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TOXICOLOGICAL STUDIES ON THREE INSECTICIDES AGAINST THREE LAND SNAIL SPECIES USING DIFFERENT TECHNIQUES

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ABSTRACT: *Molluscicidal effects of three pesticides namely; triazofos, cloropyrifose and benzonitrile against adult stage of three land snails Monacha cartusiana,Theba pisana and Eobana vermiculata were studied under laboratory conditions. Thin film, leaf dipping and poisonous baits techniques were used for exposure the snails to pesticides. Triazofos proved to be the most toxic one against the three tested snail species either used as thin film or as poisonous baits or leaf-dipping techniques. The toxicity of tested pesticides applied as thin-films, leaf-dipping or poisonous baits could by arranged in descending order as follows: triazofos > cloropyrifose > benzonitrile. Snails exhibited a comparably high tolerance for benzonitrile as LC50's values for the three methods of application. M. cartusiana was the most sensitive; while E. vermiculata registered the highest tolerant, snail in comparison with the other two tested snails.*

Key words: *Land snails – Pesticides – Techniques – Mortality – laboratory.*

INTRODUCTION

Land snails had become an economic and serious pest in Egypt during the last few years.They cause considerable damage to field crops and horticultural plants, Kassab & Daoud (1964), Ghamry *et al* (1993), Ismail (1997), Zedan *et al* (2005) and Al-Akra (2005). Land snails were mostly controlled chemically using insecticides, Crowell (1967). Kady *et al.* (1983) applied Profenophos, Malathion, Triazophos, Primiphas methyl, Endosulfan and Monocrotophos against *Monacha cartusiana*. Ghamry *et al.* (1994) used methomyl, dithiocarb, carbaryl, chloropyrifos and dimethoate against two land snails *M. cartusiana* and *E. vermiculata* by poisonus baits technique. Ismail (1997) tested aldicarb, carbofuran, oxamayl granules, oxamayl EC, fenamiphos, fenthion, ethoprop and brmoxynil against M. cartusiana by poisonus baits technique. Abd El-haleim(2007) applied methomyl as poisonus baits, residual film & leaf dipping techniques. Al-Akra &Al-Gendy (2008) evaluated profenofos & fenthion against three land snail species, *Monacha cartusiana, Theba pisana* and *Eobania vermiculata* by using leaf dipping technique .

MATERIALS AND METHODS

Laboratory studies were conducted under laboratory conditions (22 ± 2°C and 75 ± 5% soil moisture). Department of Agricultural Zoology and Nematology, Faculty of Agriculture, Al-Azhar Univ., Cairo.

a-Tested snails:

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

b- Tested pesticides:

Three organophosphorus pesticides were tested against land snails as follow:

1- Common name: Benzonitrile. Chemical name: 0, 0- dimethyl 0 - 4 - nitro - m - toly - phosphorothiolate.
2- Common name: Triazofos. Chemical name: 7- Phenyl-1-2,4 triazolyl -3- 0, 0 -diethyl thiono - phosphate)
3- Common name: Cloropyrifose. Chemical name: 0, 0-diethyl 0_(3,5-6-trichloro -2- pyridinyl) phosphorothiolic acid.

c- Procedure conducted:

Plastic containers (13 x 13 x 33 cm.) filled with moist sandy- clay soil were used. Ten adult snails were placed in each cotainer and exposed to benzonitrile, cloropyrifose and triazofos using leaf dipping, baiting and contact (thin film) techniques. Serial concentrations from benzonitrile, cloropyrifose and triazofos were prepared as follow: 500, 1000, 3000, 5000 and 10000 ppm. The mortality was calculated after 4 days and corrected mortality was counted according to Abbott's Formula(1925). In addition, the medium lethal concentration values (LC50) were estimated and toxicity lines were drawn according to Finney (1971).

RESULTS AND DISCUSSION

Molluscicidal effect of triazofos, cloropyrifos and benzonitrile against adult stage of three land sinals *M.cartusiana,T. pisana* and *E. vermiculata* were studied under laboratory conditions using three techniques, thin film, leaf dipping and poisonous baits. Data in Tables (1&2) showed that, on the base of LC50 values, triazofos proved to be the most toxic one against the three tested snail species when used as thin film followed by poisonous baits and leaf-dipping techniques. Toxicity of arranged the tested pesticides

Table (1): LC50's values of three pesticides against three land snail species applied as, poisonous baits, thin-film and leaf-dipping techniques, under laboratory conditions (22 ± 2°C and 75 ± 5% soil moisture).

Pesticides	Snail species	Poisonous baits method				Thin-film method				Leaf-dipping method			
		LC50 ppm	95%		Slope	LC50 ppm	95%		Slope	LC50 Ppm	95%		Slope
			Lower	Upper			Lower	Upper			Lower	Upper	
Triazofos	M. cartusiana	38.8	20.75	72.56	2.63	34.81	18.23	66.49	2.84	37.47	19.93	70.44	3.52
	T. pisana	40.5	21.8	75.3	2.93	37.05	19.60	70.02	3.65	41.53	22.45	76.82	2.93
	E. vermiculata	42.96	23.48	79.17	2.9	37.54	19.97	70.58	3.08	42.81	23.39	78.34	2.71
Cloropyrifose	M. cartusiana	47.42	26.34	85.36	2.18	41.20	22.27	76.22	2.58	47.49	26.38	85.48	2.37
	T. pisana	47.44	26.36	85.39	2.09	42.73	23.22	78.62	3.25	48.5	27.09	86.82	2.16
	E. vermiculata	47.69	26.49	85.48	2.29	43.89	24.12	79.88	2.18	50.3	28.26	89.53	2.04
Benzonitrile	M. cartusiana	48.63	27.17	87.05	2.14	44.19	24.28	80.43	2.06	51.62	29.33	90.85	1.89
	T. pisana	50.35	28.3	89.6	1.98	44.55	24.48	81.08	3.27	54.95	31.40	96.16	3.48
	E. vermiculata	52.16	29.64	91.8	1.74	47.28	26.27	85.10	1.91	56.66	32.75	98.02	1.51

Table (2): Mortality percentages of three land snail species treated with three pesticides poisonous baits, thin-film and using leaf-dipping techniques, under laboratory conditions.

pesticides	Concentrations ppm.	Mortality percentage								
		Poisonous baits			Thin film			Leaf dipping		
		M. cartusiana	*T. pisana*	*E. vermiculata*	*M. cartusiana*	*T. pisana*	*E. vermiculata*	*M. cartusiana*	*T. pisana*	*E. vermiculata*
Triazofos	500	13	22	10	27	20	29	6	20	12
	1000	53	33	20	50	40	49	13	37	33
	3000	60	66	40	67	60	88	53	55	67
	5000	80	80	60	88	80	90	80	62	74
	10000	90	88	80	100	96	93	94	84	81
Cloropyrifose	500	20	20	10	26	25	18	6	16	14
	1000	40	40	20	40	33	39	13	27	23
	3000	66	50	30	73	49	48	46	39	44
	5000	70	60	50	80	69	76	70	52	55
	10000	73	72	70	85	82	80	71	68	65
Benzonitrile	500	11	9	8	20	15	20	7	6	9
	1000	23	22	20	30	30	40	20	19	22
	3000	51	42	40	50	61	50	33	27	30
	5000	66	54	50	60	75	60	53	43	35
	10000	67	64	60	78	77	74	62	56	54

as thin-films, leaf-dipping or poisonous baits could by descending order as follows: triazofos > cloropyrifose > benzonitrile. Snails exhibited a comparably high tolerance for benzonitrile as LC50's values for the three methods of application. *M.cartusiana* was the most sensitive; while *E. vermiculata* was the highest tolerant. Data indicated that the slope values of the toxicity regression line was slightly varied according to snail species, pesticides compounds and applied techniques. Results revealed that there are slight differences in homogeneity of the tested snail population in concern with their responses Fig. (1,2&3). These results are in agreement with those obtained by Katoty and Das (1988), Lotify (1997), El-Mosry (1997) and Ismail (2000).

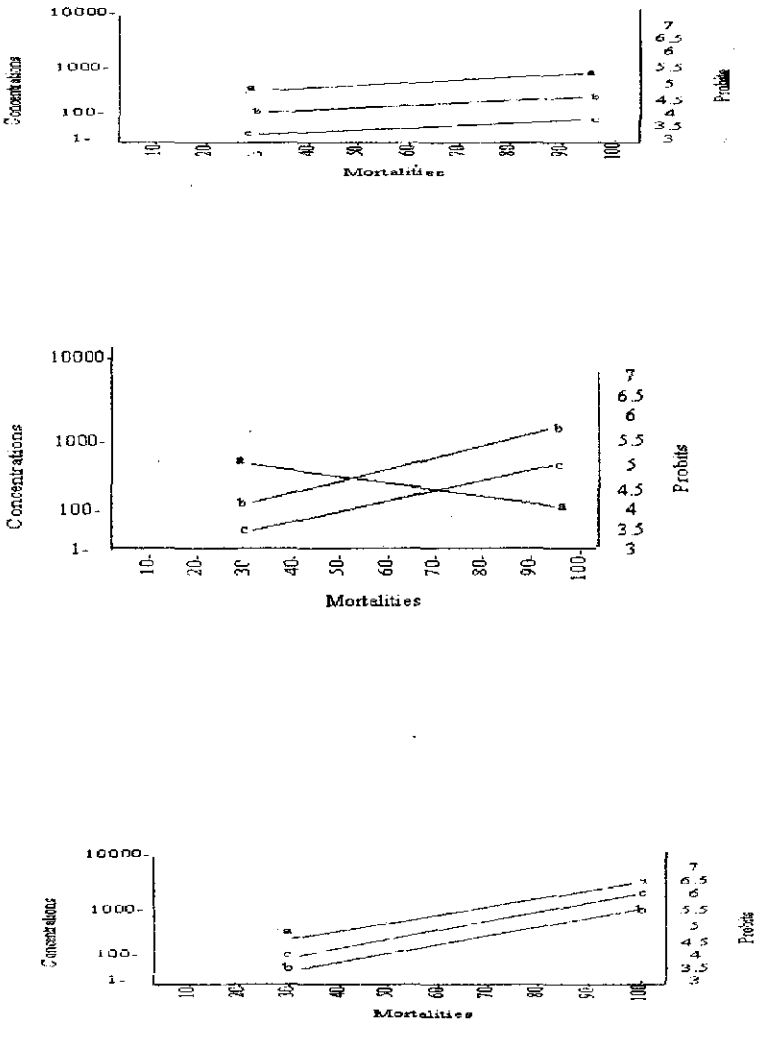

Fig.(1): Regression lines of Cloropyrifos against (a)*T. pisana*, (b) *M. cartusiana* and(c) *E. vermiculata* for poisonous baits (above), thin film(middle) and leave dipping(lower) techniques.

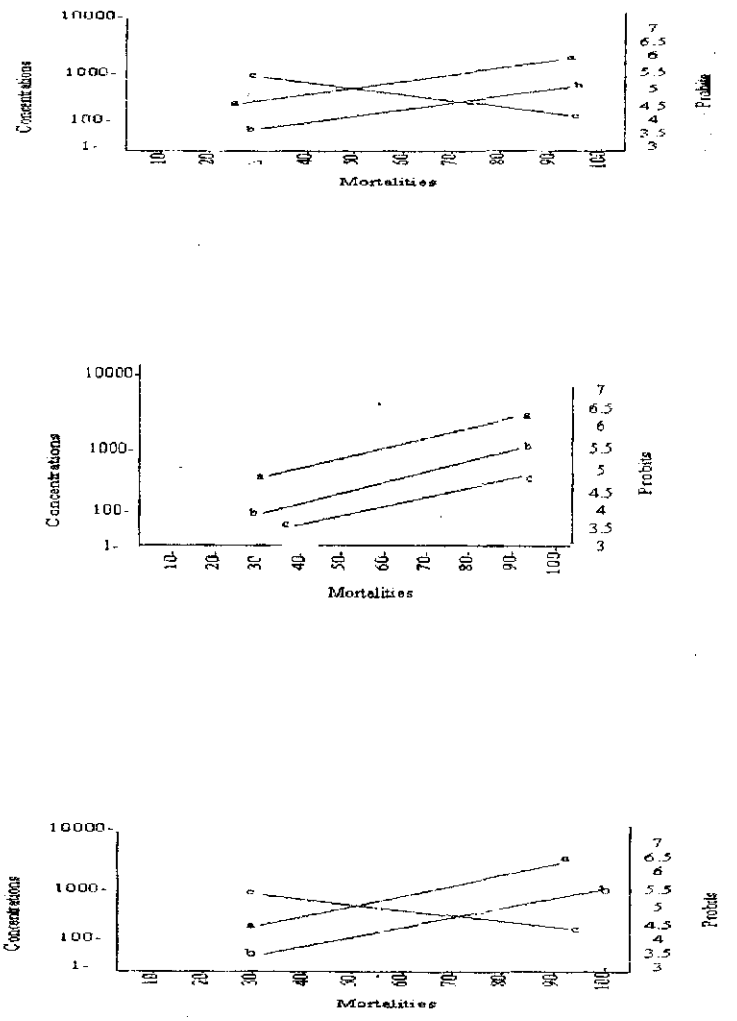

Fig.(2): Regression lines of Triazofos against (a)*T. pisana*, (b) *M. cartusiana* and(c) *E. vermiculata* for poisonous baits(above), thin film(middle) and leave dipping(lower) techniques.

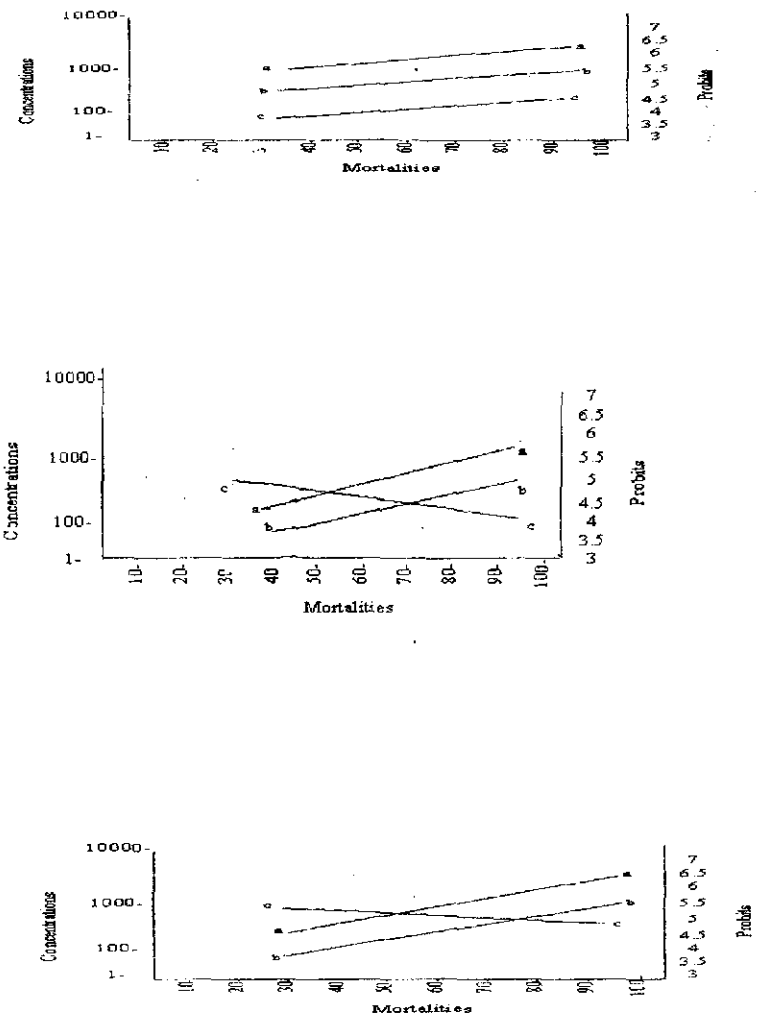

Fig.(3): Regression lines of Benzonitrileagainst (a)T. pisana, (b) M. cartusiana and(c) *E. vermiculata* for poisonous baits(above), thin film(middle) and leave dipping(lower) techniques.

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دراسات على سمية ثلاثة مبيدات حشرية على ثلاث أنواع من القواقع الأرضية بإستخدام تطبيقات مختلفة

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كان الهدف من هذا البحث هو تقييم سمية ثلاثة مبيدات حشرية (triazofos, cloropyrifose و benzonitrile) ضد ثلاث أنواع من القواقع الأرضية وهى قوقع البرسيم الزجاجى *M. cartusiana* و وقوقع الحدائق الأبيض *T. Pisana* وقوقع الحدائق البنى ذوالشفة *E. vermiculata* معمليا حيث تم جمع الأفراد الكاملة من القواقع من محافظتى المنوفية والأسكندرية. تم إطعام أفراد القواقع البالغة من كل نوع على أوراق الخس المعالجة بتركيزات متتالية لكل مبيد بطرق الغمس والطعوم والغشاء الرقيق وتم تسجيل عدد الوفيات خلال أربعة أيام وكذلك تقدير قيم LC50 لكل مركب على كل نوع من القواقع الثلاثة.

أوضحت النتائج أن مركب triazofos له قدرة على قتل القواقع السابقة. وارتفعت نسبة تدريجيا مع زيادة تركيزات المركب ، وعموما فإن قوقع البرسيم الزجاجى البالغ أكثر القواقع حساسية للمبيدات المختبرة.

أظهرت النتائج أيضا ان حساسية قوقع البرسيم الزجاجى *M. cartusiana* كانت عالية لمبيد triazofos, يليه مبيد cloropyrifose ثم مبيد benzonitrile وذلك مقارنة بكل من قوقع الحدائق الأبيض *T. Pisana* و قوقع الحدائق البنى ذوالشفة *E. vermiculata* .

كما أوضحت النتائج أن :-

طريقة الغشاء الرقيق سجلت افضل الطرق لإستخدام المبيدات لقتل القواقع الأرضية المستهدفة.