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EFFICACY OF CERTAIN BIO AND CHEMICAL INSECTICIDES AGAINST SUGAR BEET FLY AND SUGAR BEET TORTOISE BEETLE AND ASSOCIATED PREDATORS ON SUGAR BEET PLANTS IN KAFR EL-SHEIKH REGION

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ABSTRACT

Initial and residual effect of four fungal insecticides i.e. Bio-sect, Bio-cansa, Bio-far and Bio-fly and seven chemical insecticides, i.e. Aktara, Quick, Marshal, Mosblane, Admire, Admiral and Necestar were investigated against larvae of sugar beet fly *Pegomia. mixta* (Vill.) and sugar beet tortoise beetle, *Cassida vittata* (Vill.) and their associated predators, rove beetle, *Paederus alfierii*, Koch and lacewing, *Chrysoperla carena*, Schn.

In case of controlling *P. mixta*, the initial activity of Aktara was higher than the other tested compounds. While, the initial toxicities of Bio-cansa and Bio-sect were the least. Residual activities of the tested insecticides showed that Aktara, Quick, Marshal and Mosbalane were the most potent compounds, while Necestar and Bio-fly were less active.

In case of *C. vittata*, the initial activity of Bio-sect was higher than the other tested compounds. While, the initial toxicities of Admire and Admiral were the least. Residual action activities of the tested insecticides showed that Mosblane, Aktara and Marshal were the most potent compounds, while fungal compounds Bio-sect and Bio-fly were less active. On the other hand, the juvenile hormone mimic, Admiral was very poor in this respect.

Both Quick and Mosblane were the most serious application against predator, *P. alfierii*. On the other hand, Admiral, Admire and Necestar were safe to the considered predator. Quick and Marshal were highly toxic to lacewings *C. camea*, while admiral and Bio-sect were safe to the predator.

INTRODUCTION

Sugar beet has a great importance in sugar production all over the world and comes in the second order among sugar crops after sugar-cane. In Egypt, more than 153 thousand feddans are cultivated with sugar beet annually, particularly in Kafr El-Sheikh and Dakahlia Governorates (Egyptian Society of Sugar Technologists, 2002).

Under Egyptian conditions, sugar beet plantations are desirable for attacks of many insect pests (Hosney *et al.*, 1983; Youssef, 1986; Abo-Saied-Ahmed, 1987 and Bassyouny and Bleih, 1996).

Different insecticides are applied to control the main insect pests of sugar beet: *Cassida vittata* (Vill.) and *Pegomyia mixta* (Vill.). Despite, the use of insecticides in agriculture still constitutes the most available tool that gives satisfactory control of pest insects, these chemicals are injurious to the environment, man and soil (Ahmed *et al.*, 1999). Some authors tested bioinsecticides as substitutes for insecticides and reported some promising data (Mahgoub, 1998; Samy, 1999 and Talha, 2001).

The current investigation was carried out at Sakha Agricultural Research Station to test the efficacy of some biocides compared to insecticides against two main sugar beet insects; *Cassida vittata* (Vill.) and *Pegomia mixta* (Vill.).

MATERIALS AND METHODS

This experiment was carried out at the experimental farm of Sakha Agricultural Research Station (Kafr El-Sheikh Governorate). The experimental fields was divided into 48 plots (12 treatments x 4 replicates) laid out in a completely randomized block design. Each plot measure 150 m^2 (10 x 15 m^2). The chemicals (insecticides and biocides) occupied eleven treatments, while the twelfth one was untreated to act as a check.

Table (1): Insecticides formulation and rate of application.

Treatments	Insecticides and formulation	Rate of application per 100 litres water
1	Control (untreated)	-
	Bio insecticides	
2	Bio-sect wp. *Beuveria bassiana* 3 x 10^6 spore/ml	200 gm
3	Bio-cansa wp. *B. bassiana* 3 x 10^6 spore/ml	200 mg
4	Bio-far wp. *B. bassiana* 3 x 10^6 spore/ml	200 mg
5	Bio-fly E.C. *B. bassiana* 3 x 10^6 spore/ml	100 cm^3
	Chemical insecticides	
6	Aktara 25% WG (thianethoxan)	20 gm
7	Quick 90% SP. (Methomyl)	75 gm
8	Marshal 25% WP (Carbosulfan)	200 gm
9	Mosblane 20% SP (Acetambride)	75 gm
10	Admire 20% SC (Imidacloprid)	125 cm^3
11	Admiral 10% EC (Pyriproxyfen)	100 cm^3
12	Necestar 20% SC (Pyridaben)	80 cm^3

Normal agricultural practices were followed. CP_3 knapsack sprayer equipped with one nozzle was used in spraying. Barriers some rows of sugar beet plants were left untreated among plots to act as avoid drift effect. Five sugar beet plants were weekly chosen randomly from each plot (20 plants per treatment) to count the number of *P. mixta* larvae and *C. vittata* individuals and associated predators before spray and 1, 3, 5, 7, 9, 12 and 15 days after spray. Using Henderson and Tilton formula, the reduction percentage of insects and predators were calculated.

RESULTS AND DISCUSSION

1. Effect of applied substances against insects:

1.1. Sugar beet fly *P. mixta*:

Results in Table (2) showed that the applied substances, by their insecticidal effects on *P. mixta*, are differentiated into two groups as follows:

A. Substances with persisting insecticidal effect, that did not decrease by time and these were: Bio-sect and Aktara.
B. Substances with decreasing effect by time, and these were: Bio-cansa, Bio-far, Bio-fly, Quick, Marshall, Mosbalane, Admire, Admiral and Necestar.

Table (2): Initial and residual effect of certain substances against the larvae of sugar beet leaf fly *P. mixta*.

Tested substances	% initial kill 1 day after application	% residual effect at days after treatments 3	5	7	9	12	15	% residual action
Bio-insecticides								
Bio-sect	20.21	30.62	45.43	47.64	51.82	88.44	92.21	66.98
Bio-cansa	18.12	78.10	10.65	7038	78.98	39.27	20.58	61.57
Bio-far	35.6	86.41	75.22	40.16	27.14	25.12	20.19	61.01
Bio-fly	40.19	70.23	50.04	38.20	44.18	25.52	20.02	32.74
Chemical insecticides								
Aktara	91.02	82.38	82.66	89.53	88.44	80.1	90.02	86.00
Quick	62.90	84.27	96.18	80.38	83.44	79.61	56.68	82.51
Marshal	53.90	81.90	92.19	79.25	62.50	95.83	79.17	82.27
Mosblane	33.20	86.71	58.30	93.13	94.95	59.56	69.67	81.65
Admire	32.60	70.48	65.63	81.13	56.25	1667	25.00	63.83
Admiral	27.22	77.10	78.32	48.14	46.04	37.02	34.48	63.70
Necestar	25.62	72.15	45.91	27.94	65.19	45.30	51.03	53.44

As seen from the results, the activity of tested materials varied according to the origin of the compound where Aktara gave the highest initial kill (91.02%) followed by Quick (62.90%), Marshal (53.90%) and Bio-fly (40.19%). Bio-sect and Bio-cansa gave the lowest initial kill (20.21% and 18.12%, respectively).

Regarding the residual action, Aktara was the superior one causing 86.00% reduction followed by Quick, Marshal and Mosblane (82.51, 82.27 and 81.65, respectively). The other tested products could be arranged descendingly according to their activity as follows: Bio-sect (66.98%), Admire (63.83%), Admiral (63.70%), Bio-cansa (61.57%), Bio-far (61.01%) and Necestar (53.44%). However, Bio-fly gave the lowest residual action (32.74%).

1.2. Sugar beet tortoise beetle *C. vittata*:

The results presented in Table 3 showed that Mosblane was the most effective compound against *C. vittata* recording 89.68% reduction as residual action, while Admiral was the least potent one causing 4.22% kill as residual action. According to the initial kill percentages, the tested materials could be arranged descendingly as follows: Bio-sect (52.03%), Bio-fly (38.53%), Bio-cansa (32.02%), Aktara (31.47%), Mosblane (20.03%), Quick (20.01%) and Marshal (19.73%). It is obvious that Admire gave the lowest initial kill (0.44%).

Clark (1995) attributed the low effect of bio-insecticides (abametion) to the rapid degradation in the soil. Bassyouny and Bleih (1996) mentioned that, Marshal was the best compound in reducing the larvae and adults of *C. vittata*. Talha (2001) concluded that biocide (Biofly) and the mixture of Biofly +

MC were more potent than certain chemical insecticides. He reported that Admiral gave satisfactory control of the adults of *C. vittata* (55.22% kill) after three days from treatment. Shalaby (2001) reported that the in blotches of *P. mixta* larvae were most reduced by Marshal (44.5%).

Table (3): Initial and residual effect of certain substances against tortoise beetle *C. vittata* treatments.

Tested Substances	% initial kill 1 day after application	% residual effect at days 3	5	7	9	12	15	% Residual action
Bio-insecticides								
Bio-sect	52.03	47.82	0.9	1.32	2.15	3.17	57.24	10.14
Bio-cansa	32.02	23.18	61.72	47.82	27.78	52.69	79.86	58.00
Bio-far	15.70	37.93	22.04	33.58	49.20	53.59	65.71	52.20
Bio-fly	38.53	2.02	1.53	59.97	40.13	35.07	38.17	24.89
Chemical insecticides								
Aktara	31.47	87.27	71.45	82.70	90.00	93.16	93.16	89.41
Quick	20.01	36.67	40.12	35.87	40.87	26.73	59.12	40.63
Marshal	19.73	54.93	83.16	92.35	87.02	89.11	89.74	87.51
Mosblane	20.03	71.29	62.11	83.74	88.01	92.72	98.47	89.68
Admire	0.44	0.09	20.20	82.20	21.78	56.09	61.81	47.46
Admiral	6.76	18.28	3.01	4.02	2.03	17.05	35.46	4.22
Necestar	10.81	73.24	35.96	72.49	32.49	82.60	76.65	70.15

2. Effect of applied substances against predators:

2.1. Rove beetle, *P. alfierii*:

Data presented in Table (4) exhibit the adverse effects of considered treatments on *P. alfierii* population. The most hazardous effect came from Quick 70.7%, predatory reduction followed by Mosblane 60.5% reduction. Small partial of *P. alfierii* population was removed by Admiral (13.8%) followed by Admire (15.4%) Necestar (16.7). These three treatments could be seen as safer to the predator than others. It was clear that both initial killing and residual effects both Quick and Mosblane were potent against *P. alfierii* population.

2.2. Lacewing, *C. carnea*:

The safest application on *C. carnea* was Admiral (11.1% reduction) (Table 5). Thus this compound is promising as a low toxic material against this beneficial insect. By contrast of Aktara was highly toxic (72.9%) followed by Marshal (66.82%). Admiral was the safest insecticide against the predator. Generally, broad spectrum insecticides like Aktara and Marshal Mesblane in this investigation are highly suppressive to natural enemies. Unfortunately there are few selective insecticides which favor natural enemies (Chatterji *et al.*, 1976).

Shalaby (2001) reported that Marshal was the most toxic application against *P. alfierii* (71.23%) and *C. carnea* (66.58%).

Table (4): Initial and residual effect of certain substances against rove beetle *P. alfierii*.

Tested Substances	% initial kill 1 day after application	% residual effect at days after treatments						% Residual action
		3	5	7	9	12	15	
Bio-insecticides								
Bio-sect	19.92	23.13	19.1	10.7	23.1	14.3	21.2	18.6
Bio-cansa	20.1	58.15	50.3	70.1	61.2	30.4	21.2	44.4
Bio-far	28.3	69.2	70.1	30.1	20.2	15.1	18.3	35.9
Bio-fly	33.07	21.6	60.7	50.3	30.2	40.7	25.3	37.4
Chemical insecticides								
Aktara	76.0	71.3	65.2	45.4	20.3	19.4	18.1	45.1
Quick	90.2	80.4	71.3	65.2	43.0	55.3	90.1	70.7
Marshal	86.6	81.3	49.2	33.2	35.2	27.3	29.4	48.8
Mosblane	44.3	66.7	50.3	80.1	70.9	60.3	51.4	60.5
Admire	14.4	21.11	19.8	17.9	4.2	13.4	10.3	15.4
Admiral	11.47	23.2	29.1	3.0	7.2	10.1	8.2	13.8
Necestar	14.15	34.21	35.8	12.2	13.2	4.5	3.2	16.7

Table (5): Initial and residual effect of certain substances against lacewing *C. carnea*.

Tested substances	% initial kill 1 day after application	% residual effect at days after treatments						% residual action
		3	5	7	9	12	15	
Bio-insecticides								
Bio-sect	43.2	37.8	3.2	2.3	1.5	5.1	50.2	20.4
Bio-cansa	30.2	20.1	15.7	40.2	20.2	50.9	70.1	35.3
Bio-far	10.7	30.9	20.2	30.5	40.2	50.9	60.7	34.7
Bio-fly	30.5	20.1	2.3	50.9	40.1	30.7	30.1	29.2
Chemical insecticides								
Aktara	30.7	80.2	70.1	80.3	7.1	90.1	89.3	72.9
Quick	25.3	33.9	43.1	30.2	31.2	20.7	50.3	33.45
Marshal	15.7	50.3	80.2	90.4	80.1	70.3	81.2	66.82
Mosblane	18.3	70.1	75.1	77.1	90.1	66.4	70.3	16.74
Admire	5.6	1.3	15.7	50.3	20.1	30.7	55.2	25.55
Admiral	7.6	15.4	2.1	3.2	11.2	25.2	13.4	11.15
Necestar	8.3	53.4	30.7	70.2	25.1	70.3	65.7	46.24

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كفاءة بعض المبيدات الحيوية والكيميائية ضد ذبابة وخنفساء البنجر السلحفائية والمفترسات الحشرية المصاحبة لها على محصول البنجر فى منطقة كفرالشيخ

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أجريت الدراسة بالمزرعة البحثية بمحطة بحوث سخا فى محافظة كفرالشيخ فى مساحة ٢ فدان منزرعة بنجر السكر الصنف راسبولى. تم رش المواد المستخدمة على النباتات مره واحدة عند عمر شهر.

إختبرت كفاءة الإبادة الفورية والأثر الباقى لاربعة مبيدات حيوية وهى: بيوسكت وبيوكانزا وبيوفار وبيوفلاى وهى مبيدات المادة الفعاله بها فطر بيوفاريا باسيانا وسبعة مبيدات كيميائية مخلقة وهى: أكتارا ٢٥% وكويك ٩٠% ومارشال ٢٥% وموسبلان ٢٠% وأدمير ٢٠% وادميرال ١٠% وكذلك نكستار ٢٠% لمكافحة ذبابة البنجر وخنفساء البنجر السلحفائية على أوراق بنجر السكر وكما درس تأثيرها على المفترسات الهامة المتواجدة فى حقول بنجر السكر. وقد أظهرت النتائج أن مبيد أكتارا كان أكثر المبيدات تأثيرا من حيث الابادة الفورية بينما كانت المبيدات الحيوية بيوكانزا وبيوسكت أقلها تأثيرا.

وقد أظهرت النتائج أن الاثر الباقى لكل من أكتارا ولانيت ومارشال وموسبلان كان أقوى من النكستار والبيوفلاى فى مكافحة ذبابة البنجر.

بينما فى حالة مكافحة خنفساء البنجر السلحفائية أظهرت النتائج أن المبيد الحيوى بيوسكت كان أكثرها فاعلية من حيث الإبادة الفورية بينما كانت المبيدات أدمير وادميرال اقلها تأثيرا. وكان الأثر الباقى لكل من الموسبلان والاكتارا وكذلك المارشال اكثر فاعلية من المبيدات الحيوية بيوسكت وبيوفلاى. بينما كان منظم النمو الادميرال اقل المبيدات المستخدمة من حيث الاثر الباقى.

بالنسبة للحشرة الرواغة كان كلا من الكويك والموسبلان هما اكثر المركبات ضررا للمفرسات حيث ابادا ٧٠,٧-٦٠,٥% من اعداد الحشرة بينما كانت مركبات الادميرال والادمير والنكستار هى أكثر أمانا على مفترس الحشرة الرواغة.

فى حالة المفترس أسد المن كانت المركبات اكتارا والمارشال هى الأكثر سميه (٧٢,٩ – ٦٦,٣٢%) وعلى الجانب الاخر كانت مركبات الادميرال والبيوسكت هى الاكثر أمانا (١١,١٥ ، ٢٠,٤%) على هذا المفترس.