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TOXICITY OF FOUR PESTICIDES ON *EOBANIA VERMICULATA* AND *MONACHA OBSTRUCTA* LAND SNAILS USING LEAF DIPPING AND POISON BAIT TECHNIQUE UNDER LABORATORY CONDITIONS

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ABSTRACT: ***The toxicity effect of four pesticides (Neomyl, Gastrotox, Round up and Topsin) were evaluated against the brown garden snail, Eobania vermiculata and the glassy clover snail, Monacha obstructa land snails using leaf dipping and poison bait technique under laboratory conditions.***

The toxicological studies on Eobania vermiculata snail by poison bait technique reaveled that Gastrotox exibited the highest toxic effect followed by Neomyl and Round up. While, Topsin gave the least effect in this respect. Their LC50 values were (0.16, 0.31, 1.25 and 2.03%), respectively. The relative potency of Gastrotox was 0.19, 0.56 and 0.59 times than of Topsin, Neomyl and Round up and the slope values were 1.97, 1.69, 1.64 and 2.4, respectively.

On the other hand, the activity of the same tested chemicals against Monacha obstructa and the same technique showed that Gastrotox was the most potent one followed by Neomyl, Round up and Topsin. Their LC50 values were (0.18, 0.33, 1.48 and 2.48%), respectively. Also, it noticed that the relative potency of Gastrotox was 0.37, 0.56 and 0.81 times than of Topsin, Neomyl and Round up and the slope values were 1.7, 1.72, 1.59 and 1.86, respectively.

The molluscicidal activity of Neomyl, Topsin and Round up using dipping technique against Eobania vermiculata illustrated that Neomyl exibited the highest toxic effect followed by Round up. While, Topsin gave the least effect in this respect. Their LC50 values were 0.24, 0.98 and 1.71 and the relative potency of Neomyl was 0.98 and 1.71 times than of Round up and Topsin. Also, the slope values were 0.58, 0.42 and 0.056, respectively.

Concerning the activity of the previous tested chemicals against Monacha obstructa results indicated that Round up was the most potent one followed by Neomyl. But, Topsin gave the least effect and their LC50 values were 0.23, 0.26 and 2.23, respectively. The relative potency of Round up was 0.52 and 0.20 times than of Neomyl and Topsin. Also, the slope values were 1.71, 1.87 and 1.83, respectively.

Key words: ***Brown garden snail, glassy clover snail, molluscicide, control***

INTRODUCTION

Nowadays, the terresterial snails have become a destructive agricultural pests becouse it attacking many plants at their different growth stages and feed on leaves, roots, flowers and fruits causing a great economic damage to a wide varities of field crops, vegetables, horticultural plants and fruit trees in the most areas of Egypt and reduce the yield and its marketing value.

Most molluscicides against terresterial gastropods more usually deployed in baits Barker (2002). Bait technique is more suitable for reducing environmental pollution as well as the simplety for use and usually low costly.

The present work aims to evaluate the molluscicidal activity of four pesticides against two land snails species, the brown garden snail, *Eobania vermiculata* and the glassy clover snail, *Monacha obstructa* using two methods of application.

MATERIALS AND METHODS

Experiments were designed to study the control measures which can be used effectively to diminish population density and consequently damage caused by common land snails, *E. vermiculata* and *M. obstructa*.

-Tested snails:

The tested snails were adult individuals of glassy clover snails, M.obstructa (muller) and brown garden snails, E. vermiculata (muller) were collected from infested horticulture, vegetables and field crops at Ashmoon district, menufiya governorate

The snails transferred in closed bags to the laboratory and were kept-separately each species-at room temperature in glassy terrariums (40*25*20cm) containing moist soil and provided with fresh green lettuce leaves for two weeks for acclimatization before testing (Godan,1983). Ten healthy individuals were selected for each replicate and starved for 24 hours before starting the testes.

-Tested materials:

Four pesticides belonging to different chemical groups were tested, common name, trade name and chemical name of these compounds were as follows:

-Methomyl (Neomyl 90% WP) insecticide, molluscicide.
Chemical name:
S-methyl-N-[(methyl carbamoy)oxy] thio acetimidate.

-Metaldhyde (Gastrotox 5% RB) molluscicide.
Chemical name:
2,4,6,8 tetramethyl-1,3,5,7 tetraoxacyclooctane; acetaldehyde tetramer

-Round up 48% WSC Herbicide
Chemical name:
N-(phosphono methyl) glycine, iso propyl ammonium.

-Topsin 70% WP Fungicide , Nematicide.
Chemical name:
Dimethyl [(1,2-phenylene) bis-(iminocarbonothioyl)] bis [carbamate].

-Procedure conducted:

Sixty plastic boxes of 13 cm diameter and 15cm depth were prepared to conduct the experiments by putting 10 snail in it to treat it with different pesticides. Twenty boxes, 4 replicates for each treatment, two methods were used for test these pesticides.

- Method of pesticide applications:

1-Leaf dipping technique:

Neomyl 90%, Gastrotox 5%, Topsin 70 % WP and Round up 48% WSC were tested at different concentrations, similar pieces of green lettuce leaves were dipped in glass jar containing 100ml of tested pesticide for 5 seconds, then left to dry before being offered to the tested animals. Ten adult individuals with the same shell diameter were exposed to each treated leaves in plastic box and the boxes were covered with muslin cloth held by rubber band to prevent animals from escaping, (Baker and Hawake., 1991). Each concentration was included 4 replicates and 4 replicates were kept without treatment as control. All boxes were examined after 3, 6, 9 and 11 days to recorded the mortality percentage.

2-Poisonous baits technique;

Neomyl 90%, Gastrotox 5%, Topsin 70% WP and Round up 48% WSC were tested as poisonous baits at different concentrations, the poisonous baits were

prepared by mixing a known of each compound with 5 parts of black sugarcane syrup, then the mixture was incorporated with wheat bran to be finally 100 parts and the bait was moistened with appropriate amount of water

Ten adult individuals were exposed to 20 grams bait in plastic box and a small piece of sponge saturated with water was kept in the bottom of each box as source of humidity to keep animals active. Boxes were covered with tiny holes muslin for ventilation and to prevent snails from escaping, 4 replicates were used for each concentration of bait and 4 replicates were prepared using wheat brain bait mixed with black sugarcane syrup only without pesticide as control. Finally, all boxes were examined after 3, 6, 9 and 11 days, the mortality percentage was calculated and recorded.

- Toxicity of the tested compounds :

Mortality percentages were calculated and corrected according to abbott`s formula (1925) as follows:

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

The toxicity lines were statistically analyzed according to Litchfield and Wilcoxon (1949) as follows:

$Y = a + b\,x$ were Y = Probit unit, a = constant value, b = slope of line and x = log concentration .

LC50, confidential limits, and slope for the tested pesticides were calculated according to Finny (1952).

RESULTS AND DISCUSSION

A serial of experiments had been conducted to evaluate the efficiency of certain pesticides and molluscicides against adults of *Monacha obstructa* and *Eobania vermiculata* land snails using leaf dipping and poison bait technique under laboratory conditions.

1- Poison bait technique:

Neomyl, Gastrotox, Topsin and Round up were tested as poisonous bait against *E. vermiculata* in Table (1) and Figures (1,2,3,4).

The results revealed that Gastrotox exhibited the highest toxic effect followed by Neomyl and Round up. While, Topsin gave the least effect in this respect. Their LC50 values were (0.16, 0.31, 1.25 and 2.03%), respectively. The relative potency of Gastrotox was 0.19, 0.56 and 0.59 times than of Topsin, Neomyl and Round up and the slope values were 1.97, 1.69, 1.64 and 2.4, respectively.

On the other hand, the activity of the same tested chemicals against *M. obstructa* in Table (2) and Figures (1,2,3,4) showed that Gastrotox was the most potent one followed by Neomyl, Round up and Topsin. Their LC50 values were (0.18, 0.33, 1.48 and 2.48 %), respectively. Also, it noticed that the relative potency of Gastrotox was 0.37, 0.56 and 0.81 times than of Topsin, Neomyl and Round up and the slope values were 1.7, 1.72, 1.59 and 1.86, respectively.

2-Leaf dipping technique:

Data in Table (3) and Figures (1,3,4) show molluscicidal activity of Neomyl, Topsin and Round up using dipping technique against *E. vermiculata* . it is clear that Neomyl exhibited the highest toxic effect followed by Round up while Topsin gave the least effect in this respect. Their LC50 values were 0.24, 0.98 and 1.71 and the relative potency of Neomyl was 0.98 and 1.71 times than of Round up and Topsin. Also, the slope values were o.58, 0.42 and 0.056, respectively.

Table (1). Molluscicidal activity of certain tested pesticides against adults of *Eobania vermiculata* land snail using poisonous bait technique under laboratory conditions.

Toxicant	LC_{50}	Confidence limits		Slope and variance	Relative potency
		Lower	Upper		
Neomyl 90 % W P	0.31	0.267	0.372	1.69 ± 0.156	0.569
Gastrotox 5 % G	0.16	0.086	0.284	1.97 ± 0.165	0.004
Topsin 70 % WP	2.03	1.796	2.381	2.40 ±0.287	0.198
Round up 48 % WSC	1.25	1.051	1.514	1.64 ± 0.156	0.598

Table (2). Molluscicidal activity of certain tested pesticides against adults of *Monacha obstructa* land snail using poisonous bait technique under laboratory conditions.

Toxicant	LC_{50}	Confidence limits		Slope and variance	Relative potency
		Lower	Upper		
Neomyl 90 % W P	0.33	0.280	0.389	1.72 ±0.157	0.569
Gastrotox 5 % G	0.18	0.157	0.219	1.70 ±0.155	0.004
Topsin 70 % WP	2.48	2.078	3.275	1.86 ±0.273	0.377
Round up 48 % WSC	1.48	1.237	1.845	1.59 ±0.158	0.818

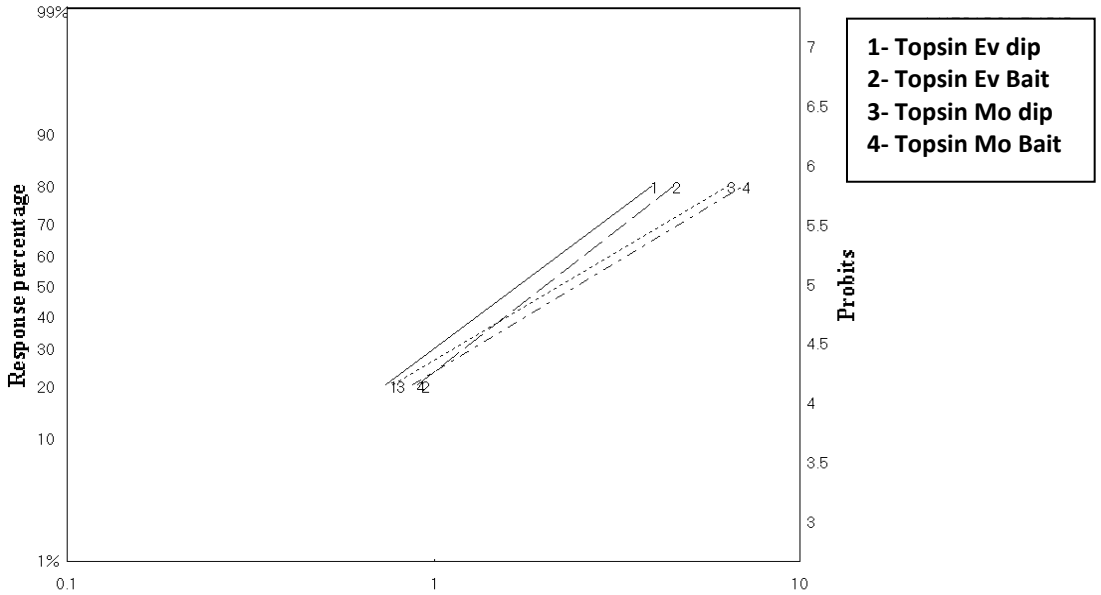

Fig. (1): LD-P lines of dipping and baiting treatments of Topsin against *Monacha obstructa* and *Eobania vermiculata*

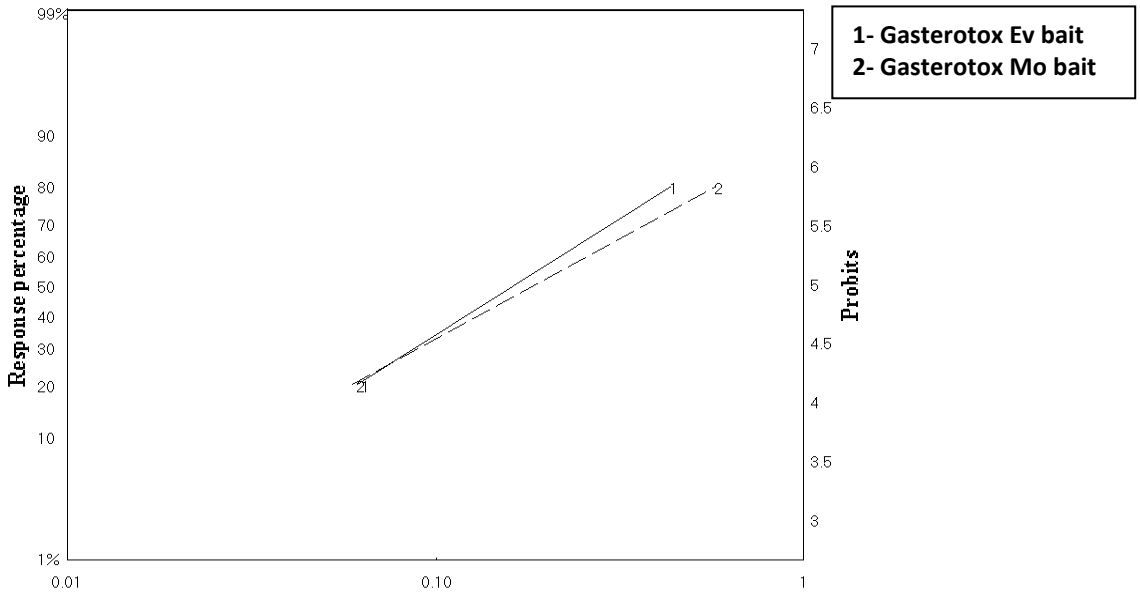

Fig. (2): LD-P lines of granules treatment of Gastrotox against *Eobania vermiculata* and *Monacha obstructa*

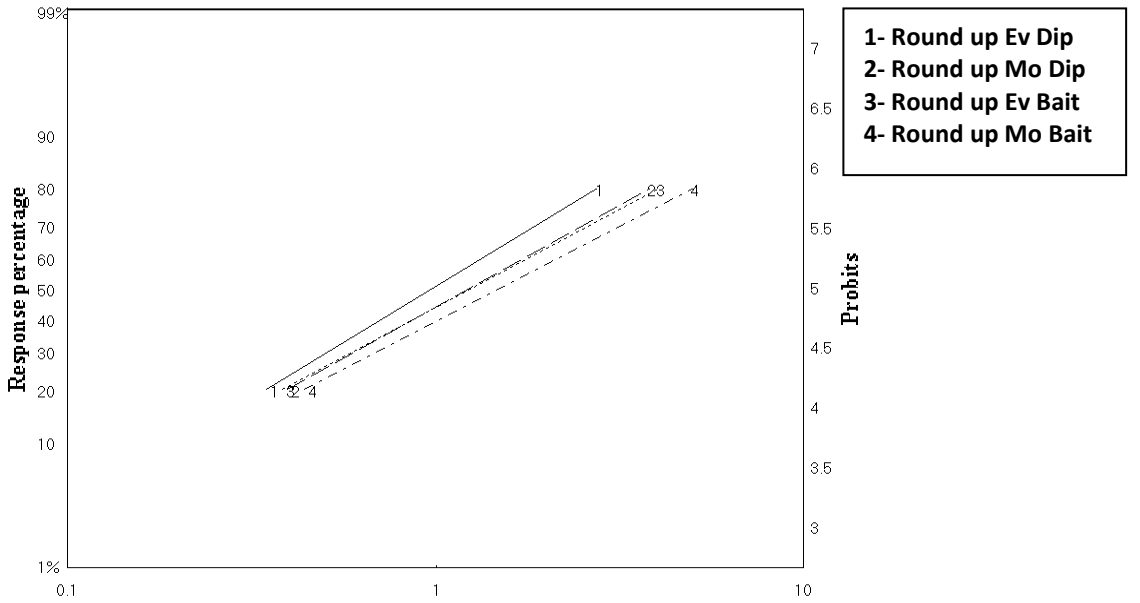

Fig. (3): LD-P lines of dipping and baiting treatments of Round up against *Monacha obstructa* and *Eobania vermiculata.*

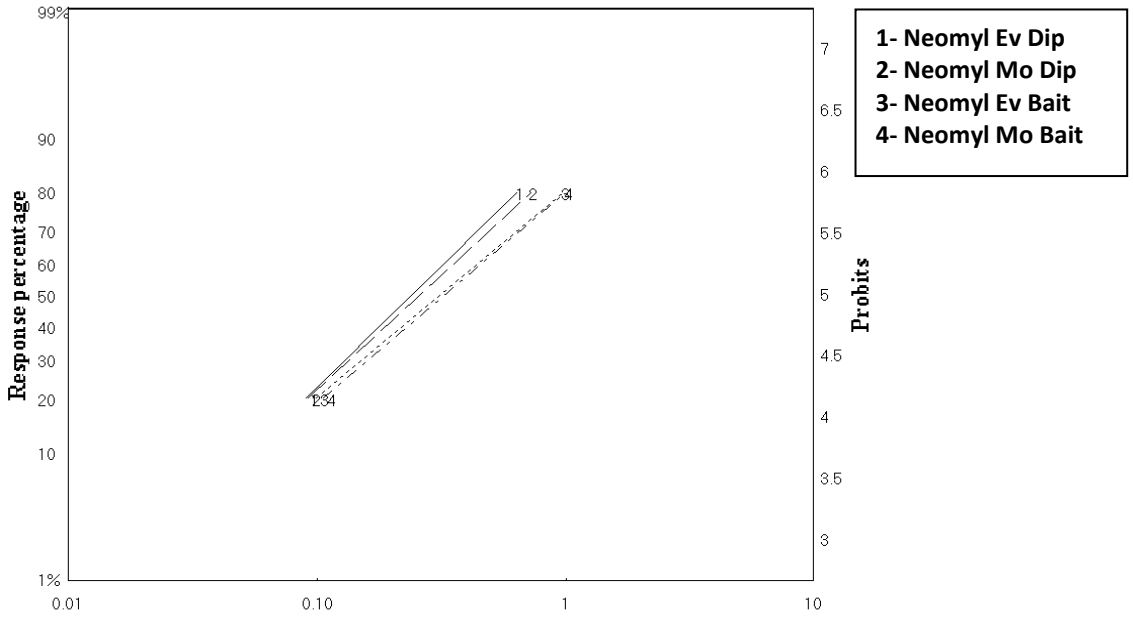

Fig. (4): LD-P lines of dipping and baiting treatments of Neomyl against *Monacha obstructa* and *Eobania vermiculata*

Table (3). Molluscicidal activity of certain tested pesticides against adults of *Eobania vermiculata* land snail using dipping technique under laboratory conditions.

Toxicant	LC_{50}	Confidence limits		Slope and variance	Relative potency
		Lower	Upper		
Neomyl 90 % W P	0.24	0.208	0.279	1.97 ± 0.167	0.581
Topsin 70 % WP	1.71	1.523	1.967	2.31 ± 0.269	0.056
Round up 48 % WSC	0.98	0.842	1.147	1.87 ± 0.161	0.416

Concerning the activity of the previous tested chemicals against *M. obstructa* data in Table (4) and depicted in Figures (1,3,4) results indicated that that Round up was the most potent one followed by Neomyl but Topsin gave the least effect and their LC50 values were 1.71, 1.87 and 1.83, respectively. The relative potency of Round up was 0.52 and 0.20 times than that of Neomyl and Topsin. Also, the slope values were 1.71, 1.87 and 1.83, respectively.

The obtained results are in agreement with those conducted by Abdel Aal (2004 and 2008), Abdel Aal and Hamed (2010), Awadalla (1997), Daoud (2010), El-Deeb *et al.* (1999), Essawy *et al.* (2009), Fouad *et al.* (2004), Gaber *et al.* (2006), Hegab *et al.* (2006), Mortada (2006), Mortada *et al.* (2005), Mortada *et al.* (2009) and Mortada *et al.* (2012), Zedan (2004), Zedan *et.al.* (2006) and Eshra (2014).

Table (4). Molluscicidal activity of certain tested pesticides against adults of *Monacha obstructa* land snail using dipping technique under laboratory conditions.

Toxicant	LC_{50}	Confidence limits		Slope and variance	Relative potency
		Lower	Upper		
Neomyl 90 % W P	0.26	0.223	0.304	1.87 ±0.162	0.525
Topsin 70 % WP	2.23	1.890	2.849	1.83 ±0.265	0.204
Round up 48 % WSC	0.23	1.045	1.484	1.71 ±0.159	0.827

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سمية اربعة من المبيدات على قوقع الحدائق البنى وقوقع البرسيم الزجاجى بطريقة الغمروطريقة الطعم السام تحت الظروف المعملية

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الملخص العربى

أجريت هذه الدراسة بمعامل قسم وقاية النبات بكلية الزراعة جامعة بنها ومعهد بحوث وقاية النباتات – الدقى – جيزة لتقييم فعالية بعض المبيدات فى مكافحة قوقع الحدائق البنى *Eobania vermiculata* وقوقع البرسيم الزجاجى *Monacha obstructa* باستخدام طريقة الطعوم السامة و طريقة الغمرتحت الظروف المعملية . أظهرت النتائج على قوقع الحدائق البنى بطريقة الطعم السام أن مبيد Gastrotox أعطى أعلى سمية يتبعه مبيد Neomyl ومبيد Round up. بينما أعطى مبيد Topsin أقل تأثير للسمية . وكانت قيم LC_{50} (0.16 , 0.31 , 1.25 و 2.03 ٪) بالترتيب. أما عند دراسة السمية على قوقع البرسيم الزجاجى بطريقة الطعم السام أظهرت النتائج أن مبيد Gastrotox أعطى أعلى سمية يتبعه مبيد Neomyl ومبيد Round up. بينما أعطى مبيد Topsin أقل تأثير للسمية . وكانت قيم LC_{50} (0.16 , 0.31 , 1.25 و 2.03 ٪) بالترتيب.

وبالنسبة الى قوقع الحدائق البنى بطريقة الغمر فى المبيد أظهرت النتائج أن مبيد Neomyl أعطى أعلى سمية يتبعه مبيد Round up ، بينما أعطى مبيد Topsin أقل تأثير للسمية . وكانت قيم LC_{50} (0.24 , 0.98 و 1.86 ٪) بالترتيب. أما عند اجراء التجربة على قوقع البرسيم الزجاجى بطريقة الغمر فى المبيد أظهرت النتائج أن مبيد Round up أعطى أعلى سمية يتبعه مبيد Neomyl . بينما أعطى مبيد Topsin أقل تأثير للسمية . وكانت قيم LC_{50} (1.71 , 1.87و 1.83 ٪) على الترتيب.

أسماء السادة المحكمين

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