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LAND SNAILS ATTACKING PEA FIELDS: II- EFFICIENCY OF CERTAIN BIOCIDES AND MOLLUSCICIDES AGAINST *Monacha* SP. LAND SNAILS AT DAKAHLIA GOVERNORATE.

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ABSTRACT

This study was conducted at El-Mansoura district, Dakahlia Governorate during September – October 2011 on pea plantation to evaluate the efficiency of certain biocides compared with some Molluscicides against *Monacha* sp. Land snails on laboratory and field.

Results can be concluded that Biogard, Cranch, Protecto and Vertimec were used with 1, 2 and 3 % concentrations as leaf dipping technique. LC50 and LC90 values were (2.84 and 18.75 %), (1.97 and 4.57 %), (4.99 and 25.29 %) and (0.63 and 2.56 %), respectively. While LC50 and LC90 as poison bait fore mention before biocides were (2.04 and 37.3%), (2.08 and 5.97 %), (3.45 and 19.50 %) and (0.51 and 2.13 %), respectively in laboratory.

Results of the field experiments showed that the tested biocides reduced *Monacha* sp. Population density on pea plantation with low values, except, Vertimec (83.32%) after 21 days residue effect. While Molluscicides were the most effective (up to 90 %) to population density reduction of land snails infesting pea plantation compared with tested biocides compound.

INTRODUCTION

Land snails are attacking pea plants at their different growth stages and reduce their yield and its marketing value. Gastropods usually occur in moist regions or during long period of damp weather. Biocides are favorable this environmental conditions and their activity increases in humid surrounding, so that they are very suitable to gastropods.

The most effective control method is application by chemical compounds which cause the upsetting of natural balance and acute and chronic hazards to man, also, it is respensable environmental pollution and toxic effects on non- target organisms.(Mortada, 2006, Khidr, *et al*. 2011 and Mourad, *et al*. 2011).

This environmental pollution by synthetic chemicals has been providing us an impetus to get biocides (*B.t.* or natural products) as mollscicides.

Therefore, the present work aimed to evaluate the molluscicidal activity of certain biocides against *Monacha* sp. Land snails in pea fields and compared with certain recommended molluscicides.

MATERIALS AND METHODS

Tested Animals:

Specimens of *Monacha cartusiana* snails were collected during Autumn 2011from fields cultivated with pea at El-Mansoura district Dakahlia Governorate. Adult snails with a similar shell size were chosen and acclimation in the laboratory conditions for two weeks and fed on fresh lettuce leaves (Mortada, 2002).

Pesticides used:

1-Biocides:

-Biogard: WP *Bacillus thuriengensis* (*Bt.*).
-Cranch: 10% WP copper sulfate.
-Protecto: WP (*Bt.*).
-Vertimec: Abamectin (produced by fungi)

2- Molluscicids:

-Gastrotox: 5% Metaldehyde Ready Bait for Use (R.B)
- Metarol: 5% Metaldehyde Ready Bait for Use (R.B)
-Molotov: 5% Metaldehyde Ready Bait for Use (R.B)

Laboratory experiment:

Biogard, Cranch, Protecto and vertimec (as biocides) and Gastrotox, Metarol and Molotov as mulluscicides were assessed against *Monacha cartusiana* land snails using two methods in laboratory of Plant Protection Research Institute El-Mansoura branch.

Biocides were tested at serial concentrations of 1,2 and 3% with leaf dipping technique methods. A similar pieces of green lettuce leaves were dipped in glass jar containing 100 ml of tested biocides for 5 seconds, then left to dry before being offered to the snails. Ten adults individuals were exposed to each treated leaf in disposable plastic box (24×16×10cm). Boxes covered with its cover. Each concentration was included 5 replicates. The untreated check was only treated with water and included an equivalent number of snails.

Also, poison bait technique was used as another method to test, 1,2 and 3% concentrations for each compound was tested. The poisonous baits were prepared by mixing a known amount of each compound with 5 parts of black sugarcane syrup, then the mixture was incorporated with wheat bran to finally 100 parts. The bait was moistened with appropriate amount of water to form a crumb mash mixture. Five grams bait offered to ten adult snails in plastic box covered with its cover. Five replicates were used for each treatment. Control treatment was prepared using wheat bran bait mixed with black sugarcane syrup only without pesticides.

Molluscicides were tested against *Monacha cartusiana* as dispersion technique on moist soil with rate of (0.25, 0.5 and 0.75 g /m²), (0.75, 1.25 and 1.75 g /m²) and (0.25, 0.5 and 0.75 g /m²) for Gastrotox, Molotov, and Metarol, respectively.

Mortality was recorded after 1,3,5 and 7 days, at the end of this period, mortality percentages were estimated and corrected for natural mortality according to Abbott`s formula (1925), then subjected to probit analysis by Finney`s method (1971).

Field experiments

Three feddans were cultivated with pea variety Master B at Kolongiel, El-Mansoura district, Dakahlia governorate during successive season 2011. This field was infested with *Monacha* SP land snails. It divided into seven plots (1260 m² each) including control, each plot divided into three subplots (420 m² each) represented 3 replicates for each treatment. Area of about 50 m² was lift as buffer between each two plots. (Mortada, 2002).

Biogard, Cranch and Vertimec were tested with rates of 4, 4 and 2% respectively. While Molluscicides Gastrotox, Metarol and Molotov recommended dose were used as dispersion soil surface. Alive snails per one meter (10 times/ replicates) were recorded in check and treatments area before application. The experiment was started after 4 days of irrigation. Baits (biocides) were offered on plastic sac, each one contained 100g the population density of *Monacha* sp were estimated in 1m² placed adjacent to baits after 3, 5, 7, 14 and 21 days of application.

Reduction percentage were calculated according to Henderson and Tillton`s formula (1955) as follows:

$$\%\text{Reduction} = \left(1 - \frac{\mathbf{t}_2 \times \mathbf{r}_1}{\mathbf{t}_1 \times \mathbf{r}_2}\right) \times 100$$

where : r_1 = number of alive snails before treatment in untreated plots.
r_2 = number of alive snails after treatment in untreated plots.
t_1 = number of alive snails before treatment in treated plots.
t_2 = number of alive snails after treatment in treated plots.
Data were statistically analyzed using F test.

RESULTS AND DISCUSSION

Laboratory experiments

A serious of experiments had been conducted to evaluate the efficiency of certain biocides and Molluscicides against adults of *Monacha* sp land snails using leaf dipping and poison bait technique under laboratory conditions.

Biogard, Cranch, Protecto and Vertimec were used with 1, 2 and 3% concentrations as leaf dipping technique. Data in Table (1) showed that Vertimec exhibited the highest toxic effect followed by Cranch and Biogard while Protecto gave the least effect in this respect. Their LC_{50} and LC_{90} values were (0.63 and 2.56 %), (1.97 and 4.57%) and (2.84 and 18.75%) and (4.99 and 25.29%), respectively. The relative potency of Vertimec was 3.1, 4.5 and 7.6 times than of Cranch, Biogard and Portecto, respectively.

In case of poison bait technique, data in Table (2) revealed that Vertimec seems to be the most potent one (0.518 and 2.13%) followed by Biogard LC_{50} and LC_{90} were (2.04 and 37.03%), followed by Cranch (2.08 and 5.97%). while Protecto gave the lowest toxic effect (3.45 and 19.50%). The relative potency of Vertimec was 4, 4.16 and 6.66 times than that Biogard, Cranch and Protecto, respectively.

Table (1): LC_{50}, LC_{90} and relative potency of certain biocides as leaf dipping technique under laboratory conditions.

Compunds	LC_{50}%	95% Fudicial limits		LC_{90}%	95%fudicial limits		Slope & variance	Relative potency
		lower	upper		lower	Upper		
Biogard	2.84	2.08	8.15	18.75	7.13	3076.1	1.56 ±0.54	4. 5
Cranch	1.97	1.7	2.3	4.57	3.55	7.36	3.509 ±0.60	3.1
Protecto	4.99	3.23	37.72	25.29	8.83	5933.5	1.81 ±0.63	7.6
Vertimec	0.63	0.16	0.94	2.56	1.92	5.55	2.11 ±0.62	1

Relative potency compared with Vertimec .

Table (2): LC_{50}, LC_{90} and relative potency of certain biocids as poison bait technique under laboratory conditions.

Compounds	LC_{50}%	95%Fudicial limits		LC_{90}%	95%fudicial limits		Slope & variance	Relative potency
		lower	upper		lower	upper		
Biogard	2.0 4	____	____	37.03	____	____	1.018 ±0.60	4
Cranch	2.08	1.7	2.75	5.97	4.16	13.35	2.79 ±0.57	4.16
Protecto	3.45	2.47	11.69	19.50	7.58	1675.4	1.70 ±0.57	6.66
Vertimec	0.518	0.085	0.83	2.13	1.62	3.94	2.08 ±0.64	1

Relative potency compared with Vertimec .
LC_{50}, LC_{90} values and slope were calculated by probit analysis method of Finney (1971).

Data in Table (3) showed that the efficiency of Gastrotox, Metarol and Molotov were applied as poison bait (dispersion on soil) against *Monacha cartusiana* land snails. It was found that LC_{50}, LC_{90} were (0.231 and 0.598 g/m²), (0.597 and 1.679 g/m²) and (0.256 and 0.548 g/m²) respectively. The relative potency of Gastrotox 1.12 and 2.63 times than that Metarol and Molotove, respectively.

Table (3): LC_{50},LC_{90} and relative potency of certain molluscicides as poison bait technique under laboratory conditions.

Compunds	LC_{50}% g/m²	95% Fudicial limits		LC_{90}% g/m²	95%fudicial limits		Slope & variance	Relative potency
		lower	upper		lower	upper		
Gastrotox	0.231	0.152	0.286	0.598	0.491	0.854	3.09 ±0.62	1
Metarol	0.597	0.279	0.775	1.679	1.343	3.049	2.85 ±0.79	1.12
Molotov	0.256	0.196	0.302	0.548	0.463	0.725	3.87 ±0.69	2.63

Relative potency compared with Vertimec .

Field experiment

The efficiency of Biogard, Cranch and Vertimec were evaluated against *Monacha* sp land snails infesting pea fields at Kolongiel, El-Mansoura district, Dakahlia governorate during September- October 2011 plantation as poison bait in field.

Data in table (4) showed that Vertimec was the most effective one in biocides compounds, population density reduction after 3days (Initial Kill) and residue effect after 21days were 45.26% and 73.32%, followed by Cranch 24.91% and 56.43 % while Biogard was the least effect with values 6.10% and 28.03% respectively.

On the other hand, the reduction percentages after 3 days (I.K) and 21 days after treatment (Table, 5) for Gastrotox, Metarol and Molotov were (76.48 and 95.65 %), (69.20 and 93.93%) and (64.33 and 95.78 %),respectively.

Table (4): Evaluating the efficiency of certain biocides as poisonous baits in reducing the population density of *Monacha* sp land snails infesting pea fields at El-Mansoura Dakahlia Governorate during September - October 2011 plantation.

Compounds	I.K after 3days	% Reduction after …… (days)				Mean residue effect%	Average
		5	7	14	21		
Biogard	6.10	20.41	23.54	23.25	28.03	23.81	20.27
Cranch	24.91	37.68	49.98	57.14	62.80	51.90	46.50
Vertimec	45.26	61.78	65.12	70.11	83.32	70.08	65.12

Table (5): Evaluating the efficiency of certain molluscicids in reducing the population density of *Monacha* sp land snails infesting pea fields at EL-Mansoura district Dakahlia Governorate during September – October 2011 plantation.

Compounds	I.K after 3days	% Reduction after …….. (days)				Mean residue effect%	Average
		5	7	14	21		
Gastrotox	76.48	84.84	89.05	92.75	95.65	90.57	87.75
Metarol	69.20	85.71	88.53	90.89	93.93	89.77	85.65
Molotov	64.33	83.82	84.82	92.97	95.78	89.35	84.34

In general, it is clear that the tested biocides reduced *Monacha* sp population density on pea plantation with low values after21days, this reduction isn't satisfactory so, it wasn't reached fifty six percent except Vertimec (73.32%). While Molluscicides were the most effective to population density reduction of *Monacha* sp land snails infesting pea plantation compared with tested biocides compounds.

These results are agreement with those reported by (Daoud, 2004) tested Vertimec against *Eobania Vermiculata* and *Monacha contiana* on Egyptian clover crop 2002 season. He revealed that Neomyl exhibited the highest toxic action followed by Vertimec under field conditions. Zedan *et al.* (2006) evaluated five compounds include metaldehyde against land snails, they found that methomyl was the effective one. Mortada *et al.* (2006)

reported that Molluscicides compound (Molotove, Gastrotox, Neomyl) were the most effective to population density reduction of land snails *M. contiana* compared with biocides (Agrien,Diple 2x,Protecto and vertimec) on sugar beet plantation.

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القواقع الأرضية تهاجم حقول البسلة :
1 – تقيـيم كفـاءة بعـض المبيـدات الحيويـة ومبيـدات القواقـع فـى مكافحـة قوقـع البرسيم الزجاجى فى محافظة الدقهلية .

محمد محمد مرتضى ، عبد الرؤف أحمدمحمد مراد، عبد المقصود محمد أبو هاشم و طلعت محمد سليمان قشطة
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أجريت هذه الدراسة فى مركز المنصورة محافظة الدقهلية وفى معمل فرع معهد بحوث وقاية النباتات بالمنصورة . وذلك لتقييم تأثير بعض المبيدات الحيوية مقارنة ببعض مبيدات القواقع لخفض أعداد قوقع البرسيم الزجاجى على زراعات البسلة فى عروة سبتمبر 2011 م .
أوضحت النتائج المعملية أن مبيد الفرتيمك كان أقوى المبيدات الحيوية تأثيرا يليه مبيد الكرانش ثم البيوجارد ثم البروتكتو وذلك عندما اختبروا بطريقتى غمس الورقة و الطعوم السامة. وكانت قيم الجرعة النصفية المميتة و الجرعة التى تقتل 90 % من الأفراد المعاملة للمبيدات المختبرة كما يلى : [(0,63 و 2,56 %) و (0,518 و 2,13 %)] ، [(1,97 و 4,57 %) و(2,08 و 5,97 %)] ، [(2,84 و 18,75 %) و (2,04 و 37,03 %)] و [(4,99 و 25,29 %) و (3,45 و19,50 %)] على الترتيب .
كما أوضحت نتائج التجارب الحقلية أن مبيد الفيرتيمك أيضا كان أقوى المبيدات الحيوية المختبرة 73,32 % ولكن جملة النتائج للمبيدات الحيوية غير مرضية حيث كانت أعلى النتائج لها بعد 21 يوم من المعاملة لم تتعدى 56,46 % نسبة خفض فى تعداد القواقع لمبيد الكرانش وعلى الجانب الآخر فكانت نتائج مبيدات القواقع المتخصصة مثل الجاستروتوكس والميتارول والمولوتوف أعطت نسبة خفض فى تعداد قوقع البرسيم الزجاجى على محصول البسلة تجاوزت 90 %.

قام بتحكيم البحث

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