EFFECTS OF UNICORN PLANT *Ibicella lutea* (STAPH.) VAN ESLET. (MARTYNEACEAE) PHENOLIC COMPOUNDS ON SAME BIOLOGICAL ASPECTS OF *Bemisia tabaci* (GENN.) (HOMOPTERA: ALEROYDIDAC).

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Abstract

Phenolic compounds were extracted from *I. lutea* leaves. The mortality rate of *B. tabaci* was severely affected by those compounds, it reached 100%. at concentrations of 1.0 and 2.0%. The cummulative mortality was also affected and reached 100%. at the same concentrations. The rate of developmental stages of *B. tabaci* was also affected by the extracted compounds it reached 22.1 day at the concentration of 0.5%, while the control was 12 days.

The different major bands of phenolic compounds were separated by T.L.C. technique. The separated compounds exert a strong effect on the mortality rate of all developmental stages of *B. tabaci*, it was 38.3-27.3 in the first larval instar at bands No. 1,2 and 3 , 30.0-21.3% in the second larval instar and 29.3-17.6% in the 3rd larval instar.

Egg hatchability were also affected. It was 24.3-33.37% in separated compounds. The mortality of adults also affected, and reached 52.6%.

The data also indicated that the extracted compound seems to have a synergistic effects on the mortality rate of whitefly *Bemisia tabaci*.

Introduction

Phenolic compounds are abundant in plant kingdom, following carbohydrates in their quantity. it shows extreme variability in their structure, but they are all hydroxylated benzene derivatives[1]. Their role in insect/plant relationships are well documented[2,3,4,5,6]. Coumarins for example, have been shown to deter curculionid beetles from feeding on the Ubellifera and Cruciferae, and blister beetles from feeding on high coumarin strains of sweet clover; *Melilotus parallelus* [7].

Aqueous extracts of *I. lutea* leaves have some effects on the mature and immature stage of whitefly, *Bemisia tabaci*[8], this study was conducted to evaluate any effects of phenolic compounds extracted from *Ibicella lutea* leaves on the whitefly *B. tabaci*.

Materials and Methods

Unicorn weed plants were collected from eggplant, potato, and cucumbe: field during 1994. The collected plants were washed with tap water, the leaves were separated and kept in plastic bags at 18°C.

The extraction of phenolic compounds was done according to Gayon method,[9]. Then collected and dried by using rotary evaporator

Thin layer chromatography technique was done by using plates covered with silica gel, with dimensions of 20 x 20 cm, solvent of acetic acid: chloroform (1:9) and Butanol: acetic acid: water (67: 23: 10), were used to separation the phenolic compounds, then examined with Uv light. The separated compounds treated with vanillin-sulfuric acid folin reagents and ferric chloride[9,10].

Concentrations of 0.0 (control), 0.1, 0.5, 1.0 and 2.0% were prepared from phenolic compounds extracted. liquid paraffin 1% and 1-2 drops of tween[20] were added to each concentration as adhesive agent and surfactant respectively[8].

The effects of phenolic compounds on the adult whitefly were tested by using 100 adults (24 hrs. old). They were introduced to an experimental cage supplied with young host plant (*Solanum melangun*) at four leaf stage.

Three replicates of each treatment. Each cage was sprayed with 2 ml of each concentrations by using laboratory spray gun supplied from London Shandon Scientific Co. The treated cages were incubated for 24 hrs. (in incubator with temperature of 25 C and 70% relative humidity). The adult mortality was recorded.

The effects of extract on the immature stages:-

The procedure of Coudriet; *et. al* [11] was used to evaluate the effects of phenalic compounds on the immature stage of whitefly, three replicates, 100 individual of whitefly were used and surrounding by oil ring (mustared oil: Canada balsam 50:50) and sprayed with appropriate concentration. The mortality rate was recorded after 24 hrs. (at seem condition of adult).

Effects of phenolic compounds on the developmental period of immature stages :-

The effects of phenolic compounds on the developments of immature stages of whitefly was conducted by using 25 newly hatched larvae (24hrs old). 3 replicates after treated with concentrations mentioned before. They were surrounded by oil ring and kept in incubator conditions. (mentioned before).

Statistical analysis of the data was based on completely randomized design by using analysis of variance with confidence limits of 95%[12]. All mortality rates were corrected according to Abbot's formula[13].

Results and discussion :

In this study three major phenolic compounds were separated by using T.L.C technique, the general characteristics of these compounds are shown in (Table 1).

Separated compound seems to have a strong effects on white fly egg mortality (Table 2) Mortality rate ranged between 2.0 to 67.5% at the concentration of 0-2%. In this respect Coudriet *et. al*[11] found a 29%. reduction in egg viability when they were treated the eggs of *B. tabaci* with 2% neem seed extracts which is which is supported present study findings. Al-Mansour[8] found that the aqueous extracts of *I. lutea* affect egg hatchability of whitefly at a lesser degree.

Larval stages were more susceptible by phenolic compounds than egg stage (Table 2). A direct concentration was found between larval mortality rate and phenolics concentration (Table 2). Mortality rate reached 100% in all larval and pupal stages at the concentration 2%. The adults were also affected, the mortality rate reached 68.3% at the concentration of 2%. Al-Mansour[8] found that aqueous extracts of *I. lutea* affected larval and pupal stages of *B. tabaci* the mortality rate reached 39% at concentration of 100%. Sanford *et. al.*[15]. Finding revealed a negative linear relationship between the level of *Empoasea fabae* infestation and solanidine glycoside concentration. While Smith *et al.*[16] reported that condensed tannins decrease

fiworm, bud worm larval growth rate and the survival which were supported the present study findings.

The developmental period of *B. tabaci* generally prolonged in all treatments as compared with control (Table 3). Direct correlation was found between the phenols concentration and the period required for development in all treatments (Table 3).

Al-Mansour[8,14] found that both aqoues extract and solvents extracts of *I. lutea* affected the developmental period of *B. tabaci* Ladd[19] found that azadirachtin was completely distruped the normal development of the Japanese beetle.

Larval growth and developments of corn earworm *Heliothis Zea* was significantly affected by *liriope muscani* extracts[17] while Al-Zubaidi and Al-Araji[18] found that phenolic compound were significantly affected the biological performance of cabbage aphids. All above mentioned studies supported present findings.

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Table 1 : Same characteristic of separated phenoles from *I. lutea* leaves by using TLC technique and two solvents (1) chlorophorm:Acitic acid 90:10; (2) Butanol: Acetic acid: H_2O 67:23:10.

Comp-ound	Rf value at solv-(1)	Rf value at solv-(2)	Phenol indicator * 1	** 2	*** 3	UV	UV + Amonia
1	83.0	80.0	Blue	Violet	Brown	Blue	Blue
2	75.1	76.2	"	"	"	Green	Green
3	41.3	50.6	"	"	"	Green	Green

* 1. Folin + NH_3.
** 2. Vanillin + Sulfunic acid.
*** 3. Ferric chloride.

Table 2 : The effects of phenolic compounds extracted from *I. lutea* on the mortality rate of various developmental stages of whitefly *B. tabaci.*

concen-tration	%mort-ality rate	Nympnal stages mortality (%)			pupal mort-ality (%)	adult morta-lity (%)
control	2	0.0	0.0	0.0	0.0	17.0
0.05	13.6	29.0	23.0	9.0	10.0	22.0
0.25	21.0	23.0	91.0	54.0	10.5	31.0
0.5	40.0	100.00	88.5	76.5	37.0	49.0
1.0	59.0	100.00	90.0	82.0	57.0	59.0
2.0	67.5	100.00	100.00	100.00	100.00	68.3
L S D	5.2	3.5	6.6	5.7	8.8	9.7

Table 3 : The effects of phenolic compounds extracted from *I. lutea* on the developmental period of different stages of whitefly *B. tabaci*

concen-tration	Nymphal period	develop-mental period (days)	Total Nymphal developmental period (days)	Pupal devel-opmental per-iod (days)
control	5.4	3.2	4.0	12.0	4.7
0.05	4.5	4.1	5.8	14.3	8.1
0.25	5.3	5.8	8.3	18.3	9.2
0.5	6.8	6.5	9.1	22.1	-
1.0	-	-	-	-	-
2.0	-	-	-	-	-
L.S.D	1.1	1.3	2.9	2.1	2.2

تأثير مستخلص المركبات الفينولية لنبات قرن الغزال *I. lutea* في بعض الجوانب الحياتية للذبابة البيضاء *B. tabaci*

الخلاصة

استخلصت المركبات الفينولية لنبات قرن الغزال *I. lutea* وتأثرت نسبة هلاك الذبابة البيضاء *B. tabaci* بهذه المركبات وبلغت ١٠٠% في التركيزين ١ و ٢%. نسبة الهلاك التراكمية تأثرت هي الاخرى وبلغت ١٠٠% في نفس التركيزين. تأثر معدل تطور الحشرة في الاطوار غير البالغة وقد وصل ٢٢,١ يوماً في التركيز ٠,٥% بينما بلغ في السيطرة ١٢ يوماً.

استخدمت تقنية الكروماتوغرافيا الصفائح الرقيقة T.L.C لفصل المركبات الفينولية. واظهرت النتائج تأثيراً في معدل الهلاك في كل الاطوار غير البالغة لحشرة *B. tabaci* وتراوحت بين ٢,٣-٨,٣% في الطور الحوري الاول عند استخدام مركبات ١ و ٢ و ٣ وتراوحت بين ٢١,٣-٣٠% في الطور الحوري الثاني وتراوحت بين ١٧,٦-٢٩,٣% في الطور الحوري الثالث. نسبة فقس البيض تأثرت هي الاخرى وتراوحت بين ٢٤,٣-٣٣,٣% لهذه المركبات المفصولة. بلغت نسبة هلاك البالغات ٥٢,٦% واظهرت النتائج بأن المركبات المفصولة لها تأثيراً تضامنياً اكثر من تأثيرها منفردة.