

## CONTROL STUDIES ON THE GLASSY CLOVER SNAIL, *MONACHA CARTUSIANA* UNDER LABORATORY AND FIELD CONDITIONS

ISMAIL, SH. A.<sup>1</sup>, G. H. RADY<sup>2</sup>, A. A. ABDEL GAWAD<sup>2</sup> and M. H. LOKMA<sup>1</sup>

1. Plant Protection Research Institute, ARC, Dokki, Giza, Egypt.

2. Plant Protection Department, Fac. Agric. (Moshtohor), Benha Univ.

(Manuscript received 19 November 2014)

### Abstract

Control studies had been conducted under laboratory and field conditions on *Monacha cartusiana* snail. Laboratory studies was carried out to evaluate the effect of Diesel oil on egg hatchability of the same land snail *M. cartusiana* with three application rates 10, 20 and 30 L/Fe. Result assured that no any egg can hatching when Diesel oil applied with three application rates. On the other hand, when Diesel oil applied under field conditions to control *M. cartusiana* snail, with application rates 30 L/Fe., reduction rate was 5.07% only. Regarding evaluation of three application methods (hand sowing, under plant stack and piles on plastic pieces) for metaldehyde and methiocarb, under field condition. Results revealed that percent reduction of metaldehyde and methiocarb (as ready made bait) were markedly increased when, applied as hand sowing as compared when they used as piels on plastic under plant stacked.

### INTRODUCTION

Land snails are consider one of the most economic and serious pests in Egypt. The snails cause great damage to numerous field crops, vegetables, fruits and ornamental plants. (Kassab and Daoud, 1964, El- Okda, 1981, Ghamry et al 1993 and Ismail 1997). Recently, many attempts to evaluate the molluscicidal activity of various chemicals with different methods were carried out against land snails under laboratory and field conditions. (Aioub *et al.*, 2000, Ghamry *et al.*, 2000, Lokma, 2007 and Ismail *et al.*, 2010). For example, the metaldehyde highly efficacy than copper hydroxide, methomyl and diazinon against *Monacha cartusiana*. The poisonous baits of methomyl were more effectiveness than spray technique, poisonous baits were put as piles on plastic pieces was the best technique to reduce numbers of *M. cartusiana* snails in Egyptian clover fields. Ismail *et al.* (2014). The present work was directed to evaluate the efficiency of emulsion of Diesel oil against eggs under laboratory conditions and field conditions. Moreover, and evaluated metaldehyde and methiocarb at three different application methods i.e. hand sowing, under plant stack and put on plastic pieces.

## MATERIALS AND METHODS

### 1. laboratory experiment.

#### 1.2. Effect of local surfactants Diesel oil emulsion on the egg hatching of *M. cartusiana*.

Adult snails of *M. cartusiana*, were collected from a field cultivated with Egyptian clover and highly infested then transferred directly to the laboratory. Collected snails were placed in small rounded plastic boxes 10 cm diameter, filled with moist clay soil 7 cm depth and were closed with musline cloth to prevent snails from escaping (Baker and Hawake (1990). Three application rates of Diesel oil were prepared at three application rates as follows 10, 20 and 30 L/Feddan, respectively and mixed appropriate volume with irrigation water. Twenty newly deposited eggs were put in a small hole in soil and irrigated with water mixed with Diesel oil. Five replicates were prepared for every application rate and control. Boxes were examined daily and hatchlings were recorded until three weeks post-treatment.

### 2. Field experiments.

#### 3.1 Effect of Diesel oil emulsion on the land snail *Monacha cartusiana* infesting Egyptian clover under field conditions.

Diesel oil emulsion was tested against *M. cartusiana* snail in Egyptian clover field at EL-Nakhas village, Zagazig district, Sharkia Governorate, during the growing season of, 2010/ 2011. The experimental area was about two feddans. The area of study was divided into two plots of 175 m<sup>2</sup>. The first plot of Egyptian clover was treated with diesel oil emulsion added during irrigation as a recommended dose 30 L/feddan. The second area was left without treatment as check. Five samples of 50 × 50 cm<sup>2</sup> were randomly checked in each plot before and after 1,3,7 and 14 days post treatment and number of alive snails were recorded. Percent reduction of snails were calculated according to the formula given by Henderson and Tilton (1955).

#### 3.2. Evaluate different application methods of metaldehyde and methiocarb (as ready made baits) in controlling *M. cartusiana* under field condition.

The goal of this study was to evaluate the best application technique of two molluscicides used in controlling land snails, in potato field highly infested with *M. cartusiana* was chosen in EL-Nakhas village, Zagazig district, Sharkia Governorate during mid April 2011. Metaldehyde and methiocarb were applied by three different techniques method i.e. hand sowing, piles put on plastic pieces and under plant stack (Takbeesh which means put small clumped quantity). The tested compounds were applied as

follows: metaldehyde (2 g/m<sup>2</sup>) and methiocarb (4 g/m<sup>2</sup>) with a recommended rate, metaldehyde (2 Kg/Fed.) and methiocarb (4 Kg/Fed.). Three replicates each of 1m<sup>2</sup> were randomly chosen for each treatment and compound including control treatment. Number of alive snails were counted in 50 × 50 cm<sup>2</sup> one day before and after 1,3,7 and 14 days post application. Examination was accomplished for two weeks post application. Percent reductions were calculated according to the formula giving by of Henderson and Tilton (1955).

## RESULTS AND DISCUSSION

### 1.laboratory experiment.

#### .1.2 Effect of surfactants Diesel oil emulsion against snail, *M. cartusiana*.

Diesel oil was tested at rates of 10,20 and 30 L/Fed. against eggs of land snail *Monacha cartusiana* under laboratory conditions. Results in Table (1) show that diesel oil emulsion gave completely inhibition of *M. cartusiana* eggs where the mean percent mortality was 100 % for three application rates, respectively. It noticed that after thirteen days eggs becomes dark gray in treatments, and not hatched. The obtained results agree to certain extent with those reported by Ghamry *et al.* (2000) who evaluated four surfactants namely, solar oil emulsion, Nonoditte 20 (1: 05%), Nonoditte 40, 80 and Ethanol amine, tested either against eggs, juvenile or adults of *M. cartusiana* under Laboratory condition. Solar oil emulsion gave the highest ovicidal activity followed by Ethanolamine, Nonoditte 40 and Nonoditte 80. No effect on adult snails was observed with these surfactants.

Table 1. Effect of surfactants material (Diesel oil emulsion) on *M. cartusiana* eggs under laboratory conditions.

Application rate L/Fe.	Variable	Hatchability and mortality of embryos percentages / week		Hatching Inhibition %
		First week	Second week	
10	Hatchability	0	0	100
	Inhibitions	100	100	
20	Hatchability	0	0	100
	Inhibitions	100	100	
30	Hatchability	0	0	100
	Inhibitions	100	100	

## 2. Field experiments.

### 2.1. Effect of diesel oil emulsion on land snail *Monacha cartusiana*.

Diesel oil was tested in Egyptian clover field infested with *M. cartusiana* at Nakhas village, Zagazig district during April, 2011. Diesel oil emulsion was added in irrigation water with application rate 30 L/Fe. as the recommended rate of 30 L / feddan. Data in Table (2) show that initial effect was 14.6% reduction and as the time elapsed, reduction percentages were decreased since, the residual mean of the effect was 1.12%. Regarding general mean of the tested oil emulsion, it gave weak effect on land snail adults of *M. cartusiana* under field condition when added in irrigation water. The literature reports in this field is very lack. The obtained results agree to certain extent with those reported by Ghamry *et al.* (2000) who evaluated four surfactants namely, solar oil emulsion, Nonoditte 20 (1:05%), Nonoditte 40, 80 and Ethanol amine, tested either against eggs, juvenile or adults of *M. cartusiana* under Laboratory condition. Solar oil emulsion gave the highest ovicidal activity followed by Ethanolamine, Nonoditte 40 and Nonoditte 80. No effect on adult snails was observed with these surfactants.

Table 2. Effect of surfactant (diesel oil emulsion) against snails of *M. cartusiana* under field conditions.

Surfactant	Reduction /day %		Mean of the initial effect %	Reduction /day %		Mean of the residual effect %	General Mean
	1	3		7	14		
Diesel oil emulsion	14.61	3.44	9.02	2.25	0	1.12	5.07

### 3.2. Evaluation of different technique of metaldehyde and methiocarb (as ready made baits) in controlling *M. cartusiana* under field conditions:

In this experiment metaldehyde and methiocarb were applied at three application methods hand sowing, under plant in stack and piles on plastic pisces. Data in Table (3) revealed that when metaldehyde and methiocarb were applied at different application rate technique, reduction percentages were differed from method to another. It noticed that reduction percentages for metaldehyde were 40.61, 26.75 and 30.43 while the parallel values for methiocarb were 34.89, 27.23 and 17.09 % for hand

sowing, under plant stack and piles on plastic pieces, respectively. Since the initial effect of applications, effect of the lowest one when the compounds were used on plastic pieces (30.43 %) and under plant in stack (17.09%) for methiocarb and metaldehyde, respectively. Regarding residual effect it reached 41.85, 33.34 and 35.46% for metaldehyde and 30.49, 22.07 and 26.34% for methiocarb respectively.

On the other hand, the moderate of the reduction percentages was obtained when a compound applied under plant in stack with values (26.75% and 27.23%) and residual effect (33.35% and 22.07%) of metaldehyde and methiocarb respectively. On contrary, the mean of initial effect increased when the compounds applied with hand sowing (40.61% and 34.89%) and the residual effect reduction were (41.85% and 32.49%) for metaldehyde and methiocarb, respectively.

Regarding general means for the three (hand sowing, under plant in stack and on plastic Pisces) tested of the technique application for metaldehyde and methiocarb were (41.23%, 32.69%), (30.04%, 24.70%) and (32.94%, 21.71%) respectively. It could be concluded that the reduction percentages increased when compounds were applied at the hand sowing methods.

Table 3. Reduction percent in of *M. cartusiana* infesting potatos field as influenced by different application methods of metaldehyde and mesourol.

Compounds	Technique of application	Reduction /days %		Mean of the initial effect %	Reduction /days %		Mean of the residual effect %	General mean
		1	3		7	14		
Metaldehyde	hand sowing	52.40	28.83	40.61	31.75	51.96	41.85	41.23
	Under plant stack	22.17	31.33	26.75	38.73	27.95	33.34	30.04
	On plastic pieces	29.40	31.47	30.43	29.47	41.46	35.46	32.94
Methiocarb	hand sowing	36.94	32.85	34.89	23.82	37.16	30.49	32.69
	Under plant in stack	24.12	30.35	27.23	21.45	22.69	22.07	24.70
	On plastic pieces	15.04	19.14	17.09	24.72	27.97	26.34	21.71

These results are in a harmony with those reported by many authors, who applied these compounds against gastropod pests. Barker *et al.* (1991) showed that a commercial product of bait formulation, with 1.87 metaldehyde by weight concentrated to 9% in the edible outer coating and applied at 130-260 baits m<sup>2</sup> (10 -20 kg ha<sup>-1</sup>), was effective against a range of gastropod species in various crop situations. Moreover, Ghamry *et al.* (1993) tested five molluscicidal baits against land snail species, under field conditions at Sharkia Governorate. Results revealed that metaldehyde compound was the most effective one followed by methiocarb, thiocarb, cyanophose and monocrotophos. However, Frank and Friedli (1998) revealed that application of metaldehyde in a 50 cm wide band against *Arion lusitanicus* and *Deroceras reticulatum* has been shown to be practicable and efficient in protecting rape from seven slug damage near to wild flower strips. On the other hand, Lokma (2007) evaluated metaldehyde against *M. cartusiana* under field condition applied at three rates i.e., 0.43, 0.50 and 0.62 gm /m<sup>2</sup>, the reduction percentages increased by increasing application rate. Since, general means of percent reduction at the three tested rates were 32.24, 43.64 and 51.54% respectively. Finally, Ismail *et al.* (2009) revealed that metaldehyde recorded highly efficacy than other pesticides (copper hydroxide, methomyl and diazinon). High mortality percentage (100%) was obtained after 7 days at concentration 2% under laboratory conditions, while under field conditions, methomyl induced a higher effect on the population. Finally, Ismail *et al.* (2014) evaluated of two application methods commonly used in controlling land snail *M. cartusiana* spray and poisonous baits. Results indicated that poisonous baits of methomyl were more effectiveness than spray technique, Poisonous baits put as piles on plastic pieces was the best technique to reduce numbers of *M. cartusiana* snails in Egyptian clover fields.

## REFERENCES

1. Aioub, A. A., Ismail, Sh. A. and Mohamadein, Amal, A. 2000. Toxicological and histological studies on some pesticides treated land snails. Proc. of the First International Conference on Biological Science., Fac. of Science, Tanta Univ., 1 (2): 19 – 38.
2. Baker, G. H. and Hawke, B. G. 1990. Life history and population dynamic of *Theba pisana* (Mollusca: Helicidae), in a cereal- pasture rotation J. Appl. Ecol., 27: 16 – 29.

3. Barker, G. M., Pottinger, R. P., Lloyd, J.M., Addison, P. J., Firth, A. C. and Stewart, A. P. 1991. A novel baits formulation for slug and snail control. Proceedings of the New Zealand Weed and Pest Control Conference 44, 195 - 200.
4. El-Okda, M. M. K. 1981. Response of two land molluscs to certain insecticides. Bull. Ent. Soc. Egypt. Econ. Ser., 12, 53-57 .
5. Frank, T. and Friedli, J. 1998. Reduced applications of metaldehyde pellets for reliable control of the slug pests *Arion lusitanicus* and *Deroceras reticulatum* in oil seed rape adjacent to sown wild flower strips. J. Appl. Ecol., 35: 504 – 513.
6. Ghamry, E. M., El-Deeb, H. I. and Abd El-All, S. M. 1993. Efficacy of certain pesticides against some land snails under field conditions of Sharkia Governorate. Egypt. J. Appl. Sci., 8 (6): 764 – 774.
7. Ghamry, E. M., El- Masry, S. A. A, Ismail, Sh. A. A. and Khattab, M. M. 2000. Effect of certain local surfactants on the land snail *Monacha cartusiana* (Mollusca, Helicidae). Egypt. S. Appl. Sci., 15 (8) 239- 245.
8. Henderson, G. F. and Tillton, E.W. 1955. Test with acaricides against the brown wheat mite. J. Econ. Entomol., 48: 157- 161.
9. Ismail, Sh. A. A. 1997. Ecology, biology and control of certain terrestrial snails infesting some vegetable and field crops in Sharkia Governorate. Ph.D. Thesis, Fac. Agric., Zagazig Univ., 130 pp.
10. Ismail, Sh. A. A. 2009. Effect of bait colour, carrier and attractive materials on the efficiency of methomyl against two land snail species under field conditions. Al-Azhar J. Agric. Sci. Res., 6: pp 245-254.
11. Ismail, SH. A.A, Shetaia, S.Z.S. and Abdel kader Samah, M. 2010. Effect of neem extract, neemazal T.S. on two land snail species under laboratory conditions. J. Plant Port. and Path., Mansoura Univ., 1 (10):799- 806.
12. Ismail, SH. A.A, Shetaia, S.Z.S. and Arafa, A.A.I and Khattab, M. M. 2014. Field trials on the bait attractive distances and evaluation the efficacy of methomyl using different control application methods against the gastropod pest *Monacha cartusiana* (Muller) infesting clover field. J. Plant Port. and Path., Mansoura Univ., 5 (6):497- 503.
13. Kassab, A. and Daoud, H. 1964. Notes on the biology and control of land snails of economic importance in the U.A.R. Agric. Res. Rev., 42: 77–98.
14. Lokma, M. H. E. 2007. Studies on some terrestrial gastropods injurious to field crops at Sharkia Governorate. M. Sc. Thesis, Fac. Agric, Zagazig Univ., 147pp.

## دراسات مكافحة على قوقع البرسيم الزجاجي (*Monacha cartusiana*) تحت الظروف المعملية والحقلية

شحاته أحمد على إسماعيل<sup>١</sup>، جاد حمادة حسن راضي<sup>٢</sup>،  
أحمد عبد الوهاب عبد الجواد<sup>٢</sup>، محمد حسن عصام لقمة<sup>١</sup>

- ١- معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - حيزه.  
٢- قسم وقاية النبات - كلية الزراعة بمشتهر - جامعة بنها.

تم إجراء الدراسات المعملية لتقييم تأثير الكيروسين على كفاءة فقس بيض قوقع البرسيم الزجاجي (*Monacha cartusiana*) عند استخدام بثلاث معدلات تطبيق ١٠ و ٢٠ و ٣٠ لترا فدان. أوضحت النتائج عدم فقس البيض عند استخدام مركب الكيروسين بالمعدلات الثلاثة. وعند إضافة الكيروسين تحت الظروف الحقلية لمكافحة قوقع البرسيم الزجاجي في محصول البرسيم بمعدل ٣٠ لتر/ فدان كانت نسب الخفض ٥.٠٧% فقط. ومن ناحية أخرى عند استخدام الميتالدهيد والميزارول بثلاث طرق تطبيق مختلفة وهي نثرا وأسفل النباتات وعلي مشمع بلاستيك تحت الظروف الحقلية أتضح أن نسب الخفض للميتالدهيد والمثيوكارب ( كطعوم جاهزة) ازدادت عند استخدام طريقة النثر مقارنة باستخدام طريقة وضع المركبين تحت النباتات أو علي قطع مشمع بلاستيك. لذا يتم التوصية باستخدام السولار لتأثيره علي بيض القواقع في موسم وضع البيض واستخدام طريقة النثر في الحقل للطعوم الجاهزة عند مكافحة قوقع البرسيم الزجاجي حقليا.