

.PERSISTENCE OF POISON BAITS OF SOME PESTICIDES COMMONLY USED IN LAND SNAILS CONTORL

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ABSTRACT

The efficacy of three known pesticides (methomyl 20% SL, methiocarb 2% GR and metaldehyde 5% GR) was evaluated as poison baits against adults of *Monacha cartusiana* under laboratory and field conditions. The effect of time elapsed between preparation of poison baits and their offering to snails on the efficacy of these baits was also studied. Under laboratory conditions, results revealed that metaldehyde baits was the most effective while baits of methomyl were the lowest one and the poison baits of methiocarb occupied an intermediate position. Regarding the effect of time passing between preparation of baits and their use against snails, it was found that mortality percentages were decreased as the time passed. Results under field conditions cleared that methomyl and metaldehyde were more degraded rapidly by time passing while methiocarb was more stable.

INTRODUCTION

Molluscs have been largely neglected within pest-control literature, and yet gastropod molluscs species currently constants some of the most significant and intractable threats to sustainable agriculture. However, the 20th century witnessed the emergence of gastropods as important crop pests in temperate and tropical regions (Barker, 2002). The increased pest status has been associated with cultivation of new crops, intensification of agricultural production system, and the spread through human trade and trend of species adapted to these modified environments. Furthermore, in some crops, the significance of gastropods is only now becoming apparent with the decline in the importance of other pest groups, such as insect, for which effective control strategies have been developed (Baker and Vogelzong, 1988 and Barker, 2002). Recently, terrestrial snails have increased rapidly in all crops causing economic damage in the field crops, vegetables as well as horticultural crops. In Egypt, land molluscs have been increased and distributed rapidly in most Governorates. They caused considerable damage especially in most areas where they found suitable conditions for survival and dispersion (Kassab and Daoud 1964 and EL-Okda, 1981). In Sharkia Governorate, land snails are considered one of the dangerous crop pests causing severe damage especially in vegetables and field crops (Ghamry *et al.* 1993, Ismail, 1997 and EL-Massry, 1997). The present study is planned to investigate the effect of time elapsed between preparation of poison baits and their using on the molluscicidal activity of

certain pesticides against *Monacha cartusiana* as which the main pest of Egyptian clover under laboratory and field conditions.

MATERIALS AND METHODS

Pesticides Used:

a- Methomyl (Neomyl 20 % S.L.) (insecticide) was used with the recommended application rates 1 L. /feddan . Poison baits of methomyl were prepared by mixing 5 ml methomyl + 5 ml sugar can syrup and 90 gm wheat bran to give 100 parts from poison bait. Methiocarb 2% RB as a ready baits was used with the recommended application rates of 2 Kg / feddan . Metaldehyde 5% GR as ready baits was used with the recommended application rates of 2 Kg / feddan.

The tested pesticide samples were the formulated products supplied by the central pesticides laboratory, Agricultural Research Center. Methomyl baits were prepared one time in the same day of conducting the experiment. On the other hand. methiocarb and metaldehyde were conducted as fresh ready baits.

1- Laboratory experiments:

Laboratory experiments were conducted to study the molluscicidal activity of certain pesticides against *M cartusiana* snails .The effect of elapsed time between preparation of poison baits and their offering to snails on the molluscicidal activity was determined also.

An amounts (25gm) of each poison baits were spread directly at zero time into the glass cages of treatment. Control cage were treated with bran bait free from any pesticides .Ten adult snails were introduced into each cage. Four replicates were used for each pesticide as well as for the control. Other experiments were conducted later after one and two weeks using the same procedures and the same poison baits which were prepared before. The cages were tightly covered with muslin cloth and secured with rubber bands to prevent snails to eat the baits. Mortality percentages were recorded 1, 3, 7, 14, 21 and 28 days post treatments. Observation of mortality entailed using stainless steel needle according to EL-Okda (1980). Dead snails were removed after testing and mortality percentages were calculated for all treatments during the experimental period. .Percent reduction of snails were calculated according to Abbott formula (1925).

2-Field Experiments:

Under field conditions the three tested pesticides were applied in a field cultivated with Egyptian clover highly invested with *M. cartusiana* at Hehia EL-balad, Hehia county Sharkia governorate, by using the recommended rates as poisonous baits. Each pesticide was spread directly into 15 plastic cages under the plants. Five cages from all pesticides were offered to the snails directly at zero time and 10 cages were covered with muslin cloth under the plants to offer after one and two weeks. Mortality percentages were recorded 1, 3, 7, 14, and 21 days post treatments. Reduction percentages of snails were calculated according to the formula of Handerson and Tilton (1955). Tabulated data were statistically analyzed to obtain L.S.D by Duncan (1955) program.

RESULTS AND DISCUSSION

1-Laboratory experiments

Data concerning the effect of time elapsed between preparation of poison baits and their offering to snails on the molluscicidal activity of methomyl ,methiocarb and metaldehyde against *M. cartusiana* under laboratory conditions (Table1). Results showed that cumulative mortality percentages for all tested pesticides increased gradually by increasing the exposure period for all treatments. Methomyl bait exhibited a rapid degradation and the mortality percentages were increased after 14 days of exposure to reach 60%, 14% and 6.67 % when the baits offered directly, one week and two weeks, respectively.

Table (1):Effect of time elapsed between preparation of certain pesticides as poison baits and their offering to snails on their efficacy against *M. cartusiana* snails under laboratory conditions.

Tested pesticides	Tret	Cumulative mortality percentages after indicated day					
		1	3	7	14	21	28
Methomyl	A	20a	41.67a	56.67a	60a	60a	60a
	B	8b	10b	12b	14b	14b	14b
	C	2c	6.67c	6.67c	6.67c	6.67c	6.67c
	LSD	1.99	1.15	1.15	1.63	1.63	1.63
Methiocarb	A	3.33a	26.67a	26.67b	26.67c	39.67a	39.67a
	B	2.67b	20b	30a	30b	33.33b	33.33b
	C	1c	20b	30a	33.33a	33.33b	33.33b
	LSD	0.57	1.63	1.63	1.15	0.02	0.02
Metaldehyde	A	5.33a	10c	26.67c	43.33a	49.67a	65a
	B	3.33b	16.67b	32.67b	36.67b	45.33b	45.33b
	C	2c	33.33a	36.67a	36.67b	41.67c	41.67c
	LSD	1.15	1.15	0.02	0.02	0.02	1.15

A= Poison baits offered in the same day of preparation (zero time)

B= Poison baits offered after one week of preparation.

C= Poison baits offered after two weeks of preparation.

.Values in column followed by the same letters are not significantly different ($P < 0.05$) according to Duncan's Multiple-range test.

Regarding methiocarb baits, mortality percentages were decreased after 21 days of the exposure to reach 39.67% for the fresh baits to 33.33 and 33.33 % for baits offered one and two weeks, respectively. Data also revealed that the tested baits of metaldehyde gave high molluscicidal effect against *M. cartusiana* recording the highest mortality percentages of 65%, 45.33% and 41.67 % after 28 days for the three tested times, respectively.

2- Filed experiments

The effect of time elapsed between preparation of poison baits of the three tested pesticides and their offering to snails and their efficacy against *M. cartusiana* under field conditions is presented in Table (2). Data show that

all the tested pesticides revealed obvious molluscicidal action; reduction percentages after 3 days (initial effect) ranged between 63.87% - 71.69%; 42.09% - 65.43% and 24.29% - 57.12% when the baits were offered to the snails at zero time, one and two weeks, respectively. The bioactivity was decreased gradually up to 21 days with a range of 49.75% – 60.39%, 36.04% – 58.02% and 7.4% – 49.59% at zero time, one and two weeks, respectively.

Data also revealed that methiocarb gave high reduction in snails population comparing with the other two tested pesticides indicating 67.63%, 62.67% and 53.73 % reduction as general mean during the three tested times, respectively.

Table (2): Effect of time elapsed between preparation of poison baits and their offering to snails on their efficacy against *M. cartusiana* snail under field conditions.

Pesticides	Treatments	% Reduction percentages at indicated days after treatments							General mean
		1	3	Initial effect	7	14	21	Residual effect	
Neom eal	A	70.97a	62.87a	66.92a	56.50a	52.60a	49.75a	52.95a	59.93
	B	51.86b	50.57b	51.21b	44.30b	39.95b	36.40b	40.21b	45.71
	C	25.48c	23.11c	24.29c	18.12c	12.23c	7.4c	12.58c	12.76
	LS D	1.04	0.09	11.09	0.51	0.37	0.13	8.62	
Mesa rol	A	72.06a	71.33a	71.69a	66.49a	62.23a	60.39a	63.03a	67.36
	B	66.47b	64.39b	65.43b	62.30b	59.42b	58.02b	59.91a	62.67
	C	59.26c	54.99c	57.12c	51.15c	50.33c	49.59c	50.35b	53.73
	LS D	0.80	0.80	6.26	0.31	0.01	0.01	4.48	
Metarol	A	64.72a	63.06a	63.87a	57.41a	54.37a	51.43a	54.40a	59.13
	B	42.47b	41.72b	42.09b	38.84b	36.06b	39.60b	36.50b	39.29
	C	33.15c	28.85c	31.00c	24.76c	25.62c	20.19c	23.52c	27.26
	LSD	0.65	0.13	6.08	0.89	0.01	0.06	5.27	

A= Poison baits offered directly (at zero time) after preparation.

B= Poison baits offered after one week of preparation.

C= Poison baits offered after two weeks of preparation

.Values in column followed by the same letters are not significantly different (P < 0.05) according to Duncan's Multiple-range test.

The forgoing results are in harmony with those obtained by Hammond *et al* (1996) reported that the efficacy of pesticide depend on numerous factors including the validity of pesticide samples which can led to poor performance resulting in the need for additional application representing a further cost to the grower and environment. Chabert (1996) found that a commercial 5 % metaldehyde bait formulation caused 90% mortality during the first 6 days , but caused only 13 % mortality during the third 6 days period. In comparison, a commercial 4% methiocarb bait (a carbamate compound) caused low mortality for the first and second 6 day periods (68 and 34%), respectively. Aioub *et al* (2000) reported that some of carbamate compounds exhibited highly toxic effect against *M. cartusiana* snails with laboratory tests. Daoud (2004) reported that Vertemic and Neomyl induced a high toxic against *E. vermiculata* snails under laboratory conditions. Ismail *et*

al (2005) mentioned that methomyl showed the highest residual effect against *M. cartusiana* snails under field conditions. Ismail and Hegab (2006) demonstrated that abamectin and methomyl were highly effective against *E. vermiculata* snails under laboratory and field conditions. Ismail and Mohamed (2009) assured that metaldehyde was the most effective while abamectin was the lowest one against *M. cartusiana* snail under laboratory condition. It is necessary to mention that abamectin degraded more rapidly than metaldehyde and methomyl. 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 and Dipel 2X.

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ثبات الطعوم السامة لبعض مبيدات الآفات الشائعة الاستخدام في مكافحة القواقع الأرضية

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في هذا البحث تم دراسة تأثير الطعم السام لثلاثة من المبيدات الشائعة الاستخدام في مكافحة الآفات الزراعية وهي الميثوميل الميثوكارب والميتالدهيد علي قوقع البرسيم الزجاجي موناكا كارتوسيانا تحت الظروف المعملية والحقلية .

معمليا أوضحت النتائج ان مركب الميتالدهيد كان أعلاها فاعلية بينما كان مركب الميثوكارب هو اقلهم فاعلية كما تم دراسة تأثير الوقت المنقضي من بداية إعداد الطعم السام وحتى تقديمه للقواقع علي الكفاءة الإبادية لهذه المركبات علي النحو التالي:

المعاملة الأولى تم وضع الأفراد علي الطعم السام في نفس يوم تجهيز الطعم

المعاملة الثانية تم وضع الأفراد علي الطعم السام بعد أسبوع من تجهيز الطعم

المعاملة الثالثة تم وضع الأفراد علي الطعم السام بعد أسبوعين من تجهيز الطعم

أظهرت النتائج المعملية أن كفاءة المبيدات علي القواقع تقل بمرور الزمن في المعاملات الثلاث حيث

كان مركب الميتالدهيد هو أعلاها تأثيراً بينما كان مركب الميثوكارب اقلهم تأثيراً

أما بخصوص الدراسة تحت ظروف الحقل حيث تمت المعاملة بنفس الطريقة السابقة معمليا

أوضحت النتائج أن مركب ميثوكارب هو أكثرها فاعلية وكذلك كان أكثر المركبات ثباتاً تحت ظروف الحقل

بينما كان مركب الميثوميل و الميتالدهيد ألسرع تحطما وبالتالي تقل فاعليتهما.