

## TOXICITY OF THREE PESTICIDES TO THREE LAND SNAIL SPECIES UNDER LABORATORY CONDITIONS.

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**ABSTRACT:** The molluscicidal activities of two organophosphorus insecticides (profenofos & fenthion) and one fungicide (diniconazole) were evaluated against three land snail species, *Monacha cartusiana*, *Theba pisana* and *Eobania vermiculata*. Adult snails of each species were allowed to feed on lettuce leaves previously treated with concentration series of each compound (leaf dipping technique) and mortalities were recorded after 12 h/s intervals. Thus, LC50 values were estimated for each compound on the three examined snail species. Results showed that diniconazole has the highest molluscicidal activity. As expected, the mortality percentages increased gradually with increasing the time of exposure. Generally, *Monacha cartusiana* were the most sensitive snails to the examined pesticides. LC50 values were (38.8, 44.77 & 40.5), (48.63, 50.35 & 59.6) & (86.02, 111.99 & 119.05) for diniconazole, Profenofos and Fenthion on *Monacha cartusiana*, *Theba pisana* and *Eobania vermiculata* respectively. The toxicity of the three tested pesticides as leaf dipping technique arranged in descending order as follows: diniconazole, profenofos and fenthion. *Monacha cartusiana* were comparably sensitive for diniconazole than *Theba pisana* and *Eobania vermiculata*. No mortality percentage was recorded 12 hours after exposure to profenofos on *Theba pisana*, and *Eobania vermiculata* while only 20 % was recorded for *Monacha cartusiana*. The mortality percentages increased gradually with increasing exposure period to reach 76, 66 and 60 % for *Monacha cartusiana*, *Theba pisana* and *Eobania vermiculata* respectively, at the end of trial (72 hours exposure period). The results exhibited that fenthion treatment slayed 16% of animals of all tested snails next 12 hours after exposure. The fatality percentages of all examined snails slowly extended with the elongation of treatment interval; to approach 82, 80 and 70 % 72 hrs after exposure for *Theba pisana*, *Eobania vermiculata* and *Monacha cartusiana* respectively. The results expose that *Monacha cartusiana*, were

contrastly perceive for fenthion than *Theba pisana* and *Eobania vermiculata*.

## INTRODUCTION

In recent years, terrestrial snails have increased greatly in economic importance. Snails cause considerable damage to field and horticultural crops in the world. The destructive of these pests is far greater today than in former times, since limits for their spread not only from one country to another but also from one province to another are not existent as a result of ever denser and faster transport and traffic (Godan, 1983). In Egypt, land snails could be considered as dangerous crop pests and cause considerable damage especially in moist areas where snails find the optimum conditions for rapid multiplication El-okda (1980). Miller *et al.* (1988) mentioned that diniconazole was highly toxic against *Theba pisana*.

## MATERIALS AND METHODS

The study was carried out under the laboratory conditions of the Department of Agriculture Zoology and Nematology, Faculty of Agriculture, Al-Azhar University, Nasr City, Cairo.

### a-Tested snails:

Adult land snails *Theba pisana*, (at Alexandria Governorates) *Monacha cartusiana* and *Eobania vermiculata* (at El-Menufia Governorate) were collected from field crops and transported in white cloth bags to the laboratory. Healthy individuals were kept in round plastic boxes (15 cm diameter) contained moistened soil and provided with fresh discs of green lettuce leaves for two weeks for acclimatization.

### b- Tested pesticides:

Three pesticides belonging to two chemicaly used insecticides (profenofos & fenthion) and one fungicide (diniconazole) were tested against land snails. Common name and chemical name of each were as follows:-

Common name: Profenofos, Chemical name: O-(4-bromo-2-chlorophenyl)-O- ethyl-S- propyl) phosphorothiote.

2- Common name: Fenthion, Chemical name: O,O-dimethyl-O-[3-methyl-4-(methylthion) phenyl] Phosorothioate}.

3- Common name: Diniconazole, Chemical name :(E)-(RS)-1-

(2, 4-dichlorophenyl)-4, 4-dimethyl-2-(1H-1,2,4-triazol-1-yl)-pent-1-en-3-ol.

#### **c- Procedure conducted:**

Plastic containers (13 x 13 x 33 cm) filled with moist soil were used. Ten adult snails of each species *Theba pisana*, *Monacha cartusiana* and *Eobania vermiculata* were caged individually and used for each concentration of each compound. Treated lettuce leaves with Profenofs, diniconazole & Fenthion using leaf dipping technique were introduced to replicates. Serial concentration from Profenofs, diniconazole & Fenthion were 500, 1000, 3000, 5000, 7000 and 10000 ppm. Ten adult animals of each species *Theba pisana*, *Monacha cartusiana* and *Eobania vermiculata* were caged individually and used for each concentration to each compound. This procedure was repeated daily for 4 days with lettuce leaves previously dipped for 3 second in the tested concentration. Mortality were calculated after 4 days and corrected according to Abbott's formula (1925). In addition, the medium lethal concentration values were estimated and toxicity lines were drawn according to Finney (1971).

## **RESULTS AND DISCUSSION**

The molluscicidal effect of three pesticides namely; diniconazole, Profenofs and Fenthion against adult stage of three land snail species, *Monacha cartusiana*, *Theba pisana* and *Eobania vermiculata* were studied under laboratory conditions. Data compiled in table (1) revealed that, on the base of LC50 values, diniconazole proved to be the most toxic compound against the three-tested snail species. The three tested pesticides toxicity leave dipped technique could be arranged descendingly as follows: diniconazole, Profenofs and Fenthion. Data indicated that the slope values of the toxicity regression line slightly varied according to snail species and pesticides compounds fig(1). Data in table (2) showed that diniconazole killed 20% from animals of all tested snails 12 hours after treatment. The present results showed that *Monacha cartusiana*, were comparably sensitive for diniconazole than *Theba pisana* and *Eobania vermiculata*. Regarding, the toxic effect of profenofs against the three tested snails, no mortalities were recorded 12 hours after exposure with profenofs to *Theba pisana*, and *Eobania vermiculata*, while only 20 % was recorded for *Monacha cartusiana*. Generally, the mortality percentage of all tested snails gradually increased with the prolongation of treatment period. Considering the poisonous produce of Fenthion the three tested

snail in table (2) exhibited that fenthion treatment slaged 16% from animals of all examined snails after 12 hours from tertment. The results expose that *Monacha cartusiana* , were contrastly perceive for Fenthion than *Theba pisana* and *Eobania vermiculata*. The results are agreement with those obtained by Miller et al. (1988), Maha-Mohammed, (1994), El-Morsy (1997) and Ismail – Nehmedo, (2000).

Table ( 1 ): LC50 values of three pesticides against three land snail species, using leaf dipping technique, under laboratory conditions.

Tested pesticides	Tested snails	LC50 ppm	95% fiducial limits		Slope
			Lower	Upper	
Diniconazole	<i>M. cartusiana</i>	38.8	20.75	72.56	2.63
	<i>T. pisana</i>	44.77	24.60	81.48	2.55
	<i>E. vermiculata</i>	40.5	21.9	55.3	2.93
Profenofs	<i>M. cartusiana</i>	48.63	27.17	87.05	2.14
	<i>T. pisana</i>	50.35	28.3	89.6	1.98
	<i>E. vermiculata</i>	59.6	30.6	116.22	2.85
Fenthion	<i>M. cartusiana</i>	86.02	66.2	111.8	2.6
	<i>T. pisana</i>	111.99	82.95	111.99	1.83
	<i>E. vermiculata</i>	119.05	85.04	166.04	2.35

Soil moisture 75 % ±5.

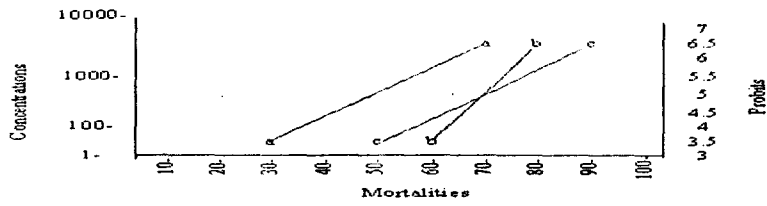
Temperature degrees 22 ± 2°C.

Table ( 2 ): The molluscicidal effect of three pesticides against three land snail species, under laboratory conditions after 12 hrs intrvals.

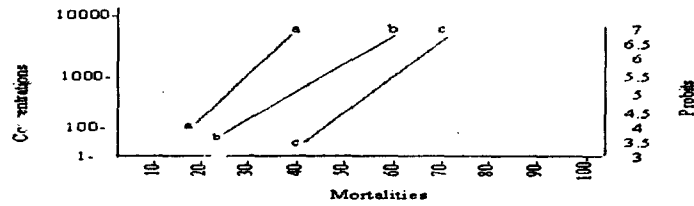
Tested pesticied	Tested snails	Mortality percentages/Hrs of exposure					
		12hrs	24hrs	36hrs	48hrs	60hrs	72hrs
Diniconazole	<i>M. cartusiana</i>	20	36	44	56	78	88
	<i>T. pisana</i>	20	30	42	50	66	90
	<i>E. vermiculata</i>	20	32	48	56	66	83
Profenofs	<i>M. cartusiana</i>	20	36	48	52	60	76
	<i>T. pisana</i>	0	16	22	32	52	66
	<i>E. vermiculata</i>	0	20	36	48	50	60
Fenthion	<i>M. cartusiana</i>	16	28	33	42	60	70
	<i>T. pisana</i>	16	20	30	50	74	82
	<i>E. vermiculata</i>	16	18	40	66	70	80

Soil moisture 75 % ±5.

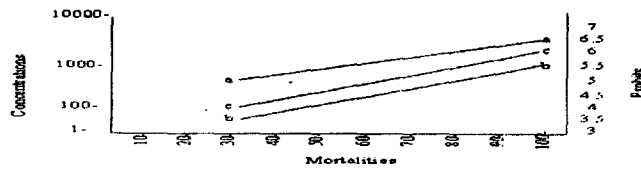
Temperature degrees 22 ± 2°C.



( III )



( II )



( I )

Fig.(1)Probity regression lines of Diniconazole (a), Profenofos (b) and Fenthion (c) against (I)*Theba pisana*, (II)*Monacha cartusiana* and *Eobania vermiculataby* used leave dipping technique.

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## سمية ثلاثة من المبيدات على ثلاث أنواع من القواقع الأرضية تحت الظروف المعملية

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الهدف من البحث تقييم كفاءة اثنين من المبيبات الحشرية (Fenthion و Profenofs) وواحد من المبيدات الفطرية (Diniconazole) على قتل ثلاث أنواع من القواقع الأرضية مثل قوقع البرسيم الزجاجي *M. cartusiana* و قوقع الحدائق الأبيض *T. Pisana* قوقع الحدائق البنى ذوالشفة *E. vermiculata* معمليا والتي تم جمعها من محافظتى المنوفية والأسكندرية. تم إطعام أفراد القواقع البالغة من كل نوع على أوراق الخس المعلجة بتركيزات متتالية لكل مبيد بطريقة الغمس وتم تسجيل عدد الوفيات بعد ١٢ ساعة وكذلك تقدير قيم LC50 لكل مركب على كل نوع من القواقع الثلاثة.

أوضحت النتائج أن مركب Diniconazole له قدرة على قتل أنواع القواقع السابقة. كما أن نسبة الموت ارتفعت تدريجيا مع زيادة فترة التعرض للمركب ، وعموما فإن قوقع البرسيم الزجاجي البالغ أكثر القواقع حساسية للمبيدات المختبرة.

أظهرت النتائج مايلي ان قوقع البرسيم الزجاجي *M. cartusiana* حساس Diniconazole يليه Profenofs ثم Fenthion أكثر من قوقع الحدائق الأبيض *T. pisana* و قوقع الحدائق البنى ذوالشفة *E. vermiculata* .

و أوضحت النتائج مايلي:-

المبيد Diniconazole قتل ٢٠% من الأفراد خلال ١٢ ساعة من المعاملة بينما قتل ٩٠, ٨٣, ٨٨% من الأفراد خلال ٧٢ ساعة من المعاملة للأنواع وقوقع الحدائق الأبيض *T. Pisana* و قوقع البرسيم الزجاجي *M. cartusiana* و قوقع الحدائق البنى ذوالشفة *E. vermiculata* .

المبيد Profenofs قتل ٢٠% من الأفراد خلال ١٢ ساعة من المعاملة بينما قتل ٧٦, ٧٦% من الأفراد خلال ٧٢ ساعة من المعاملة للنوع قوقع البرسيم الزجاجي *M. cartusiana* بينما لم يقتل أى فرد خلال ١٢ ساعة من المعاملة للأنواع قوقع الحدائق الأبيض *T. pisana* و قوقع الحدائق البنى ذوالشفة *E. vermiculata* وقتل ٦٦ & ٦٠% من الأفراد بعد ٧٢ ساعة من المعاملة على التوالي.

المبيد Fenthion قتل ١٦% من الأفراد لكل الأنواع خلال ١٢ ساعة من المعاملة بينما قتل ٨٢, ٨٠, ٧٠% من الأفراد خلال ٧٢ ساعة من المعاملة للأنواع قوقع الحدائق البنى ذوالشفة *E. vermiculata* و قوقع الحدائق الأبيض *T. pisana* و قوقع البرسيم الزجاجي *M. cartusiana* .