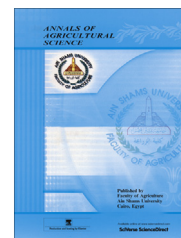




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# Toxicity of methomyl, copper hydroxide and urea fertilizer on some land snails



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## KEYWORDS

Land snails;  
Methomyl;  
Copper hydroxide;  
Urea

**Abstract** Terrestrial gastropods have become important economic pests attacking various vegetations in Egypt. According to this study, the molluscicidal activity of methomyl, urea, and copper hydroxide against the brown garden snail *Eobania vermiculata* and the small white garden snail, *Theba pisana* was investigated.

The obtained results indicated that copper hydroxide was the most toxic compound against *E. vermiculata* followed by methomyl and urea after 72 h of evaluation where LC<sub>50</sub> values were 3.31%, 3.75% and 40.88%, respectively. Methomyl was also the most toxic compound when it was tested against *T. pisana* followed by copper hydroxide followed by urea. The LC<sub>50</sub> values were 3.76%, 4.63% and 40.13%, with respect. The brown garden snail was more susceptible to copper hydroxide and methomyl than the second one. There was no difference in the susceptibility of the two tested snails to urea. The toxicity of the compounds was enhanced as increasing the exposure time. This study showed that the land snails may be controlled using urea fertilizer at concentration of 8%, to give % mortality in a range of (67–100)%.

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## Introduction

The terrestrial gastropod mollusks; snails and slugs, are serious pests attacking the vegetations including vegetables, horticultural plants and field crops in the most areas of Egypt. The fruits and vegetables get poor marketing ratings with reduced value (El-Okda, 1980; Glen and Wilson, 1997; Glen et al., 2000).

Among the most serious land snails in Egypt, the brown garden snail, *Eobania vermiculata* (Müller), and the white snail, *Theba pisana* (Müller). These snails have a destructive effect to citrus species and also feed on the foliage of many gardens and ornamental plants. Therefore, the control of these snails is becoming very important. Nowadays the control with chemical pesticides is still one of the most effective methods (Radwan et al., 1992; Eshra, 2004; Moran et al., 2004; El-Shahaat et al., 2005, 2009; Ghoneim, 2006).

This study is carried out in the laboratory to evaluate the toxicity of methomyl (as oximecarbamate insecticide), copper hydroxide (as a fungicide), and urea (as a fertilizer) against the two mentioned snails.

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## Materials and methods

### Land snails

Adults of the brown garden snail, *E. vermiculata* (Muller) and the white small snail, *T. pisana* (Muller) having approximately the same age and size were collected for laboratory study. These snails were collected during April from El-Maamoura region, Alexandria. They were then transferred to plastic cups covered with cloth netting and maintained under laboratory conditions of 27 °C and 65% R.H. The snails were daily fed on lettuce leaves until the start of tests. They were allowed to be acclimatized to these conditions for two weeks. Dead snails were removed immediately.

### Chemicals

Methomyl (as Lannate® 90% SP), copper hydroxide (as Kocide®2000) and urea 46.5 nitrogen (as a fertilizer) were evaluated.

### Molluscicidal activity against *E. vermiculata* and *T. pisana* snails

Toxicity of the formulated methomyl (Lannate®), urea, copper hydroxide (Kocide®2000) against *E. vermiculata* and *T. pisana* were evaluated. Homogenous disks of lettuce leaves were dipped in series of the methomyl, urea and copper hydroxide concentrations for 5 min and left for dryness. The treated lettuce disks were transferred into plastic cups and 10 adult snails were placed into each cup. Each concentration had three replicates at two periods; after 48 and 72 h. Untreated lettuce disks were used as a check treatment. Mortality percentages were recorded after 48 and 72 h post-treatments. Snails' mortality values were corrected according to the Abbott equation (Abbott, 1925).

The results were subjected to probit analysis (Finney, 1971), and the LC<sub>50</sub> values were estimated.

## Results and discussion

### Molluscicidal activity of methomyl, urea, and copper hydroxide against *E. vermiculata* and *T. pisana*

As shown in Table 1 and Figs. 1 and 2, methomyl gave the % mortality values as 6.7, 25.0, 40.0, 60.0 and 85.0 for

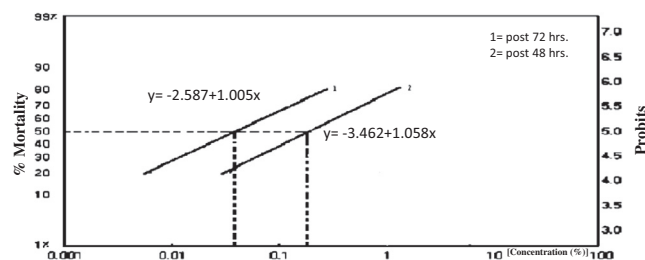


Fig. 1 Regression lines of methomyl against *E. vermiculata* at different exposure times.

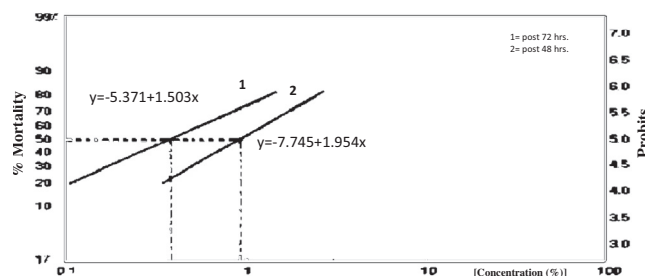


Fig. 2 Regression lines of methomyl against *T. pisana* at different exposure times.

*E. vermiculata* after 48 h of testing, while the corresponding values were 20.0, 53.3, 75.0, 80.0 and 95.0 after 72 h. In regarding to the toxic effect on *T. pisana*, the % mortality values were 5.0, 15.0, 26.0, 45.0 and 80.0 at the 1st period and they were 20.0, 40.0, 60.0, 80.0 and 100.0 at the 2nd period of test. These results indicated that the LC<sub>50</sub> values were  $18.71 \times 10^3$  ppm and  $3.75 \times 10^3$  ppm for *E. vermiculata* after 48 h and 72 h, respectively. The values for *T. pisana* were  $9.18 \times 10^3$  ppm and  $3.76 \times 10^3$  ppm, respectively. These data revealed that, the methomyl treatment was more toxic to *E. vermiculata* and *T. pisana* after 72 h of evaluation while the lowest toxicity value was appeared with, *E. vermiculata* after 48 h of study. The toxicity of methomyl against the two snail types increased with increasing the exposure time. This result is in agreement with that obtained by Abdallah et al. (1992) who reported that the white snail, *T. pisana* was more sensitive to methomyl 2% wheat bran bait than the garden snail, *E. vermiculata* after one day of treatment.

Toxicity of urea concentrations against *E. vermiculata* and *T. pisana* is shown in Table 2 and Figs. 3 and 4. The % mortality values were 5.0, 13.3, 40.0, 50.0 and 67.0 after 48 h of

Table 1 Molluscicidal activity of methomyl against *E. vermiculata* and *T. pisana* snails.

Conc. (ppm)	% Mortality		% Mortality	
	<i>E. vermiculata</i>		<i>T. pisana</i>	
	48 h	72 h	48 h	72 h
100	6.7	20.0	5.0	20.0
300	25.0	53.3	15.0	40.0
1000	40.0	75.0	26.0	60.0
6000	60.0	80.0	45.0	80.0
10,000	85.0	95.0	80.0	100.0
Slope ± S.E	1.058 ± 0.01	1.005 ± 0.07	1.954 ± 0.04	1.503 ± 0.03
LC <sub>50</sub> : ppm × 10 <sup>3</sup>	18.71	3.75	9.18	3.76

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