FOLIA MALACOLOGICA
Vol. 17(4): 215–217
ISSN 1506-7629
The Association of Polish Malacologists
& Faculty of Biology, Adam Mickiewicz University
Poznań 2009
doi:10.2478/v10125-009-0017-9

EFFECTIVITY OF SELECTED NON-MOLLUSCICIDE CHEMICALS AGAINST THE SLUG *DEROCERAS LAEVE* (O. F. MÜLLER, 1774) (GASTROPODA, PULMONATA, LIMACIDAE)

EWA DANKOWSKA

Chair of Plant Protection Methods, Poznań University of Life Sciences, Zgorzelecka 4, 60-198 Poznań, Poland (e-mail: kmor@post.pl)

ABSTRACT: Slugs in greenhouses often damage cultivated plants. Traditional molluscicides in greenhouse conditions are not always effective, hence new chemicals and ways of their application are sought. Several non-molluscicide chemicals were tested for their effectivity against eggs and adults of *Deroceras laeve* (O. F. Müll.). They proved to be of little effectivity (below 30%), except Oncol 120 EC which decreased hatching success by 60%.

KEY WORDS: *Deroceras laeve*, greenhouse, slug control, chemicals

INTRODUCTION

Greenhouse conditions favour slug development and feeding throughout the year. An excessive slug abundance combined with the absence of natural enemies may then create problems. As a result of mass slug feeding, the plants loose their decorative or commercial value; sometimes mass destruction occurs. In greenhouse cultivations slug control with traditional molluscicides is difficult, since such chemicals are not resistant to the high humidity. New means and ways of their application are constantly sought (KOZŁOWSKI 2003, DANKOWSKA 2006, DANKOWSKA & ROBAK 2006, KOZŁOWSKI & WALIGÓRA 2007, DANKOWSKA & KŁOSEK 2008). The aim of this sudy was to test non-molluscicide chemicals for their effectivity against *Deroceras laeve* (O. F. Müller, 1774).

MATERIAL AND METHODS

Experiments with eggs and adults of *D. laeve* were performed in laboratory conditions at the Chair of Plant Protection Methods, Poznań University of Life Sciences. The chemicals used, their active components and concentrations are presented in Table 1. The effectivity of the substances was calculated with the formula:

$$S_k = \frac{Pa - Pk}{100 - Pk} \times 100$$

Where: S_k – effectivity of the substance; Pa – proportion of dead slugs in experimental object; Pk – proportion of dead slugs in control object (GOOS 1976).

EGGS

Fertilised eggs with live embryos were used. Each chemical was tested in four replicates, each of 10 eggs. The eggs were submerged in the solution of the tested chemical for 5 minutes, and then placed in Petri dishes lined with three layers of damp filter paper. Control eggs were submerged in distilled water. Dishes with eggs were kept in a climatic chamber at constant temperature of 20°C and constant humidity of 95%. Every 2–3 days changes in the eggs were observed and hatchlings were counted.

Table 1. List of chemicals applied in the experiments

Commercial name	Active substance (functional group)	Concentration (%)
Afugan 30 EC	Pyrazophos (pirimidin)	0.40
Ammo 250 EC	Cypermethrin (pyrethroid)	0.05
Applaud 25 WP	Buprophenzin (thiodiazine)	0.10
Danitol 10 EC	Fenpropathrin (pyrethroid)	0.05
Dimilin 25 WP	Diflubenzuron (benzoilourea)	0.10
Oncol 120 EC	Benfuracarb (carbamate)	0.30
Regent 200 EC	Fipronil (phenylopyrazole)	0.05
Vertimec 018 EC	Abamectin (macrocyclic lactones)	0.05

ADULT SLUGS

For each replicate five adult slugs were placed in a plastic container of 11 × 6 × 7 cm, lined with a layer of damp soil (3 cm) sprinkled with the tested chemical. Each chemical was tested in four replicates. In the control, the soil was sprinkled with distilled water. During the experiment the soil was dampened with water and food was provided according to need. The containers were kept in a climatic chamber at 20°C and 95% humidity. Dead slugs were counted every two days.

RESULTS AND DISCUSSION

None of the tested chemicals inhibited hatching completely (Table 2, Figs 1, 2). Applying Oncol 120 EC resulted in the smallest hatching success (35%) (Fig. 1). The effectivity of the remaining chemicals was below 30%. The egg envelopes may preclude penetration of the active substances into the egg. Besides inhibiting hatching, Oncol 120 EC killed the greatest proportion of eggs (61.1%) (Fig. 2).

None of the tested chemicals proved to be very effective against adult *D. laeve* (Table 3, Fig. 3). The tested chemicals, except Oncol 120 EC (carbamates), represented active domains other than those of traditional molluscicides. Probably the tested substances did not have a dehydrating effect on adult slugs and

Table 2. Effect of the tested chemicals on hatching success

Chemical	Mean number of hatched slugs ± SD
Afugan 30 EC	6.75 ± 2.75
Ammo 250 EC	6.25 ± 1.26
Applaud 25 WP	7.75 ± 1.51
Danitol 10 EC	6.50 ± 1.29
Dimilin 25 WP	7.75 ± 1.36
Oncol 120 EC	3.50 ± 2.43
Regent 200 EC	8.50 ± 1.00
Vertimec 018 EC	6.75 ± 2.28
Control	10.00

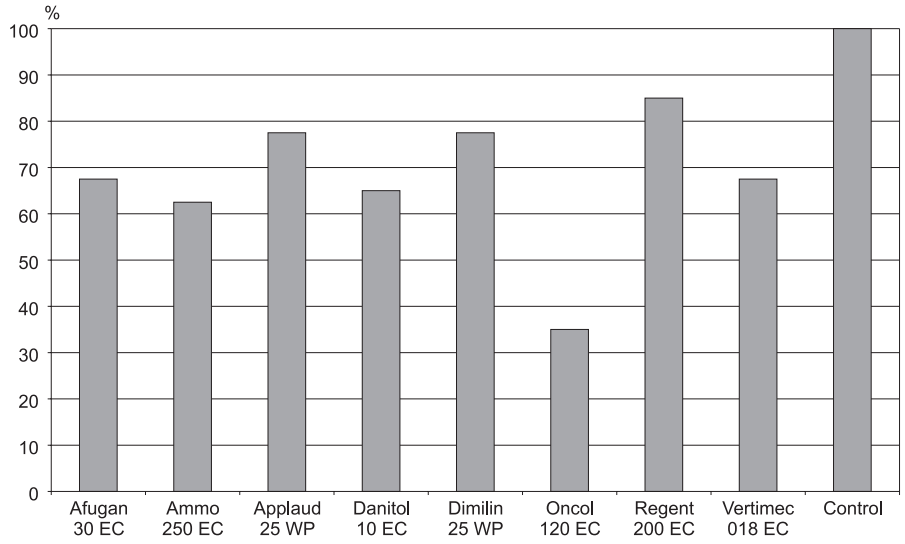

Fig. 1. Hatching success [%] under the effect of the tested substances

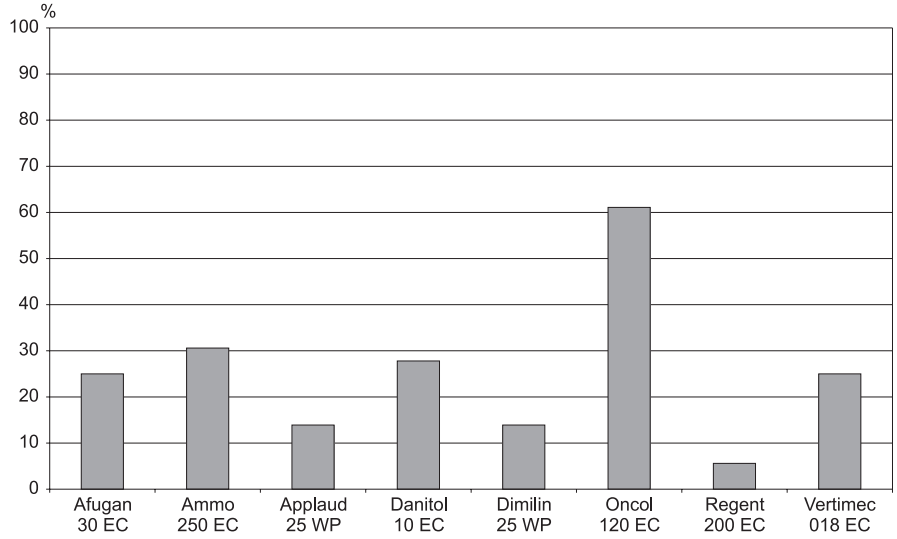

Fig. 2. Mortality of eggs [%] under the effect of the tested substances

Table 3. Effect of the tested chemicals on adult slugs

Chemical	Mean number of dead slugs ± SD
Ammo 250 EC	0.0
Applaud 250 EC	1.50 ± 0.58
Dimilin 25 WP	0.75 ± 0.50
Regent 200 EC	1.25 ± 0.96
Control	0.0

did not show a sufficiently strong contact effect. Also, providing the slugs with sufficiently damp substratum during the experiment might cause dilution of the chemicals and, consequently, decrease in their efficiency.

There is further need to test new chemicals for their effectivity in slug control, either against slugs or their eggs. This study points to Oncol 120 EC, with its effectivity against eggs, as the only promising substance among the tested chemicals.

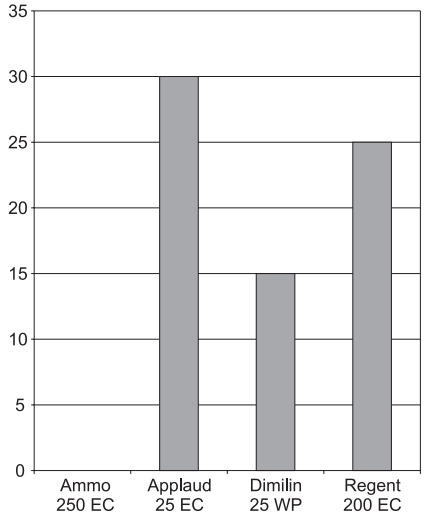

Fig. 3. Mortality of adult slugs [%] under the effect of the tested substances

REFERENCES

DANKOWSKA E. 2006. Wykorzystanie naparów roślinnych w ograniczaniu żerowania pomrowika małego (*Deroceras laeve* Müll.) Rocz. AR. Pozn. CCCLXXIX, Ogrodn. 40: 3–7.

DANKOWSKA E., ROBAK M. 2006. Wpływ naparów roślinnych na żerowanie pomrowika małego *Deroceras laeve* (Müll.). Prog. Plant Protection/Post. Ochr. Roślin 46: 406–408.

DANKOWSKA E., KŁOSEK I. 2008. Plant extracts, infusions and decoctions as factors limiting feeding activity of *Deroceras laeve* (O.F. Müller, 1774) (Gastropoda: Pulmonata: Agrolimacidae). Folia Malacol. 16: 35–38.

GOOS A. 1976. Technika ochrony roślin. In: KOCHMAN J. (ed.), Nauka o chorobach i szkodnikach roślin oraz technika ich stosowania. PWRiL, Warszawa, p. 559.

KOZŁOWSKI J. 2003. Stan badań nad metodami zwalczania szkodliwych ślimaków. Post. Nauk. Roln. 5: 25–42.

KOZŁOWSKI J., WALIGÓRA D. 2007. Reakcja *Arion lusitanicus* Mabille, 1868 (Gastropoda: Pulmonata: Arionidae) na wyciągi roślinne. Prog. Plant Protection/Post. Ochr. Roślin 47: 176–179.

Received: March 20th, 2009
Accepted: May 27th, 2009