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LAND SNAILS ATTACKING SUGAR BEET FIELDS: II–EFFICIENCY OF CERTAIN BIOCIDS AND MOLLUSCICIDES AGAINST *Monacha contiana* SNAILS AT KAFR EI-SHEIKH AND DAKAHLIA GOVERNORATES.

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ABSTRACT

Field experiments had been conducted to evaluate the efficiency of certain biocides compared with some molluscicides against *M. contiana* land snails infesting sugar beet crop in Dakahlia and Kafr El-Sheikh governorates during 2008-2009 season.

Results can be concluded that Agrein, Diple 2X, Protecto and Vertimec were tested as poisonous baits with rates of 2, 4 and 6 %. Reduction percentages were [(26.91, 30.19 and 41.10 %) and (26.14, 28.03 and 31.09 %)], [(26.91, 29.62 and 37.67 %) and (23.16, 28.67 and 32.66 %)], [(35.98, 45.15 and 47.36 %) and (27.12, 36.11 and 39.7 %)] and [(76.95, 82.07 and 81.05) and (72.60, 78.51 and 80.37)] in the two districts 21 day after treatment, respectively. Biocides reduced *M.contiana* population density with low values after 3 days of treatment but thereafter the reduction increased gradually to reach its maximum after 21 days, this reduction isn't satisfactory so, it wasn't reached fifty percent except Vertimec.

The efficiency of Gastrotox, Molotov and Neomyl were (78.14,79.68 and 68.17%) and (80.22, 78.61 and 72.14 %) 3 days after application, respectively. while values were (96.78, 98.46 and 97.18 %) and (94.36, 96.14 and 92.75 %) 21 days after treatment for above mention molluscicides in two districts, respectively.

INTRODUCTOIN

Land snails were recorded with a relatively high population density on majority of economic crops and casing great damage to all plant parts. (El-Okda, 1980 and Zedan, 1999). Numerous efforts are devoted to control terrestrial snails, until recently no chemicals had been reported to be more effective and specific against land snails than Metaldehyde and Methomyl, but these compounds have very toxic action on human and his animals (Mortada, *et al.* (2006)).

Terrestrial gastropods usually occur in moist regions or during long periods of dump weather, this behavior has effect on molluscicide compounds (Metaldehyde) where makes it lowest effective against land snails. So, biocides (Bt) and fungi were more effective in dump weather or moist regions. Also, it is more suitable for reducing environmental pollution and no traces in sugar beet roots.

This work will be the second paper of research series " land snails attacking sugar beet fields ". Therefore the objectives of this study were to: Evaluating the efficiency of certain biocides compared with some molluscicides against *M. contiana* land snails infesting sugar beet crop in Dakahlia and Kafr El-Sheikh governorates during 2008-2009 season. We hope to use biocides replacing to pesticides for reducing the residue effects with our foods.

MATERIALS AND METHODS

Field experiments were conducted at Mahalet Mosa, Sakha district, Kafr El-Sheikh Governorate and El-Malha, Mansoura district, Dakahlia Governorate during the successive season 2007 – 2008. *Beta vulgaris saccarifera* L. var. Zeda was sown at mid November in both Kafr El-Sheikh and Dakahlia Governorates.

Agrien (Bt.), Diple 2x (Bt.), Protecto (Bt.) and Vertimec (Abamectin produced by fungi) were tested as biocides and Gastrotox (Metaldehyde 5%), Molotov (Metaldehyde 3%) and Neomyle 90% (Methomyl) were tested as molluscicides against *M.containa* land snails infesting sugar beet crop fields. For this purpose two experimental areas (one faddan each) were chosen and cultivated with sugar beet crop. Each one divided into eight plots (420 m^2 each) including control, each plot was divided into three subplots represented 3 replicates for each treatment. Area of about 50 m^2 was lift as buffer between each two plots. (Mortada, 2002).

Biocides were tested with rates of 2, 4 and 6 %, while molluscicides recommended dose were used as dispersion soil surface. Alive snails per 50 × 50 cm (10 times / replicates) were recorded in check and treatments area before application. The experiment was started after 3 days of irrigation. Baits (biocides and Neomyl) were offered on plastic sac, each one contained 100 g. the population density of *M.containa* were estimated in 0.25 m^2 quadrate placed adjacent to the baits after 3, 5, 7, 14 and 21 days of application.

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

$$\% \text{ Reduction} = \left(1 - \frac{t_2 \times r_1}{t_1 \times r_2}\right) \times 100$$ 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

1- Biocides:

The efficiency of Agrein, Diple 2X, Protecto and Vertimec were evaluated against *M.contiana* infesting sugar beet plantation at El-Mansoura and Sakha districts in El-Dakahlia and Kafr El-Sheikh Governorates during 2008 – 2009 season.

Data in Table (1&2) showed that Agrein, Diple 2X, Protecto and Vertimec were tested as poisonous baits with rates of 2, 4 and 6 %. Reduction percentages were calculated 3 days after application (initial kill) at El-Mansoura and Sakha districts. Population density reduction were (2.77, 7.89 and 5.40 %) and (3.72, 6.34 and 6.41%) for Agrein, (2.85, 5.71 and 7.89

%) and (3.04, 6.11 and 7.38 %) for Diple 2X, (2.70, 5.62 and 5.55 %) and (4.17, 6.14 and 6.65 %) for Protecto and (29.72, 37.83 and 51.42 %) and (31.17, 34.68 and 49.15 %) for Vertimec.

On the other hand, the reduction percent 21 day after treatment were [(26.91, 30.19 and 41.10 %) and (26.14, 28.03 and 31.09 %)], [(26.91, 29.62 and 37.67 %) and (23.16, 28.67 and 32.66 %)], [(35.98, 45.15 and 47.36 %) and (27.12, 36.11 and 39.7 %)] and [(76.95, 82.07 and 81.05) and (72.60, 78.51 and 80.37)] for Agrein, Diple 2x, Protecto and Vertimec biocides, respectively in El-Mansoura and Sakha districts during 2008 – 2009 season. Also, the residue effect and average (General mean) were [(16.25, 19.25 and 26.64) & (17.97, 16.36 and 21.93) and (9.51, 13.93 and 16.02), (13.83, 15.64 and 18.82)]for Agrein, [(17.04, 20.56 and 25.42) & (15.65, 19.82 and 23.24) and (14.77, 17.02 and 21.92), (13.13,17.08 and 20.07)] for Diple 2X, [(23.41, 31.80 and 32.70) & (18.94, 24.35 and 27.55) and (19.27, 26.56 and 27.27) & (15.99, 20.71 and 23.37)] for Protecto and [(64.12, 72.13 and 76.14) & (60.70, 68.66 and 73.08) and (57.24, 65.27 and 71.20) & (54.80, 61.86 and 68.29)] for Vertimec in Table (1&2).

Table (1) : Efficiency of certain biocides as poisonous baits in reducing the population density of *M.contiana* land snails infesting sugar beet plantation at El-Mansoura district – El Dakahlia Governorate during April 2008-2009 season.

Compounds	Conc. %	I.K After 3 days	% reduction after(days)				Mean residue effect	Average
			5	7	14	21		
Agrein	2	2.77	2.77	13.32	21.50	26.91	16.25	9.51
	4	7.89	7.96	15.50	25.20	30.19	19.98	13.93
	6	5.40	8.26	23.73	33.42	41.10	26.64	16.02
Diple 2X	2	2.85	5.95	13.82	21.50	26.91	17.04	14.77
	4	5.71	11.83	16.60	24.21	29.62	20.56	17.02
	6	7.89	10.76	23.18	30.19	37.67	25.42	21.92
Protecto	2	2.70	8.26	21.11	28.30	35.98	23.41	19.27
	4	5.62	16.09	28.30	37.67	45.15	31.80	26.56
	6	5.55	14.28	29.72	39.47	47.36	32.70	27.27
Vertimec	2	29.72	47.18	60.55	71.3	76.95	64.12	57.24
	4	37.83	61.08	68.44	76.95	82.07	72.13	65.27
	6	51.42	64.73	77.76	81.05	81.05	76.14	71.20

In general, it clear that the tested biocides reduced M.contiana population density with low values after 3 days of treatment but thereafter the reduction increased gradually to reach its maximum after 21 days, this reduction isn't satisfactory so, it wasn't reached fifty percent except Vertimec.

Statistically, it is obvious that Vertimec gave best results as compared with the all other tested biocides.

Table (2) : Efficiency of certain biocides as poisonous baits in reducing the population density of *M.contiana* land snails infesting sugar beet plantation at Sakha district–Kafr El-Sheikh Governorate during April 2008-2009 season.

Compounds	Conc. %	I.K After 3 days	% reduction after(days)				Mean residue effect	Average
			5	7	14	21		
Agrein	2	3.72	8.75	9.24	19.43	26.14	16.36	13.83
	4	6.34	11.31	13.11	21.31	28.03	17.97	15.64
	6	6.41	13.20	17.71	25.73	31.09	21.93	18.2
Diple 2X	2	3.04	6.12	14.21	19.12	23.16	15.65	13.13
	4	6.11	10.95	17.05	22.63	28.67	19.82	17.08
	6	7.38	11.84	20.33	28.14	32.66	23.24	20.07
Protecto	2	4.17	7.18	18.11	23.38	27.12	18.94	15.99
	4	6.14	11.90	20.23	29.17	36.11	24.25	20.71
	6	6.65	14.05	24.11	32.27	39.78	27.55	23.37
Vertimec	2	31.17	43.16	59.01	68.06	72.60	60.70	54.80
	4	34.68	57.67	64.08	74.38	79.51	68.66	61.86
	6	49.15	63.71	69.11	79.14	80.37	73.08	68.29
F value	-	27.38**	-	-	-	-	21.71*	24.91**
L.S.D 05		13.1					10.3	11.1

* Significant at 5 % of probability.
** Highly significant at 5 % of probability.

2- Molluscicides :

Data in Table (3 and 4), showed that the efficiency of Gastrotox 5 % (2 Kg./ faddan) and Molotov 3 % (5 Kg. /faddan) were applied as dispersion method while Neomyl 90 % (1 L / faddan) as poisonous bait methods against *M.contiana* land snails in field cultivated with sugar beet crop at El-Mansoura and Sakha districts during 2008 -2009 season. It was found that the population density reduction 3 days after treatment (initial kill) were (78.14,79.68 and 68.17%) and (80.22, 78.61 and 72.14 %), respectively. while 21 days after treatment values were (96.78, 98.46 and 97.18 %) and (94.36, 96.14 and 92.75 %) for above mention molluscicides in two districts, respectively.

Table (3) : Evaluating the Efficiency of some molluscicides in reducing the population density of *M.contiana* land snails infesting sugar beet plantation at El-Mansoura district El-Dakahlia Governorate during April 2008-2009 season.

Compound	rate®	I.K After 3 days	% reduction after ....(days)				Mean residual effect	Average
			5	7	14	21		
Gastrotox	2Kg.	78.14	82.30	87.27	91.60	96.78	89.48	83.81
Molotov	5Kg.	79.68	8643	90.13	93.65	98.46	92.16	85.92
Neomyl	1 L.	68.17	73.21	78.82	86.11	97.18	83.83	76.00

Table (4) : Evaluating the Efficiency of some molluscicides in reducing the population density of *M.contiana* land snails infesting sugar beet plantation at Sakha district –Kafr El-Sheikh Governorate during April 2008-2009 season.

Compound	rate®	I.K After 3 days	% reduction after ....(days)				Mean residual effect	Average
			5	7	14	21		
Gastrotox	2Kg.	80.22	84.11	89.81	93.68	94.36	90.49	85.35
Molotov	5Kg.	78.61	85.42	91.11	93.11	96.14	91.44	85.02
Neomyl	1 L.	72.14	76.17	81.60	87.66	92.75	84.54	78.34
F value	-	27.69**	-	-	-	-	21.31*	26.14**
L.S.D 05		7.85					5.1	6.431

® Recommended dose
* Significant at 5 % of probability.
** Highly significant at 5 % of probability.

The residue effect after 21days and average (general mean) for these compound were [(89.48, 92.16 and 83.83) and (90.49, 91.44 and 84.54)] and [(83.81, 85.92 and 76) and (85.35, 85.02 and 78.34)]in El-Mansoura and Sakha districts, respectively. Generally, Molotov 3% gave the best results compared with both Gastrotox and Neomyl . while molluscicides were the most effective to population density reduction of *M.contiana* land snails infesting sugar beet plantations compared with tested biocide compounds.

These results are in harmony with those reported by many authors, who applied these compounds against gastropod pests. Ghamry *et al.* (1993) tested five molluscicides against some land snails under laboratorycondition. The obtained results revealed that Metaldehyde was the most effective one, followed by organophosphours compounds. Radwan, (1993) reported that Metaldehyde were more effective than mesurol when used against land snails. These results have been obtained by Mortada, (2002) when he used Metaldehyde against land snails and slugs. Daoud,(2004) revealed that Neomyl exhibited the highest toxic action against *Eobania vermiculata* followed by Vertimec as poisonous bait infield conditions. Zedan *et al.* (2006) evaluated five compounds include Metaldehyde against land snails, they found that Methomyl was the most effective one. Mortada *et al.* (2006) reported that Molotov and Gastrotox were the same order of activity and exhibited the highest toxic action against *E.vermiculata* snails and *M.cartusiana* when applied at field conditions. While the Neomyl and Vertimec appeared to be the least effect in this respect.

REFERENCES

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.

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.

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.

Henderson, G.F and Tillton, E.W. (1955).Test with acaricides against the brown wheat mite . J. Econ. Entomol., 48: 157-161.

Mortada, M.M.(2002): Ecological and biological studies on certain terrestrial Gastropods in Dakahlia Governorate. Ph. D. Thesis Fac. Agric. Zagazig Univ.,185 pp.

Mortada, M.M, Khedr, K. Fatma and Soliman, A.M. (2006): Molluscicidal activity of certain compounds against *Monacha cartusiana* land snails under laboratory and field conditions.
J. Agric. Sci. Mansoura Univ., 30 (12): 8147 – 8151.

Radwan, M.A. (1993). A technique for testing the efficacy of molluscicidal baits against land snails. Communications in Science & Develop. Res. 43, 17-26

Zedan, H. A. A. (1999). Formulation and evaluation of Niclosamide 70% WP as land snails molluscicide against *Monacha obstructa* and its phytotoxicity under laboratory and field condition. J. Agric. Sci. Mansoura Univ., 24 (3): 1359- 1366.

Zedan, H.A.; Mortada, M.M. and Shoeb, A. Amera (2006): Assessment of molluscicidal activity of certain pesticides against two land snails under laboratory and field circumstances at Dakahlia Governorate. J. Agric. Sci. Mansoura Univ., 31 (6): 3957 – 3962.

القواقع الأرضية تهاجم حقول بنجر السكر:
٢- تقييم كفاءة بعض المبيدات الحيوية ومبيدات القواقع فى محافظتى الدقهلية وكفر الشيخ.

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أجريت هذه الدراسة فى مركزى المنصورة وسخا بمحافظتى الدقهلية وكفر الشيخ وهما اكبر محافظات الجمهورية زراعة لمحصول بنجر السكر وذلك لتقييم كفاءة بعض المبيدات الحيوية مقارنة مع مبيدات القواقع المتخصصة ، وتأثيرهما على خفض الكثافة العددية للقوقع الأرضى *Monacha cantiana* خلال الموسم ٢٠٠٨ / ٢٠٠٩ م.

أوضحت النتائج أن نسبة الخفض فى الكثافة العددية للقوقع الأرضى *Monacha cantiana* للمركبات الحيوية: أجرين ، دبيل ، بروتكتو والفرتيمك عندما استخدمت كطعم سام بمعدل ٢ ، ٤ و ٦% كانت[(٢٦,٩١، ٣٠,١٩ و ٤١,١٠) و (٢٦,١٤، ٢,٠٣ و٣١,٠٩)] و [(٢٦,٩١ ، ٢٩,٦٢ و ٣٧,٦٧) و (٢٣,١٦ ، ٢٨,٦٧ و ٣٢,٦٦ %)] و [(٣٥,٩٨ ، ٤٥,١٥ و ٤٧,٣٦) و (٢٧,١٢ ، ٣٦,١١ و ٣٩,٧٠)] و [(٧٦,٩٥ ، ٨٢,٠٢ و ٨١,٠٥) و (٧٢,٦٠ ، ٧٨,٥١ و ٨٠,٣٧)] فى كلا المنطقتين على الترتيب. وعلى العموم فان نتيجة المركبات الحيوية لم تتعدى نسبة ال٥٠ % وهى نتيجة غير مرضية ، ماعدا مبيد الفيرتيمك.

وعلى الجانب الآخر فان المبيدات المتخصصة مثل الجاستروتوكس ، المولوتوف والنيوميل أعطت نسبة خفض فى تعداد القواقع بعد ٢١ يوم من المعاملة فكانت (٩٦,٧٨ ، ٩٨,٤٦ و ٩٧,١٨ %) و ٩٤,٣٦ ، ٩٦,١٤ و ٩٢,٧٥) فى كلا المنطقتين على الترتيب.