

MOLLUSCICIDAL ACTIVITY OF CERTAIN COMPOUNDS AGAINST *Monacha cartusiana* LAND SNAILS UNDER LABORATORY AND FIELD CONDITIONS.

Mortada, M. M.; A.M. Soliman and Fatma. K. Khidr

Plant Protection Inst. Res., Agric. Research Center, Dokki-Giza, Egypt.

ABSTRACT

Laboratory and field trials had been conducted to evaluate the molluscicidal activity of Gastrotax 5 %, Molotov 3 %, Spintor 24 %, Neomyl 20 %, Neomyl 90 % and Vertimec 1.8 % against *Monacha cartusiana* land snails, during the period from March to June 2005.

The results showed that Molotov 3 %, Gastrotax 5 %, Neomyl 90 %, were exhibited the highest toxic action while Vertimec, Neomyl 20 % and Spintor 24 % appeared to be the least in activity.

INTRODUCTION

Land snails are becoming a serious agricultural animal pests in Egypt especially in northern coastal areas. They attack numerous orchard trees, field and vegetable crops as well as ornamental plants, causing great damage to all plant parts including fruits. The injured plants may intensely recompile the damaged parts and the yield of crops seems not to be affected, but at least the quality was reduced so that the vegetable crops got poorer marketing ratings and was reduced in value (El-Okda, 1980 and Nakhla *et al.* 1993).

Most molluscicides against terrestrial gastropods more usually deployed in baits (Barker, 2002). Bait technique is more suitable for reducing environmental pollution, moreover simple for use, focal treatment not area wide, thus it is usually low costly.

The present study aim to evaluate the molluscicidal activity of certain pesticides against *M.cartusiana* snails under laboratory and field conditions.

MATERIALS AND METHODS

1- Tested snails:

Adult snails of *M.cartusiana* were collected from Egyptian clover fields at Mit-Azoon village El-Mansoura district, Dakahlia Governorate. The collected snails were transferred in cloth bags to laboratory. Healthy individuals were kept in glass boxes (50 × 50× 70 cm²) contained moistened soil and fed on fresh lettuce leaves for two weeks for acclimatization (El-Okda, 1981).

2- Tested pesticides:

Six pesticides belonging to different chemical groups were tested. Common name, trade name and formulation of these compounds were as follows:

- 1- Abamectin (Vertimec 1.8 % EC)

- 2- Metaldehyde (Gastrotox 5 % RB)
- 3- Metaldehyde (Mlotov 3 % RB)
- 4- Methomyl (Neomyl 90 % WP)
- 5- Methomyl (Neomyl 20 % SL)
- 6- Spinosad (Spintor 24 % SC)

3- Laboratory experiments:

Six chemical compounds were tested as poisonous baits. Gastrotox 5 % RB (bait for ready use) and Molotov 3 % RB with rate of (0.5, 1 and 2 Kg / fed.) and (1.5, 3 and 6 Kg / fed.) respectively, while Spintor 24 % SC, Neomyl 90 % WP, Neomyl 20 % SL and Vertimec 1.8 EC with rate of (0.5, 1.0 and 2.0 %) were used. The poisonous baits were prepared by mixing a known amount of each compound with 5 parts of black sugarcane syrup, then the mixture incorporated with wheat bran to be finally 100 parts. The bait was moisten with appropriate amount of water to form a crumbly mash mixture. Ten adult snails were exposed to 3 grams bait in plastic jar (24×16×10 cm.) and small piece of sponge saturated with water was put in bottom of each jar as a source of humidity to keep snail active. Boxes were covered with tiny holes muslin for ventilation and to prevent snails from escaping. Three replicates were used for each concentration of bait. Control treatment was prepared using wheat bran bait mixed with black sugarcane syrup only without pesticides. Mortality percentages were recorded 1,3,7 and 14 days post-treatment and corrected for natural mortality according to Abbott's formula (Abbott, 1925), then subjected to probit analysis by Finney's methods (Finney, 1971).

4- Field experiments:

The field experiments were carried out at Shennessa village – Aga district, Dakahlia Governorate, the pesticides that exhibited high efficacy in the laboratory testes were applied in a heavily infested orchard cultivated with orange against *Monacha cartusiana* land snails. Gastrotox, Molotov, Neomyl 90 and Vertimec were tested as poisonous baits at the rate of the mention before. An experimental area of two feddan. The field was irrigated four days before treatment. Ten trees were chosen for each treatment. Twelve treatment were conducted, in addition to control treatment without pesticides. Gastrotox and Molotov (RB) were offered as dispersion at one meter around tree trunk, while Neomyl90 and Vertimec were offered on plastic piece, each one contained 100 gm / tree then divided into two parts put beside tree trunk. Number of alive snails were counted / tree after 1,3,7,15 and 21 days of application. Reduction percentages were calculated according to Henderson and Tillton's formula (1955).

RESULTS AND DISCUSSION

Molluscicidal activity of certain pesticides against *M. cartusiana* land snails as poisonous baits had been studied, under laboratory and field conditions.

1- Laboratory experiments:

The results presented in Table (1), showed that the molluscicidal activity of Neomyl 20 %, Neomyl 90 %, Spintor 24 %, Vertimec 1.8, Molotov 3

% and Gastrotax 5 % against *M.cartusiana* snails with three concentrations for the first four pesticides i.e. 0.5, 1.0 and 2.0 % while Molotov 3 % was 1.5, 3 and 6 Kg / fed. and Gastrotax 5 % 0.5 , 1.0 and 2.0 Kg / fed under laboratory conditions. The comparative results revealed that all compounds were exhibited molluscicidal activity after 14 days exception Neomyl 20 % and Spintor which gave (10, 23.33 and 40 %) and (0.0, 6.66 and 10.0 %) mortality percentages for the three concentrations, respectively. LC₅₀ values were 0.59, 0.89, 2.07 and 9.15 % for pesticides of Neomyl 90, Vertimec, Neomyl 20 and Spintor, respectively. While LC₅₀ values for Molotov 3 % and Gastrotax 5 % were 1.45 and 0.72 Kg / fed , respectively.

Table (1): LC₅₀ values and mortality percentages of the tested compounds against *M.cartusiana* as poisonous baits under laboratory conditions.

Compounds	Conc.	Mortality %	LC ₅₀	Fiducial limits		Slope & variance
				lower	upper	
Neomyl 20 % SL	0.5 %	10.00	2.07	1.69	35.71	4.24 ± 0.15
	1.0 %	23.33				
	2.0 %	40.00				
Neomyl 90 % WP	0.5 %	46.66	0.59	0.38	0.80	5.57 ± 0.15
	1.0 %	66.66				
	2.0 %	86.66				
Spintor 24 % EC	0.5 %	0.00	9.15	3.77	538	3.25 ± 0.24
	1.0 %	6.66				
	2.0 %	10.00				
Vertimec 1.8 % EC	0.5 %	36.66	0.89	0.64	1.22	5.04 ± 0.13
	1.0 %	46.66				
	2.0 %	76.66				
Molotov 3 % RB	1.5 kg	56.66	1.45	0.64	2.00	4.62 ± 0.30
	3.0 kg	66.66				
	6 kg	96.66				
Gastrotax 5 % RB	0.5 kg	36.66	0.72	0.51	0.91	5.39 ± 0.15
	1 kg	56.66				
	2 kg	93.33				

Discussing the forgoing results our results agree with many authors who worked on the molluscicides under laboratory conditions. For instances, Lokma, (1999) reported that Salute was the most effective one followed by Gastrotax as poisonous baits against *M.cartusiana* and *R.decollata* land snails in KSA. Daoud, (2004) evaluated five pesticides against *M.cartusiana* and *E.vermiculata*. He showed that Vertimec and Neomyl 90 seen to be of the same order of activity and exhibited the highest toxic action.

Generally, Gastrotax and Molotov were the most effectiveness as molluscicides against *M. cartusiana* under laboratory conditions followed by Neomyl 90, Vertimec while Neomyl 20 and Spintor failed to exhibited molluscicidal activity.

2-field experiments:

laboratory experiments indicated that Molotov, Gastrotax, Neomyl 90 and Vertimec were the most effective compounds when they were treated

against adult of *M.cartusiana*. Therefore, these four pesticides were applied as poisonous bait in orchard cultivated with orange technique at Aga district-Dakahlia Governorate during March to June 2005.

Results in Table (2) indicated that Molotove 3 % RB exhibited the highest toxic action against *M.cartusiana* snails, followed by Gastrotox 5 % RB, Neomyl 90 % WP and Vertimec 1.8 EC. The initial kill activity percentages of these pesticides were [(51.71, 58.06 and 71.12), (47.12, 58.12 and 69.00), (23.19, 36.14 and 63.07) and (34.13, 36.11 and 57.08)] % reduction after 3 days, respectively. The mean reduction percentages after 21 days post-treatment (residual effect) were [(70.44, 80.71 and 86.80), (67.18, 75.46 and 84.43), (48.81, 67.57 and 82.17) and (47.07, 52.30 and 68.52) respectively.

Table (2) : Efficiency of certain pesticides as poisonous baits in reducing the population density of *M.cartusiana* land snails infesting orchards at Aga district during April 2005.

Compounds	Conc.	I.K After 3 days	% reduction after ...(days)			Mean residual effect	Average *
			7	14	21		
Neomyl 90 % WP	1 %	23.16	37.11	48.05	61.51	48.89	36.02
	2	36.14	58.41	67.71	76.61	67.57	51.85
	3	63.07	73.30	82.11	91.10	82.17	72.62
Vertimec 1.8 % EC	1 %	34.13	41.06	47.00	53.15	47.07	40.60
	2	36.11	41.66	54.16	61.09	52.30	44.20
	3	57.08	61.33	66.11	78.13	68.52	62.80
Molotov 3 % RB	2.5 Kg	51.71	61.60	66.12	83.61	70.44	61.07
	5	58.06	67.71	83.41	91.00	80.71	69.38
	7.5	71.12	76.14	91.11	93.15	86.80	78.96
Gastrotox 5 % RB	1 Kg	47.12	58.13	67.12	76.31	67.18	57.15
	2	58.71	62.09	79.70	84.61	75.46	67.08
	4	69.00	71.11	90.07	92.11	84.43	76.71
F value	-	27.69**	-	-	-	21.31*	26.14**
L.S.D 05	-	7.186	-	-	-	9.134	6.431

* Average = mean of I.k + residual.

* Significant at 5 % of probability.

** Highly significant at 5 % of probability.

Our results are in harmony with those obtained by Lokma and Al-Harpy (1999) reported that Salut and Troksan (Metaldehyde 5 %) were the most effective compounds when these compounds applied as brain baits against *M. cartusiana* and *E.vermiculata*. Mortada, (2002) assured that metaldehyde gave the highest results as compared to carbofuran 10 % G, when they were used as dispersed on soil in pea field to control *D. reticulatum* slugs.

Daoud, (2004) reported that Neomyl 90 % exhibited the highest toxic action against *E.vermiculata* snails followed by Vertimec 1.8 % EC as poisonous bait in field cultivated with clover.

Generally, Molotov 3 % and Gastrotox 5 % were seem to be the same order of activity and exhibited the highest toxic action against *M.cartusiana* land snail when applied at field conditions, while the Neomyle 90 and Vertimec appeared to be the least effect in this respect.

REFERENCES

- Abbott, W.S. (1925): A method computing the effectiveness of an insecticide. J. Econ. Entomol. 18,265-267.
- Barker, G.M. (2002): Molluscs as crop pests. CABI publishing, CAB Intern. Walling Ford. Oxon, OX10 8D. UK.
- Daoud, M. I. A. (2004). Ecological and morphological studies on some terrestrial snails in Dakahlia Governorate. M.Sc. thesis Fac.Agric. Al-Azhar Univ., 177pp.
- EL-Okda, M.M.K. (1980). Land snails of economic importance on vegetable crops at Alexandria and neighboring regions. J.Agric. Res. 58 (1): 79-86.
- EL-Okda, M.M.K. (1981). Response of two land mollusca to certain insecticides. Bull. Entomol. Soc. Egypt. Econ. Ser. 12.
- Finney, D.J. (1971). probit analysis, Cambridge Univ. Press, London 3 rd. Ed. 333 PP.
- Henderson, G.F and Tillton, E.W. (1955). Test with acaricides against the brown wheat mite. J. Econ. Entomol., 48: 157-161.
- Lokma, H.E. (1999): Efficacy of some pesticides against tow species of land snails *Monacha cartusiana* (Muller) and *Rumina decollata* (Linne.). Zagazig J. Agric. Res., 26(2): 421-427 .
- Lokma, H.E., and AL-Harpy, F. N., (1999): Molluscicidal effect of some pesticides on two land snails under field condition at Riyadh aria, in Saudi Arabia. Zagazig J. Agric. Res. 26 (2): 437-444.
- Mortada, M.M.(2002): Ecological and biological studies on certain terrestrial Gastropods in Dakahlia Governorate. Ph. D. Thesis Fac. Agric. Zagazig Univ., 185 pp.
- Nakhla, J.M.; Tadros, A.W.; Abdel-Hafez, A.A. and Hashem, A.G. (1993). Survey and monitoring of land snails in pear orchards at the northern reclaimed lands. Alex. Sci. Exch., 14 (3): 43- 57 .

النشاط الابدائى لبعض المركبات ضد القواقع الأرضى موناكا كارتوسيانا تحت الظروف المعملية والحقلية.

محمد محمد مرتضى وأحمد محمود سليمان و فاطمة كامل خضر

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقى - جيزة - مصر .

أجريت تجارب معملية وحقلية لمعرفة كفاءة بعض المركبات فى مكافحة القواقع الأرضى موناكا كارتوسيانا *M. cartusiana* بطريقة الطعم السام ، وهذه المركبات هى جاستروتوكس ، مولوتوف ، نيوميل ٩٠ ، نيوميل ٢٠ ، فيرتيمك ، سينتور . وأوضحت نتائج الاختبارات المعملية أن مييد مولوتوف والجاستروتوكس كانا أعلى المبيدات تأثيرا على القواقع المختبرة يليهم مييد النيوميل ٩٠ ثم الفيرتيمك ثم نيوميل ٢٠ وأخيرا مييد سينتور حيث كان أقلهم فاعلية .

كذلك تم التطبيق الحقلى لأكثر المبيدات تأثيرا فى المعمل ، حيث أعطى مييد الجاستروتوكس والمولوتوف والنيوميل ٩٠ أعلى تأثير على القواقع بعد ٢١ يوم من المعاملة (كأثر باقى) حيث كانت نسبة الخفض (٨٤،٤٣ ، ٦٧،١٨،٧٥،٤٦) ، (٧٠،٤٤ ، ٨٠،٧١ ، ٨٦،٨٠) ، (٤٨،٨٩ ، ٦٧،٥٧ ، ٨٢،١٧) على الترتيب . بينما كانت نسبة الخفض لمييد الفيرتيمك (٤٧،٥٧ ، ٥٢،٧٠ ، ٦٨،٥٢) كأثر باقى بعد ٢١ يوم من المعاملة .