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Use of crude plant extract of *Adhatodavasica* as insecticides against*Bemisiatabaci*

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Abstract
The present study evaluates the insecticidal activity of (Acetone, 80% Methanol and water) crude leaf extract of *Adhatodavasica*against*Bemisiatabaci*. The extracts of (Acetone, Methanol 80%) showed 100, 86.6% mortality of nymphs*Bemisiatabaci* at 5% concentration. Then the extracts of (Acetone, Methanol 80%) showed 100, 90% mortality of pupa*Bemisiatabaci* at 5% concentration. Phytochemical screening revealed the presence of (Flavones, Volatiles oils, Tannins, Saponines, Glycosides, Alkaloids,Resins and Terpenoids)in methanol80% crude extract. It can be concluded that the acetone and methanol crude leaf extract of *A. vasica*Nees can cause mortality in *(nymphs, pupa) Bemisiatabaci*, so it can be used asinsecticides.

Keywords: *Adhatodavasica*, *Bemisiatabaci*, Insecticides.

استخدام المستخلص الخام لنبات حلق السبع الشجيري كمبيد لحشرة الذبابة البيضاء

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الخلاصة
قيمت هذه الدراسة فعالية مستخلصات اوراق نبات حلق السبع الشجيري (الاسيتون ،ميثانول 80% والماء)كمبيدات حشرية ضد حشرة الذبابة البيضاء .اظهرت مستخلصات الاسيتون والميثانول 80%نسبة فناء ليرقات الذبابة البيضاء بلغت100، 86.6% وبلغت نسبة الفناء لعذارى الذبابة البيضاء 100، 90% بتركيز 5% لكل مستخلص (الاسيتون والميثانول 80%).وقد اظهر الكشف الكيميائي للمركبات النباتية عن وجود (الفلافونات،زيوت متطايرة ،العفصيات،الصابونين ،الكلايكوسيدات ،القلويدات ،الراتنجات والتربينات)في مستخلص الميثانول 80%.نستنتج من ذلك ان مستخلص الاسيتون والميثانول 80% لاوراق نبات حلق السبع الشجيري كان سبب في فناء يرقات وعذارى حشرة الذبابة البيضاء .لذلك يمكن استخدامه كمبيدات حشرية للافات الاقتصادية.

Introduction

During the previous periods, the pests caused economic substantial losses in agricultural crops. For combating the agricultural insect pests, many countries and corporations were adopted on synthetic insecticides that begun in the 1940s [1].There are many chemical synthetic insecticides were used commercially. The accumulation of synthetic insecticides in the environment with toxic residues led to many problems such as: resistance of insects, resurgence of new insect pests, contamination of the agro ecosystem, contamination of air, water and soil, and other many problems [1].

Substances from natural sources were used biological control agents for controlling insect pests .such as; pyrethrum, rotenone and nicotine [2]. The use of plant material or crude plant extracts (botanical

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insecticides) for the protection of crops and stored products from insect pests is probably as old as crop protection itself [3]. Plants have evolved a wide variety of chemical compounds which are known as secondary metabolites wereFlavonoids, Volatiles oil,Tannins,Saponines,Glycosides,Alkaloids and Resins . For protecting of plants against pests'[4] .Therefore, these compounds were used in the production of botanical pesticides.

Adhatodavasica(L.) (Acanthaceae) is an insecticidal plant [5].Leaf extract has anti feeding activity against Spodoptera littorals [6].The currentstudy was aimed to evaluate the insecticides activity of crude extract of *Adhatodavasica* against different stages of *Bemisiatabaci*.

Materialsand Methods

Collection of plant material

The leaves of *Adhatodavasica* (*Acanthaceae*) were collected from different places the gardens of the University of Baghdad, during October 2014. The leaves were washed with clean tap water and then left at room temperature at (22-25) °C for (2-3) weeks for drying; plant leaves were grinded by electric miller to be powder.

Crude extraction

Crude leaves extract were prepared by using two solvents acetone and methanol 80%, dried leaves powder (200gm) was kept in a thimble and extracted by soxhlet apparatus which contained 600ml of the solvent, each separately at 50°C for 36 hours with an extraction ratio of (1:3) [7].Extracted was filtered through a filter paper (whatman No.4) and the filtrate was concentrated by using rotary evaporator. The extract was kept in a glass container at -4°C in a refrigerator.

Preparation of water extract of plant leaves

150g of *A.vasica*Leaves powder was added to a flask contained 450 ml of distilled water and extracted with heating over a hot plate stirrer apparatus at 80°C for 24 hours with an extraction ratio of (1:3),then crude leaves extract was filtered through a filter paper (whatman No 4), and the filtrate was concentrated by using rotary evaporator. The concentrated was kept in a glass container at - 4°C in arefrigerator[8].

Phytochemical screening

Phytochemical analysis were performed to assess the qualitative chemical composition of different crude extracts using commonly employed precipitation and coloration reactions to identify the major secondary metabolites like Flavonoids , Volatiles oil , Tannins , Saponines , Glycosides , Alkaloids and Resins. The phytochemical analysis was carried out using different reagent [9].

Preparation of*Bemisiatabaci*colonies

Colonies of*Bemisiatabaci pest* were prepared in order to conduct the bio-evaluation of pests.The pests were obtained from *RicinusCommunis L.* leaves which infected with these pests.*BemisiaTabaci* pest infected the lower surface leaves, which was diagnosed in the plant protection Directorate / Ministry of Agriculture. Aluminum plate trays were prepared with dimensions (35x42x32) cm each contained cotton wetted with distilled water and leaves of *RicinusCommunis L.* plant infected with*BemisiaTabaci* pest. The trays were incubated in an incubator at temperature 27°C and relative humidity of (80-85) %.After that, clean and free infection of castor leaves were placed in the same trays in contact with infected plant leaves. The cotton wetted and the cultivation conditions were maintained for pest colonies growth [10].

Bio-evaluation on (Nymphs, *pupa)*of *Bemisiatabaci* pest

For bio- evaluation of different plant extracts effect against(nymphs, *pupa)Bemisiatabaci*. Six dishes in replicate were prepared for each concentration contained Castor leaves with diameter of 2/ inch .A number of*BemisiaTobaci*adults'*pest* (male and female) were added to each dish. The dishes were then incubated in an incubator at temperature 27°C and relative humidity (80-85) %.During 48 hours, eggs were formed and ovulation has finished. After that, the adult pest and excess eggs were removed with leaving 10 eggs for each dish in order to get converged nymphs age .After process of hatching, all nymphs were transferred to new dishes. This splashed with 3ml of each concentration of plant extract (1.25, 2.5, and 5) ml/L by spray tower. Then, the dishes were incubated for three days and the bio evaluation for crude plant extracts effects, was determined according to the killing percentage of pests. Thereafter, the plant crude extracts were compared with control sample that contained distilled water, dispersing and adhesive factors (citowett), as well as with chemical synthetic pesticides solution Abamectin at the same amount mentioned previously and according to the manufactures' instructions.

Relative efficiency calculation.

The relative efficiency of plant extracts was estimated according to the Henderson equation [11].

$$\text{Corrected \%} = \left(1 - \frac{n \text{ in co before treatment} \times n \text{ in T after treatment}}{n \text{ in co after treatment} \times n \text{ in T before treatment}}\right) \times 100$$

Where: n=Insect population, T=treated, co=control

Statistical analysis

The experiments were designed according to Complete Randomize Design (CRD) and the results were analyzed by using ANOVA table. The Least Significant Differences (LSD) test was used to compare between means at ($p \leq 0.05$) probability (Alsahoky and wahib, 1990).

Results and Discussion

Detection of active materials (secondary metabolites) in the crude plant extracts of *A. vasica* leaves

Investigation of active materials (secondary metabolites)in the methanolic extract of*Adhatodavasica*leaves showed the presence of Flavonoids , Volatiles oil , Tannins , Saponines , Glycosides , Alkaloids and Resins, While Phenolic compounds were not found [12]Table-1.

Table 1-The secondary metabolites in themethanolic crude extract of *Adhatodavasica* leaves.

No.	Test	Reagent	Color Regent	Result
1	Coumarine	Toluene: Acetone: Formic acid	Nil	–
2	Flavonoids	Ethyl acetate + KOH	Yellow	+
3	Volatiles oil	UV. light	Pinkish	+
4	Tannins	Lead acetate	Gel precipitate	+
5	Saponines	Mercuric chloride	White precipitate	+
6	Glycosides	Keede reagent	Violet ring	+
7	Alkaloids	Dragendroffs reagent	Orange-red	+
8	Resins	HCL 4%	Turbidity	+
9	Phenolic compound	Potassium - Ferric Cyanide	Nil	–

Bio evaluation of the crude plant extracts on the different phases of *Bemisiatabaci*pest.The results presented in Table -2 showed that the best effect of extracts on nymphs of *Bemisiatabaci* was acetone then methanol extract a relative efficiency reached to 62.7% and 45.5% respectively. The statistical analysis non –significant differences between them, while, relative efficiency of water extract was

(0%).Moreover, the concentrations that used for bio evaluation were (5, 2.5 and 1.25) ml/L, with relative efficiency reached to 62.2, 42.7 and 3.3 % respectively. Furthermore, the statistical analysis showed an existence no clear statistical differences among them. Additionally, the optimum concentration was 5ml/L for both acetone and methanolic extract with relative efficiency reached to 100% and 86.6% respectively. These results were compared with control that contained distilled water, dispersing and adhesive factors (citowett), as well as with Abamectin pesticides, at the same amount mentioned previously and according to the manufactures' instructions.

Table2- Effect of Acetone, Methanolic and water extract ofAdhatodavaisca leaves on Nymphsof*Bemisiatabaci.*

Extracts	Efficiency Relative			Mean
	Concentrations ml/L			
	12.5	2.5	5	
Acetone	5	83.3	100	62.7
Methanol	5	45	86.6	45.5
Water	0	0	0	0
Mean	3.3	42.7	62.6	

LSD value for extracts = 0.81 at($p\leq$ 0.05)
LSD value for Concentration = 0.81 at ($p\leq$ 0.05)

For pupa of Bemisia*tabaci*, the Table-3 illustrates that the best extract effect on pupa of *Bemisiatabaci* was acetone extract then methanolic extract, with a relative efficiency reached to 50.5% and 38.3 % respectively. The statistical analysis showed non –significant differences between them, while, the relative efficiency of water extract was (0%). Moreover, the concentrations that used for bio evaluation were (5, 2.5 and 1.25) ml/L, with a relative efficiency that reached to 63.3, 21.1 and 4.4% respectively. The statistical analysis referred non –significant differences among them. Furthermore, optimum concentration was 5 ml/L for both acetone and methanolic extract with relative efficiency reached to 100 and 90% respectively. In addition, relative efficiency for water extract was (0%) on pupa of *Bemisiatabaci*.

Table 3-Effect of Acetone, Methanolic and water extractsof *Adhatodavasica* leaveson pupa of *Bemisiatabaci.*

Extracts	Efficiency Relative			Mean
	Concentrations ml/L			
	12.5	2.5	5	
Acetone	11.6	40	100	50.5
Methanol	1.6	23.3	90	38.3
Water	0	0	0	0
Mean	4.4	21.1	63.3	

LSD value for extracts = 0.42 at($p\leq$ 0.05)
LSD value for Concentration = 0.42 at ($p\leq$ 0.05)

These results are in agreement with several researches who reported that*Adhatodavasica* leaves are very poisons against insects. Rajni,[4], who mentioned that acetone extract has a killing effect on *Callosobruchusmaculatus*insect at the concentration of 3% with a relative efficiency of killing reached

to 86.6%. The killing impact of acetone and methanolic extract on nymphs and pupa of *Bemisiatabaci* is belonging to mixture secondary metabolites. [4]. The higher-impact of acetone than methanolic extract as pesticides against nymphs and pupa of *Bemisiatabaci* may relate to the ability of acetone to dissolve and extract the active materials more than methanol, which reflected the biological impact against the pests.Moreover, the lack of effect for the water extract as pesticides probably is due to the poor ability of water as a solvent for extract active materials. However, this may relate to the difference in insect types and their physiological differences.So it can be concluded from the current study possibility of using *Adhatodavasica leaves extract as* insecticides against*Bemisiatabaci*.

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