

TIME OF APPLICATION AS MAIN FACTOR AFFECTING THE EFFICACY OF CERTAIN PESTICIDES AGAINST LAND SNAIL *Monacha cartusiana* (Muller) UNDER FILED CONDITIONS AT SHARKIA GOVERNORATE

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ABSTRACT

Effect of timing application of three pesticides belonging to carbamate group (oxamyl and methomyl) and organophosphorous group (dimethoate) were evaluated against *Monacha cartusiana* (Muller) snails under field conditions during three different seasons (Autumn, winter and spring). Results revealed that the molluscicidal activity of the two tested pesticides oxamyl and methomyl fluctuated from season to another. Autumn and spring seasons exhibited the highest molluscicidal activity against *M. cartusiana*, while dimethoate noticed the lowest one. On contrary, winter season exhibited the lowest molluscicidal activity for the two tested pesticides (oxamyl and methomyl) comparing with the other two seasons (autumn and spring) while dimethoate gave the lowest one. It could be recommended that control of these snails pests must be carried out during autumn season where few number of snails were found in the begging of the breeding season. It could not wait to spring season where the numbers of snails reach its maximum values.

INTRODUCTION

Molluscs have been largely neglected in the pest control literature, and yet gastropod molluscs species currently constitute some of the most significant and intractable threats to sustainable agriculture, instances of crop losses from herbivorous gastropods have been reported throughout recorded history. The increased pest status has been associated with cultivation of new crops, intensification of agricultural production systems and the spread through human trade and travel of species adapted to these modifies environments. Furthermore, in some crops, the significance of gastropods is only now becoming apparent with the declined in the importance of other pest groups, such as insects, for which effective control strategies have been developed (Barker, 2002).

Most pesticides are applied in spray, dust or granular formulations but only occasionally as baits, in contrast, molluscicides direct against terrestrial gastropods are only occasionally delivered as sprays or dusts but are more usually in baits. For this reasons, application technology is lately concerned with the composition of baits and how, where and when to apply then (Barker *et al*, 1991)

In Egypt, land molluscs could be considered as dangerous crop pests and cause considerable damage especially in moist areas where they find optimum conditions for rapid multiplication (Kassab and Daoud 1964 and El-Okda, 1980). Many investigators evaluated many insecticides or biocides against certain land snails under laboratory or filed conditions to find out the

suitable molluscicide for control these pests (Mohamed, 1994, Ghamry, 1997, Mahrous *et al.* 2002, Hegabe 2003, Shetaia, 2005, Ismail *et al* 2010 and Farage, 2012)

The present study aim to study the molluscicidal activity certain pesticides against *M. cartusiana* (Muller)snails during different seasons (autumn, winter and spring) under field conditions at Sharkia Governorate

MATERIALS AND METHODS

1- Pesticides used: Three pesticides namely: Vydate 24% EC (oxamyl), Nudrin 90 % SP (methomyl) and Rogor L 40% E.C (dimethoate) were tested against *M. cartusiana* (Muller) under filed conditions. The tested pesticides were obtained from the central laboratory for pesticides, agricultural research center, dokki, Giza. Egypt.

2- Field experiments: Three field trials were chosen and cultivated with Egyptian clover and heavy infested with *M. cartusiana* snails at Hwhia El-Bald Hehia district, Sharkia Govdornorate. The field trials were conducted during three seasons i.e Autumn (November 2014), Winter (February 2015) and spring (May 2015).

The tested pesticides were applied as poisonous baits at 5 % from the recommended rates. Poison baits were prepared as follow: 5 parts pesticides + 5parts sugarcane syrup, then mixed with 90 parts of bran (El-Okda, 1981). Control treatment was designed by the same manner without pesticides. About 100 gm poison baits were put on plastic pieces after irrigation Egyptian clover field before sunset. Each treatment was replicated 4 times. Alive snails were recorded in check and treatments areas before application and after 1, 3, 7, 14 and 21 days until the end of experiment (21days). Reduction percentages were calculated according to the formula of Henderson and Tilton (1995).

RESULTS AND DISCUSSION

Efficacy of three pesticides was determined against *M. cartusiana* snails as poison baits under field conditions during three seasons (autumn, winter and spring).

1- On autumn season:

Data tabulated in Table (1) showed reduction percentages of the three pesticides on *M. cartusiana* snails under filed conditions. Results revealed that percentages of snails reduction after the first three days of treatment were 73.1, 75.7 and 3.7 % for oxamyl, methomyl and dimethoat respectively. The residual effects of these pesticides were 76.9, 55.1 and 12.6% reduction, consequently with averages of 75.0, 65.1 and 8.1 % reduction, respectively. Generally, oxamyl revealed high residual effect and general mean while Dimethoate exhibited the lowest one.

Table (1): Reduction percentages of certain pesticides against land snail *M. cartusiana* snails during autumn seasons (November) in Egyptian clover field at Sharkia Governorate.

pesticides	Reduction percentage after indicated days							General mean
	Initial killing %			Residual killing %				
	1	3	mean	7	14	21	mean	
Vydate (oxamyl)	67.3	78.8	73.1	82.3	72.7	75.7	76.9	75.0
Neodrin(Methomyl)	72.7	77.7	75.2	57.3	55.7	52.3	55.1	65.1
Roger L (dimethoate)	2.5	5	3.7	7.5	12.5	17.8	12.6	8.1

2- On winter season:

Data in Table (2) showed reduction percentages of the three tested pesticides on *M. cartusiana* under field conditions. Results revealed that the initial effect of the three tested pesticides were 36.5, 32.5 and 2.5 % reduction for oxamyl, methomyl and dimethoate, respectively. The residual effects of these pesticides were: 41.3, 34.5 and 8.9% reduction, respectively. Regarding general mean, reduction percentages were: 38.9, 33.5 and 5.7% reduction for oxamyl, methomyl and dimethoate, respectively.

Table (2): Reduction percentages of certain pesticides against land snail *M. cartusiana* during winter (February) in Egyptian clover field at Sharkia Governorate

pesticides	Reduction percentage after indicated days							General mean
	Initial killing %			Residual killing %				
	1	3	mean	7	14	21	mean	
Vydate (oxamyl)	33.6	39.5	36.5	36.3	40.2	47.3	41.3	38.9
Neodrin(Methomyl)	25.8	39.3	32.5	39.3	36.7	27.5	34.5	33.5
Roger L(dimethoate)	0	5	2.5	5.5	8.7	12.5	8.9	5.7

3- On spring season:

Reduction percentages of the three tested pesticides against *M. cartusiana* were tabulated in Table (3). Data revealed that the initial effects during the three first days were: 88.8, 69.9 and 1.25% reduction for oxamyl, methomyl and dimethoate, respectively. residual effect during the rest period were 73.4, 59.6 and 7.5% resuction for three tested pesticides, respectively. General mean reduction percentages in spring season were: 81.1, 64.7 and 4.4% reduction for oxamyl, methomyl and dimethoate, respectively.

Table (3): Reduction percentage of certain pesticides against land snail *M. cartusiana* during spring seasons (May) in Egyptian clover field at Sharkia Governorate

pesticides	Reduction percentage after indicated days							General mean
	Initial killing %			Residual killing %				
	1	3	mean	7	14	21	mean	
Vydat (oxayml)	81.1	96.6	88.8	77.8	71.2	71.3	73.4	81.1
Neodrin(Methomyl)	67.2	72.7	69.9	70.7	55.6	52.6	59.6	64.7
Roger L(dimethoate)	0	2.5	1.25	5.8	7.7	9.8	7.5	4.4

Interpretation, the effect of the three tested pesticides during different seasons (autmn, winter and spring) revealed that the molluscicidal activity of

these pesticides (oxamyl, methomyl and dimethoate) were fluctuated from season to another where noticed that reduction percentages for oxamyl were 75.0, 38.9 and 81.1% during autumn, winter and spring, respectively

It was obviously that the molluscicidal activity of the tested pesticides differed from season to another where noticed gave high reduction percentages during autumn and spring seasons while the lowest one was noticed during winter season this may be attributed to non suitable environmental condition during winter season, it was necessary mentioned that the population densities of land snail, *M. cartusiana* were noticed few numbers during autumn season and take place to increase until it reach its peaks during spring season (Ismail, 1997). For this reasons, control methods in the beginning of the breeding season gave good control of these pests and reduce damage caused by these pest during winter and autumn seasons, which caused by the time elapsed.

It has gradually become clear through practical experience that the effectiveness of molluscicides formulated as spray dusting powder or bait greatly influenced by weather and soil conditions and also by the behavior of the slugs and snails. In the damp months, winter and spring, increase in numbers and thus also of damage reach a peak, so that detecting the animals in the field presents no difficulties, there are, however, other factors which are dependent on the humidity of the environment and which affect the sensitivity of the gastropods to molluscicides (Godan, 1983)

The difference in toxicity of the tested pesticides against snails could be explained on the basis of their chemical structure and the environmental conditions. The relationship between the chemical structure and the toxicity, show that among carbamate insecticides, thiodicarb which is a dimer of the well known insecticide, methomyl containing N. methyl group with an additional carbamyl moiety had the highest molluscicidal activity. (Radwan *et.al*, 1992)

On contrast, Aioub *et al*, (2000) revealed that carbamate compounds appeared to the most highly toxic while organophosphorous was the least toxicants under laboratory conditions. Moreover, tested oxamyl and methomyl against *Eobonia vermiculata* and *M cartusiana* under field conditions. Results revealed that methomyl induced a higher affect on the population reduction than oxamyl during spring seasons.

Ismail and Mohamed (2009) revealed that abamectin degraded more rapidly than methomyl and metaldehyde when tested against *M. cartusiana* under laboratory conditions.

Finally, Samy *et al*, (2015) reported that Neomyl was the most potent compound in reducing the population density of *Monacha* spp in lettuce and cabbage fields followed by Agree, Protecto, Voliam flexi, Dipel 2X.

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**تأثير توقيت المعاملة كعامل مؤثر علي كفاءة بعض مبيدات الافات ضد قوقع مونا
كارتوسيانا تحت الظروف الحقلية بمحافظة الشرقية
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اجريت هذه الدراسة حقليا بهدف تقييم فاعلية بعض مبيدات الافات (الاوكساميل-ميثوميل) التابعة لمجموعة مركبات الكارباميت وكذلك مبيد الدايمثويت التابع لمجموعة مركبات الفوسفور العضوية ضد قوقع موناكا كارتوسيانا في فصول مختلفة من السنة (الخريف-الشتاء-الربيع) اوضحت النتائج ان المبيدات التابعة لمجموعة الكارباميت كانت الاعلي فاعلية (الاوكساميل والميثوميل) بينما كان الدايمثويت التابع لمجموعة الفوسفور العضوية هو الاقل فاعلية وذلك خلال الفصول الثلاثة التي تم اختيارها (الخريف-الشتاء-الربيع) من الجدير بالذكر ان فاعلية المبيدات عموما كانت اعلي كفاءة عند التطبيق خلال فصلي الخريف والربيع بينما كانت اقل كفاءة عند تطبيقها في فصل الشتاء. عموما يمكن اجراء عملية المكافحة في فصل الخريف وعند بداية موسم التكاثر حيث تكون الاعداد قليلة وبالتالي تقل التكاليف وعدم الانتظار لحين فصل الربيع حيث تزداد الاعداد بصورة واضحة وتزداد خسائرها وبالتالي تزداد تكاليف المكافحة الكيماوية.