

## **TOXIC EFFECT OF FOUR PLANT EXTRACTS AGAINST MONACHA OBSTRUCTA UNDER LABORATORY CONDITIONS**

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**ABSTRACT :** *Four plant extract leaves , Calotropis procera, Melia Adiantum capillus, azadirachta, Solanum nigrum were tested against the land snail Monacha obstructa under laboratory conditions, The concentration 30% was used after preliminary experiment of different concentrations. Four carrier materials for plant extracts were used : lettuce ; cabbage ; potatoes ; and wheat bran, leaf dipping technique was used in lettuce and cabbage while bait technique was used in potatoes and wheat bran . Plant extracts of four plants were tested on Monacha obstructa, these plants are Calotropis procera, Melia azadarach , Adiantum capillus and Solanum nigrum. Results cleared that after one week of Calotropis procera extract application, mortality percentages of Monacha obstructa ranged between 29: 35% raised to 100% mortality percentages after four weeks (when lettuce and potatoes used as carrier material) and five weeks (when cabbage and wheat used as carrier material). As for Melia azadarach extract application after one week of application, mortality percentages of Monacha obstructa ranged between 39: 41% raised to 100% mortality percentages after three weeks (in the case of using lettuce and potatoes) and four weeks (cabbage and wheat). Adiantum capillus gave mortality percentages ranged between 51:81% after one week of application, while the percentages of mortality increased to 100 % after three weeks (when potatoes and wheat used as carrier material) , and after four weeks for the lettuce and cabbage. Regarding to the effect of Solanum nigrum extract, one week after applications mortality percentages ranged between 36:45 %, while these percentages raised to 100 % mortality of the snail after three weeks of application at the treatments of lettuce, potatoes, and wheat , while after four weeks of application for cabbage . The obtained data revealed that all plant extracts gave satisfactory control after one month of application, but both Solanum nigrum and Adiantum capillus were more effective than Melia azadarach and the least toxic plant extract was Calotropis procera.*

**Key Words:** *land snails- slugs - Monacha obstructa – plant extracts.*

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### **INTRODUCTION**

The terrestrial mollusca including snails and slugs are destructive agricultural pests causing economic damage to a wide variety of plants

including horticulture, field crops and forestay. Land snails cause heavy damage; through eating leaves, roots and fruits, which damage was observed on the trunk of the trees and ornamental plants (El-Okda, 1979a,b and El-Deeb *et al.* 1999).

In Egypt, the land snails dispersing in northern Governorate, i.e. Alexandria, Kafr El-Shikh, Behera, and Domiate (Kassab and Daoud 1964, El-Okda, 1980a,b and Hashem *et al.* 1993a,b). At the present time these snails distribute in Ismaellia, Sharkia, Menoufiya and Gharbia Governorate (El-Massry, 1997 and Metwally *et al.* 2002). The present study aim to throw light on the toxicity effect of four plant extracts on the land snail *Monacha obstructa*.

## **MATERIALS AND METHODS:**

Experiments were conducted at Gharbia governorate during 2008 year in Gemiza resarch station, El-Santa district. The toxic effect of four plant extracts was determined on *Monacha obstructa* , these plants were tabulated in table (1).

**Table (1): Information about used plant extracts.**

Used part	English name	Scientific name	Arabic name
Leaves	Mudar	<i>Calotropis procera</i>	العشار
Leaves	Meliac	<i>Melia azadirachta</i>	الزنبق
Leaves	Adiant	<i>Adiantum capillus</i>	كزبرة البئر
Leaves	Macoy	<i>Solanum nigrum</i>	عنب الديب

### **Plant extracts preparation :**

Plants under study were collected from different places washed and leaves were separated grinding by electric mixer, a stock of leaves mixture was prepared by adding water in a ratio of 1:1(weight : volume) and kept in refrigerator for 24 hours . Then the mixture was filtered using muslin bag and it was ready for application as a crude extract .The concentration of 30 % was used after preliminary experiment of different concentrations. Four carrier materials for plant extracts were used: lettuce; cabbage; potatoes; and wheat brain. Leaf dipping technique was used in lettuce and cabbage while bait technique was used in potatoes and wheat brain. Two methods of application were used:

#### **1. Leaf dipping technique:**

Leaf discs of lettuce and cabbage (5 cm diameter were immersed in each tested plant extract for 3 seconds, discs were air dried, then ten replicates were used for each plant extract, each replicate have four adult snails which were starved over night and leaf disc kept in box fillet with moisten soil another replicate for each concentration was left as control provided with

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clean lettuce disc. Treated discs were renewed twice weekly for seven weeks, mortality percentages were calculated after every week.

### **2. Bait technique.**

Experiment was prolonged for seven weeks after treatment mortality percentages were calculated by Abbott's formula (Abbott, 1925). The four plant extracts were used as poisoned baits which prepared according to the method of Ebenso (2004). The poison bait was prepared by mixing chosen concentration of each compound + 95 gm boiled potato or wheat brain + 4 ml molasses, sample of five grams of each bait was put on plastic sheet on the surface of 40 x 25 x 40 cm box. Ten replicates were used for each plant extract, each of five adult animals in addition to control. Boxes filled with moist soil adjusted at 75% of water field capacity. Snails were provided daily with non toxic baits for two weeks before treatment for acclimatization (Godan, 1983). Then provided twice weekly with new baits and kept under laboratory conditions (22 + 3 °C and 80 + 5% R.H).

$$\text{Corrected mortality \%} = \frac{\text{Observed mor. \%} - \text{control mor. \%}}{100 - \text{control mortality \%}} \times 100$$

### **RESULTS AND DISCUSSION :**

Plant extracts of four plants were tested on *Monacha obstructa*, these plants are *Calotropis procera*, *Melia azadarach*, *Adiantum capillus* and *Solanum nigrum*. The extracts were used as baits using four food materials as carrier materials (Lettuce, cabbage, potatoes and wheat brain). All experiments were done under laboratory conditions (25°C ± 5, 65± 5 R.H %). The poisoned effect of these materials was determined and mortality percentages were calculated.

Results presented in Tables (2,3) cleared that ,after one week of *Calotropis procera* extract application, mortality percentages of *Monacha obstructa* ranged between 29: 35 % raised to 100% mortality percentages after four weeks (when lettuce and potatoes were used as carrier material) and five weeks (when cabbage and wheat where used).

As for *Melia azadarach* extract application results presented in Table (3) cleared that after one week of application, mortality percentages of *Monacha obstructa* ranged between 39: 41% raised to 100% mortality percentages after three weeks (when lettuce and potatoes where used) and four weeks (when cabbage and wheat where used).

As for *Adiantum capillus*, results presented in table (3) recorded that, *Adiantum capillus* when used as extract and applied on carrier different food baits against the land snail, *Monacha obstructa* gave mortality percentages ranged between 51:81%, after one week of application, while the percentages of mortality increased to 100 % after three weeks (when potatoes and wheat), and after four weeks for lettuce and cabbage.

**Table 2**

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**Table 3**

Regarding to the effect of *Solanum nigrum* extract food baits on the mortality percentages of *Monacha obstructa*, results indicated that, one week after applications , mortality percentages ranged between 36:45 , while these percentages raised to 100 % mortality of the snail after three weeks of application at the treatments of lettuce, potatoes, and wheat , while after four weeks of application, the treatment of cabbage.

The obtained data revealed that all plant extracts under study gave satisfactory control after one month of application but both *Solanum nigrum* and *Adiantum capillus* were more effective than *Melia azadarach* and the least toxic plant extract was cabbage. These results are complete the research articles done by, Shahawy 1998, Hussein 1999, Abd El-Allah et al., 2002, and Khalifa 2009.

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## التأثير السام لأربع مستخلصات نباتية على قوقع *Monacha obstructa* تحت الظروف المعملية

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### الملخص العربي

تم استخدام مستخلص أوراق أربع نباتات وهى العشار، الزنزلخت، كزيرة البئر، عنب الديب لدراسة سميتها على قوقع البرسيم الزجاجي تحت الظروف المعملية. وقد تم اختيار تركيز ٣٠% بعد اجراء التجارب الأولية على عدة تركيبات. وقد تم استخدام أربع مواد حاملة للمستخلصات وهى أوراق الخس، والكرنب، حيث استخدمت طريقة الغمر -البطاطس المسلوقة وطحين القمح بطريقة الطعوم السامة. أوضحت النتائج أنه عند استخدام أوراق العشار تراوحت نسبة الموت بين ٢٩:٣٥ % فى الأسبوع الأول وارتفعت الى ١٠٠% بعد أربع أسابيع عند استخدام المستخلص على أوراق الخس والكرنب بينما وصلت نسبة الموت الى ١٠٠% فى الأسبوع الخامس عند استخدام الطعوم السامة من البطاطس وطحين القمح. أما مستخلص أوراق الزنزلخت فقد تسبب فى نسبة موت تراوحت بين ٣٩:٤١% فى الأسبوع الأول وارتفعت إلى ١٠٠% بعد ثلاث أسابيع عند استخدام المستخلص على أوراق الخس والبطاطس و بعد أربع أسابيع عند استخدام المستخلص على أوراق الكرنب وطحين القمح. أما عن مستخلص أوراق كزيرة البئر فقد وجد أن نسبة الموت تراوحت بين ٥١:٨١% بعد أسبوع من المعاملة وارتفعت إلى ١٠٠% بعد ثلاث أسابيع عند استخدام المستخلص على البطاطس والقمح وبعده أربع أسابيع عند استخدام أوراق الخس والكرنب. أما مستخلص أوراق عنب الديب فقد تسبب فى نسبة موت تراوحت بين ٣٦:٤٥% فى الأسبوع الأول وارتفعت إلى ١٠٠% بعد ثلاث أسابيع عند استخدام المستخلص على أوراق الخس والبطاطس وطحين القمح و بعد أربع أسابيع عند استخدام أوراق الكرنب. ومن هنا يتضح أن المستخلصات الأربع أعطت نسبة إبادة مرضية للقوقع بعد أربع أسابيع وأن تأثير المادة الحاملة غير معنوي ولكن عنب الديب وكزيرة البئر كانت أكثر فاعلية عن الزنزلخت والعشار .



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**Table (2): Effect of four plant extracts applied on four different food carriers on the land snail, *Monacha obstructa* under laboratory conditions (25°C ± 5 , 65± 5 R.H%).**

Weeks after treatment	Numbers of <i>Monacha obstructa</i> after treatments (treated snails 200 individuals)																			
	Calotropis procera					Melia azadarach					Adiantum capillus					Solanum nigrum				
	L	C	P	W	Co	L	C	P	W	Co	L	C	P	W	Co	L	C	P	W	Co
1st week	130	142	138	154	200	118	121	118	121	200	149	132	128	119	200	112	128	110	115	200
2nd week	50	73	46	65	200	27	44	27	44	200	59	51	35	31	200	13	42	9	12	200
3rd week	20	3	21	46	199	0	17	0	17	199	14	19	0	0	199	0	11	0	0	199
4th week	0	8	0	23	199	0	0	0	0	199	0	0	0	0	199	0	0	0	0	199
5th week	0	0	0	0	199	0	0	0	0	199	0	0	0	0	199	0	0	0	0	199

L = Lettuce    C = Cabbage    P = Potatoes    W = Wheat    Co = Control

**Table (3): Mortality percentages of *Monacha obstructa* snails as affected by four plant extracts applied by four different food carriers under laboratory conditions (25oC ± 5 , 65± 5 R.H%).**

Weeks after treatments	Mortality percentages of <i>Monacha obstructa</i>																			
	Calotropis procera					Melia azadarach					Adiantum capillus					Solanum nigrum				
	L	C	P	W	Co	L	C	P	W	Co	L	C	P	W	Co	L	C	P	W	Co
1st week	35.0	29.0	31.0	23.0	0.0	41	39.5	41	39.5	0.0	25.5	34	36	40.5	0.0	44	36	45	42.5	0.0
2nd week	75.0	65.5	77.0	76.5	0.0	86.5	78	86.5	78	0.0	70.5	74.5	82.5	84.5	0.0	93.5	79	95.5	94	0.0
3rd week	90	85.0	89.5	77.0	0.5	100	91.5	100	91.5	0.5	93	90.5	100	100	0.5	100	94.5	100	100	0.5
4th week	100	96	100	88.5	0.0	-	100	-	100	0.0	100	100	-	-	0.0	-	100	-	-	0.0
5th week	-	100	-	100	0.0	-	-	-	-	0.0	-	-	-	-	0.0	-	-	-	-	0.0

L = Lettuce    C = Cabbage    P = Potatoes    W = Wheat    Co = Control