

## UTILIZATION OF EL-OSCHAR PLANT EXTRACT AS A NOVEL AND SAFE APPROACH IN CONTROLLING THE PUMPKIN FLY, *DACUS CILIATUS* LOEW AND THE PEACH FRUIT FLY, *BACTROCERA ZONATA* SAUNDERS (DIPTERA: TEPHRITIDAE) IN EGYPT

FETOH, BADR EL-SABAH A.<sup>1</sup>, GEHAD M. MOUSA<sup>1</sup> AND TAHANY G. MOHAMADEN<sup>1</sup>

1. Plant Protection Research Institute, ARC, Dokki, Giza, Egypt.
2. Central Agricultural Laboratory of Pesticides, ARC, Dokki, Giza, Egypt.

(Manuscript received 12 June 2005)

### Abstract

Different concentrations of ethanol El-Oshar (*Calotropis procera* Ait.) Leaves extract were prepared to their insecticidal effects against the pumpkin fly, *Dacus ciliatus* Loew and the peach fruit Fly, *Bactrocera zonata* Saunders (Diptera: Tephritidae) adult stages as bait. Recorded results showed that, El-Oshar extract was effective on both examined flies. The concentration of 2.5 ml/l gave the highest mortality percentages; 98.33% after 24 hours & 100% after 48 hours for *D. ciliatus* and 100% after 24 & 48 hours for *B. zonata*. LC<sub>50</sub> was 1.404 and 1.361 ml/l, LC<sub>90</sub> was 2.230 and 2.238 ml/l. after 24 hours. Also LC<sub>50</sub> was 0.934 and 0.986 ml/l., LC<sub>90</sub> was 2.712 and 1.470 ml/l after 48 hours for both tested flies, respectively. The slope values were 6.351 and 7.360 after 24 hours, 3.971 and 6.466 after 48 hours for *D. ciliatus* and *B. zonata*, respectively. Furthermore *B. zonata* was more susceptible than *D. ciliatus* to El-Oshar extract, toxicity index was 96.63% and 100% after 24 hour and 94.72% and 100% after 48 hour for *D. ciliatus* and *B. zonata*, respectively.

**Keywords:** Natural pesticides-Plant extracts- El-Oshar (*Calotropis procera*) - *Dacus ciliatus*- *Bactrocera zonata*

### INTRODUCTION

In Egypt, the pumpkin fly, *Dacus ciliatus* (Loew) was recorded for the first time by Azab and Kira (1954) as a serious pest on cucurbitaceous fruits, continued nearly till 1980 and disappeared, then appeared again after nearly 23 years in Egypt (Fetoh, 2003). The peach fruit fly *Bactrocera zonata* (Saunders) was described for the first time by Efflatoun (1924) who recorded it only in Port-Said town. Then appeared again in Egypt since 1997 on fruits as a serious pest according to El-Minshawy *et al.*, (1999). *B. zonata* infests some vegetables like cucurbitaceous fruits, tomato, egg-plant and potato according to Hashem *et al.*, (2004) & Abdel Samae and Fetoh (2005). Recently natural products such as plant extracts are utilized to avoid the hazards of chemical pesticides all over the world. El-Oshar plant, *calateopis procera* AIT. Family Asetipiadaceae, which

grown in the desert of Aswan, Egypt, has no economic value (Hoseni *et al.*, 1963). Furthermore it infested by El-Oshar fruit fly, *Dacus longistylus* Wiedeman (Diptera: Tephritidae). IT was recorded in Egypt by Efflatoun (1924) and confused with *D. ciliatus* as mentioned by Azab and Kira (1954). Some researchers used *c. procere* as insecticide in controlling the red flour beetle, *Tribolium confusum* Duval in a powder from an died leaves at concentrations ranging from 15000 to 75000 ppm (Jahan *et al.*, 1991). Also as a rodenticide with LC<sub>50</sub> at 10 ml/kg (Gaber *et al.*, 2004). The aim of the present work was to evaluate the effectiveness of ethanolic El-Oshar extract on tephirid flies (Diptera : Tephritidae) like *D. ciliatus* and *B. zonata*, as harmful pests cause a high loss in national income and challenge export.

## MATERIALS AND METHODS

A culture of adult flies of *D. ciliatus* and *B. zonata* was maintained in the laboratory at 25 ±1°C and 65 ± 5 % R. H. and fed on a mixture consisting of 25 % yeast hydrolysis enzymatic powder and 75 % sugar in tap water. El-Oshar plant was obtained from Aswan Governorate. Leaves of this plant were dried under room temperature in dark condition and grounded. 150 g of the powder were extracted in ethanol according to Freedman *et al.*, (1979). Ten different concentrations of the ethanol extract were prepared as 0.25, 0.50, 0.75, 1.00, 1.25, 1.50, 1.75, 2.00, 2.25 and 2.50 ml/l of tap water. Three teaspoonful of sugar (nearly 30 g.) were added to each concentration and stirring till sugar dissolved. Three replicates of 20 flies (two weeks old) for each treatment in both experiments were utilized. Flies were removed from the stock cage with the aid of a vacuum hose and placed in glass jars (750 ml) covered with muslin cloth. Flies were deprived from food and water for 24 hours. Each concentration of El-Oshar sugary solution was applied to each jar in small bottle (3x2.5x5 cm) contained cotton wick piece which used as a source of food and drink for both tested insects.

### Determination of median lethal concentration [LC<sub>50</sub>]

The mortality percentages of the treated flies after 24 hour were calculated, corrected by using Abbots formula (1925) and statistically computed according to Finney (1971). Computed percent mortality was plotted with the corresponding concentrations on logarithmic probability paper to obtain the corresponding Log-concentration Probit (LDP Line) lines. The lethal concentrations 50% were determined for the established regression lines. Also, toxicity index was calculated according to the equation of Sun (1950).

## RESULTS AND DISCUSSION

Results in Table (1) showed that, the different concentrations of baits had an ability to kill *D. ciliatus* and *B. zonata*. The lowest concentration (0.25 ml) elicited a response as  $1.67 \pm 1.3$  and  $1.67 \pm 1.3\%$  after 24 hours and as  $10.0 \pm 4.1$  &  $1.66 \pm 2.3$  mortality after 48 hours against both insects, respectively. The mortality percentages increased ascending with heightened of the concentration till reached the maximum of  $98.33 \pm 2.6\%$  and  $100.0\%$  after 24 hours for both insects, respectively, ( at the rate of 2.50 ml/l ). While the corresponding percentage after 48 hours was  $100.0\%$  mortality for both *D. ciliatus* and *B. zonata*.

Results tabulated in Table (2) included the relative toxicity of El-Oshar against *D. ciliatus* and *B. zonata*. The  $LC_{50}$  values were 1.404 and 0.934 after 24 and 48 hrs., respectively, for *D. ciliatus*. Fifty percent of the peach fruit fly was killed with 1.361 and 0.986 ml/l conc. after 24 and 48 hrs., respectively.  $LC_{90}$  values were 2.230 and 2.712ml/l for *D. ciliatus* and 2.238 and 1.470 ml/l for *B. zonata*, respectively. El-Oshar extract gave the highest effect against both insects especially *B. zonata*. The toxic effect against the peach fruit fly was 1.032 and 1.056 folds as toxic as that for *D. ciliatus*. Regarding the toxicity index referring to *B. zonata* than *D. ciliatus* were 100 % after 24 and 48 hour for *B. zonata* and 96.63% & 94.72% after 24 and 48 hours, respectively, for *D. ciliatus*.

Figures (1) and (2) show the probit lines of predicted percentage of knock down and death of *D. ciliatus* and *B. zonata* after 24 and 48 hours, respectively.

The obtained data from Tables (1) & (2) and Figures (1) & (2) referred that El-Oshar extract is potent for controlling both of *D. ciliatus* and *B. zonata* as bait and can be successfully applied, in this respect, at a concentration not less than 1.5ml/l.

## ACKNOWLEDGMENT

The authors would like to express deeply thanks to Dr. Wahied Gaber (PPRI) for his kind help during preparation of this work.

## REFERENCES

1. Abbott, W. S. 1925. A method of computing the effectiveness of an insecticide. J. Econ. Ent., *amal*(18): 265-267.

2. Abdel Samae, S. A. and A. Fetoh, Badr El-Sabah 2005. New record of *Bactrocera zonata* Saunders (Diptera: Tephritidae) on potatoes in Egypt. Press data. Egypt. J. Agric. Res. (83) 1.
3. Azab, K. A. and M. T. Kira 1954. *Dacus ciliatus* (Loew) an important new pest attacking cucurbitaceous plants in Upper - Egypt. Bull.Soc. Fouad Ier Ent., 48:379-382.
4. Efflatoun, H. C. 1924. A monograph of Egyptian Diptera, Part II. Fam. Typaneidae. Mem. Soc. Ent. Egypt, 2 (2): 1-132.
5. El-Minshawy, A., M. A. Eryan and A. I. Awad 1999. Biological and morphological studies on guava fruit fly, *Bactrocera zonata* (Diptera: Tephritidae) found recently in Egypt. 8<sup>th</sup> National Conference of pests and Diseases of Vegetables and Fruits in Ismiliya, Egypt, 9-10 November, pp 71-81.
6. Fetoh, B. 2003. The pumpkin fly, *Dacus ciliatus* (Loew) as a new and ancient pest in Egypt. The Agric. Magazine, 46 (546): 54-55.
7. Finney, D. J. 1971. Probit Analysis. 3rd edition Cambridge Univ. Press Cambridge.
8. Freedman, B., J. Nowak and W. F. Kwolek 1979. A bioassay for plant derived pest control agent using the European Corn borer. J. Econ. Entomol, 72: 45-54.
9. Gaber, W. M., F. K. Khidr and A.M. Hegab 2004. Evaluation of Oshar crude plant extracts as a rodenticide under laboratory and field conditions. Zagazig J. Agric. Res., 31 (4A): 1607-1616.
10. Hashem, A. G., M. F. El-Wakad and N.A. Soliman 2004. The fruit flies. Egyptian Agriculture Ministry of, Agric. Guidance Division, Circular, (859): 35 pp.
11. Hoseni, M. M., M. A. Assem and A. E. Nasr 1968. The entomological and zoological pests in Agriculture. Darel Maraf, Publishers, Cairo, Egypt, 1st edition, 1100 pp.
12. Jahan, S., A. Mannan; R. Khan and P. Karmaker 1991. Insecticidal effect of a kanada, *Calotopis procera* on *Tribolium confusum* Duval. Bangladesh, J. Zool. 19 (2): 261-262.
13. Sun, Y. P. 1950. Toxicity index and improved method of comparing the relative toxicity of insecticides. J. Econ.Entomol.,(43): 45-53.

Table 1. Efficiency of different concentrations of ethanolic El-Oshar leaves extract as baits against *Dacus ciliatus* and *Bactrocera zonata* adults, showing knock down followed by death percentage.

Concentration ml/l	<i>Dacus ciliatus</i>		<i>Bactrocera zonata</i>	
	24h	48h	24h	48h
0.25	1.67± 1.3 (0.0-5.0)	10.00±4.1 (5.0-15.00)	1.67±1.3 (0.0-5.00)	1.66±2.3 (0.0-5.00)
0.50	5.00± 4.1 (0.0-10.00)	11.66±4.7 (5.0-15.00)	3.33±2.4 (0.0-5.00)	5.00±4.1 (0.0-10.00)
0.75	6.67±2.4 (5.0-10.00)	13.33±2.4 (10.00-18.00)	5.0±4.1 (0.0-10.00)	11.66±2.4 (10.0-15.00)
1.00	8.33±2.4 (5.0-10.00)	16.66±6.2 (10.0-25.00)	8.33±4.7 (5.0-15.00)	41.66±6.2 (35.0-50.00)
1.25	21.67±6.2 (15.00-30.00)	30.00±4.1 (25.0-35.00)	20.00±4.1 (15.0-25.00)	83.33±6.2 (75.0-90.00)
1.50	51.67±6.2 (45.00-60.00)	88.33±2.4 (85.0-90.00)	70.00±4.1 (65.00-75.00)	98.36±2.4 (95.00-100.00)
1.75	75.00±4.1 (70.00-80.00)	91.66±2.7 (89.0-93.00)	80.00±4.1 (75.00-85.00)	100.00 (100)
2.00	93.33±2.4 (90.00-95.00)	100.00 (100)	96.7±2.4 (95.00-100.00)	100 (100)
2.25	95.00±0.0 (95.00-95.00)	96.66±2.4 (95.00-100.00)	96.6±2.4 (95.00-100.00)	100.00 (100)
2.50	98.33±2.6 (95.00-100.00)	100.00 (100)	100.00 (100)	100.00 (100)

The numbers between the brackets refer to the range

Table 2. LC<sub>50</sub> and LC<sub>90</sub> for El-Oshar leaves extract as bait against *Dacus ciliatus* and *Bactrocera zonata* adults after 24 and 48 hour.

Toxicity parameters	<i>D. ciliatus</i>		<i>B. zonata</i>	
	24 hour	48 hour	24 hour	48 hour
LC <sub>50</sub>	1.404	0.934	1.361	0.986
95% FL	1.032-1.812	1.032-1.812	1.003-1.767	0.783-1.177
LC <sub>90</sub>	2.230	2.712	2.238	1.470
95% FL	2.334-4.300	1.032-1.812	2.240-4.073	1.413-2.148
Folds	1	1	1.032	1.056
Toxicity index	96.63	94.72	100	100
Slope	6.351	3.971	7.360	6.466

UTILITY OF EL-OSHAR PLANT EXTRACT AS A NOVEL AND SAFE APPROACH  
 IN CONTROLLING THE PUMPKIN FLY, *DACUS CILIATUS* LOEW AND  
 THE PEACH FRUIT FLY, *BACTROCERA ZONATA* SAUNDERS  
 (DIPTERA: TEPHRITIDAE) IN EGYPT

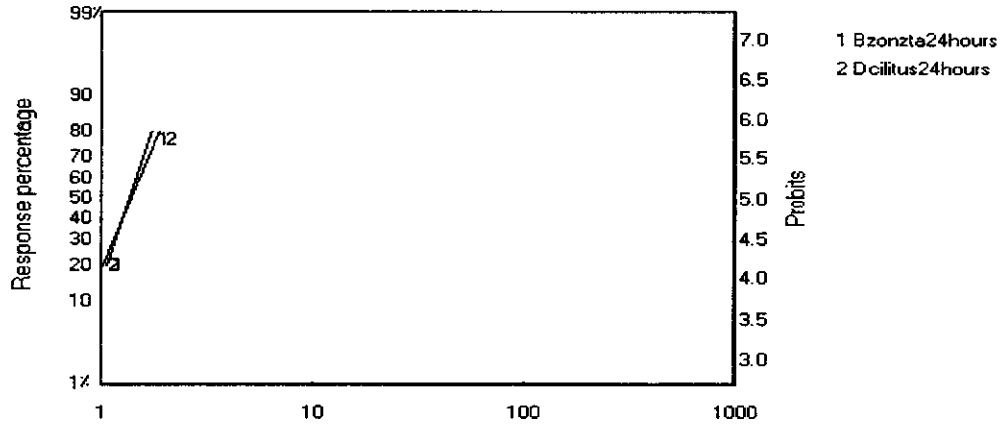


Fig 1. Lag- Probit curve of predicted percentage knock down followed by death of *D.ciliatus* and *B. zonata* after 24 hour.

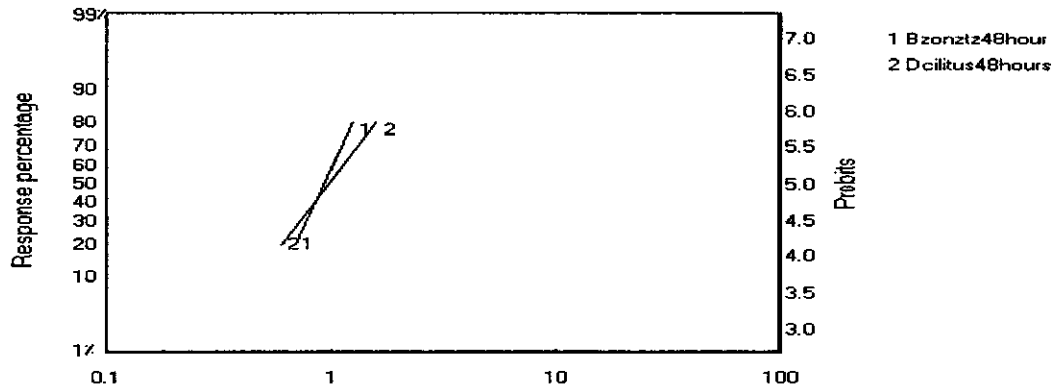


Fig 2. Lag- Probit curve of predicted percentage knock down followed by death of *D. ciliatus* and *B. zonata* after 48 hour.

## استخدام مستخلص نبات العُشار كإتجاه جديد وآمن لمكافحة ذبابة المقات وذبابة ثمار الخوخ في مصر

بدر الصباح عبد المنعم فتوح<sup>١</sup>، جهاد محمد موسى<sup>١</sup>، تهاني جابر محمد<sup>٢</sup>

١. معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - جيزة - مصر.

٢. المعمل الزراعي المركزي للمبيدات - مركز البحوث الزراعية - الدقي - جيزة - مصر.

اختبرت الكفاءة الإيادية لتركيزات مختلفة من المستخلص الإيثانول للأوراق نبات العُشار ضد كل من ذبابة المقات وذبابة ثمار الخوخ. أظهرت النتائج المتحصل عليها أن المستخلص المستخدم كان فعال ضد كلا الذبابتين، وكان تركيز ٢,٥ مل/لتر له أعلى نسبة موت تراوحت بين ٩٨,٣٣% و ١٠٠,٠٠% بعد ٢٤ ساعة و ١٠٠,٠٠% بعد ٤٨ ساعة لذبابة المقات وذبابة ثمار الخوخ على التوالي. وقيم ال  $LC_{50}$  هي ١,٤٠٤ و ١,٣٦١ مل/لتر وال  $LC_{90}$  هي ٢,٢٣٠ و ٢,٢٣٨ مل/لتر بعد ٢٤ ساعة وقيم ال  $LC_{50}$  بعد ٤٨ ساعة هي ٠,٩٣٤ و ٠,٩٨٦ مل/لتر وقيم ال  $LC_{90}$  هي ٢,٧١٢ و ١,٤٧٠ مل/لتر بعد ٤٨ ساعة لكلا الذبابتين المختبرتين على التوالي. وكان انحدار خط السمية ٦,٣٥١ و ٧,٣٦٠ بعد ٢٤ ساعة و ٣,٩٧١ و ٦,٤٦٦ بعد ٤٨ ساعة لذبابتي المقات وثمار الخوخ على التوالي. وكانت ذبابة ثمار الخوخ أكثر حساسية لمستخلص نبات العُشار عن ذبابة المقات حيث كانت نسبة السمية لها ١٠٠,٠٠% بعد ٢٤ و ٤٨ ساعة بينما كانت نسبة السمية لذبابة المقات ٩٦,٦٣% و ٩٤,٧٢% بعد ٢٤ و ٤٨ ساعة على كل من الذبابتين على التوالي.