		Eggs	
	Cold water	Hot water	Cold water	Hot water	Cold water	Hot water
20	18.0 c	29.1 d	10.1 c	18.7 c	8.3 c	3.2 c
40	21.3 b	33.7 c	12.7 c	32.1 b	12.5 b	6. 1 b
60	27.0 ab	37.4 bc	15.3 b	28.0 ab	14.9 b	9.4 ab
80	29.9 ab	43.8 b	19.1 ab	31.4 a	18.1 a	12.0 a
100	33.1 a	47.8 a	22.2 a	35.4 a	21. 7 a	13.9 a
Control	17.3 c	20.2 c	1.0 d	3.0 d	0.0 d	0.0 d

Means in the same column followed by the same letter are not significantly different according to Dancan's Multiple Range Test (P= 5 %)

Table 2

Effect of alcoholic extracts of *Ibicella lutea* leaves extract using different organic solvents (N.hexan and Methyl alcohol) on percentage mortality of the different life stages of *Aleuroclava jasmini*

Concentrations ('%)	Mortality (%)					
	Adults		Nymphs		Eggs	
	Ethyl alcohol	N.hexan	Ethyl alcohol	N.hexan	Ethyl alcohol	N.hexan
20	22.0 d	13.9 c	6.9 c	6.0 c	11.1 d	7.0 c
40	29.1 c	21.6 d	13.8 d	9.1 bc	14.4 c	10.1 b
60	38.4 b	27.4 c	17.1 c	10.8 bc	17.2 b	12.3 b
80	47.8 ab	33.9 b	22.6 b	12.4 b	23.7 ab	15.4 ab
100	56.3 a	40.1 a	27.4 a	16.3 a	29.4 a	17.9 a
Control	0.1 c	0.0 f	0.0 f	0.0 d	0.0 c	0.0 d

Means in the same column followed by the same letter are not significantly different according to Dancan's Multiple Range Test (P= 5 %)

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