

**FIELD EVALUATION OF SOME PESTICIDES FOR CONTROLLING
PULVINARIA TENUIVALVATA (NEWSTEAD) (HOMOPTERA:
COCCIDAE) ON SUGARCANE IN KOM OMBO DISTRICT,
ASWAN GOVERNORATE**

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Abstract

The present work was conducted in Kom Ombo district, Aswan governorate for two years (2002 & 2003) to evaluate the efficiency of seven compounds representing seven insecticidal groups for control the sugarcane soft scale, *Pulvinaria tenuivalvata* (Newstead) in sugarcane fields to protect the crop from the insect damage.

The obtained results showed that, the tested pesticides were highly effective on the insect populations in the both years (2002/2003). The statistical analysis of the evaluated pesticides combined over two tested years showed that, Chalinger was the highest effective compound on the nymphal populations (94.8%). Admiral and Mospilan came in the 2nd order (93.6% and 93.4%) followed by Marshal in the 3rd order (88.9%). Sulfer & Actara came in the 4th order (88.1% & 88%) and Orion was the last one (86.8%).

The efficacy of the evaluated pesticides on the adult populations showed that, Chalinger, Admiral and Mospilan were the highest effective compounds on the adult populations (93.5%, 92.5% and 91.9%) followed by Marshal in the 2nd order (86.6%). Sulfer, Actara and Orion were less effective pesticides on the adult populations (85.6%, 84.6% and 83.5%).

The efficiency of the tested pesticides on the insect populations (nymphs and adults) indicate that, Chalinger was the highest effective compound (94.6%) on the insect populations followed by Admiral and Mospilan in the 2nd order (93.4% and 93.1%). Marshal and Sulfer came in the 3rd order (88.2% and 87.7%), Orion was the least one (86.6%).

INTRODUCTION

Aswan governorate is the 2nd district for sugarcane plantation, it cultivated about 25% of total sugarcane in Egypt. In the last few years, the cultivated areas were attacked greatly with the sugarcane soft scale, *Pulvinaria tenuivalvata* (Newstead). The highly increases of temperature and relative humidity in the Upper Egypt as well as the dense of plants in the sugarcane fields are suitable for insect

activity especially in autumn season. Besheit *et al.* (2002) showed that, the severe infestation of *P. tenuivalvata* in sugarcane fields causes economic loss in sugarcane quantity and quality.

The insect suck the cell sap of the leaves and excrete a large amount of honeydew that cover plant leaves and encourages the growth of sooty mould fungus which affect on photosynthesis and respiration processes of sugarcane plants. The pest has a wide range of host plants (Ali *et al.*, 2000) and many generations per year, three generations (Shalaby, 2002) and four generations (Tohamy *et al.*, 2002).

The present work was conducted in Kom Ombo district, Aswan governorate for two years (2002 & 2003) to evaluate the efficiency of seven pesticides representing seven insecticidal groups as control measures for *P. tenuivalvata* in sugarcane fields to protect the sugarcane crop from the insect damage.

MATERIALS AND METHODS

The present work was carried out for two years (September 5th 2002 and September 16th 2003) in El-Sabeil village, Kom Ombo district to evaluate the efficiency of seven pesticides representing seven insecticidal groups for control the insect. Pesticides used were shown in Table 1.

Table 1. Evaluated pesticides in Kom Ombo district, Aswan governorate per each year (2002 & 2003).

Trade name	Common name	Pesticide group	Rate of application
1- Chalinger 36%EC	Chlorfenapyr	Pyrazole analogue	40 ml /100 liter of water
2- Admiral 10% EC	Pyriproxyfen	Juvenile hormone mimic (JHM)	50 ml /100 liter of water
3- Mospilan 20% SP	Acetamiprid	Acetamiprid	30 g /100 liter of water
4- Actara 25 % WP	Thiamethoxam	Nitromethylene	25 g /100 liter of water
5- Marshal 25% WP	Carbosulfan	Carbamate	150 g /100 liter of water
6- Orion 30 % EC	Alanycarb	Oxime carbamate	250 ml /100 liter of water
7- Sulfer 30% (liquid)	Sulfer	Natural	Liter /100 liter of water

The selected sugarcane fields were cultivated with G. T. 54-9 variety and receive all the recommended agricultural practices, homogeneous in plant growth, severely attack with *P. tenuivalvata* and don't receive any control measures before and after applications.

The experimental area was arranged in Randomized Complete Block Design and each pesticide treatment contains four replicates, each replicate 175 m². The samples were picked up at random with rate of 10 leaves / replicate (40 leaves /

treatment) before spraying, then after 2, 4 and 6 weeks of spraying. The collected samples were transferred to the laboratory in paper pages where the upper and lower surfaces of sugarcane leaves were inspected, nymphs and adults were counted and recorded.

Percent of reduction in the insect populations was estimated using Henderson and Tilton equation (1955) to determine the initial effect after 2 weeks and the residual effect after 4 and 6 weeks intervals. Reduction percentages in the insect populations were transferred to arc sine before conducting the analysis of variance (F test) and LSD values were used to separate the means. Reduction percentages in 2002 and 2003 were statistically analyzed combined over the two years to determine the final effect of the tested pesticides on the insect populations. All the statistical analyses of the present work were conducted using MSTATC computer Program.

RESULTS AND DISCUSSION

A- 1st year (2002):

Data presented in Table 2 showed the population of nymphs, adults and insect populations of *P. tenuivalvata* as well as the initial effect of the tested pesticides after 2 weeks of application and the residual effect after 4 and 6 weeks of application in the 1st year (2002).

The obtained results showed that, the initial effect of tested pesticides was varied on the nymphal populations. The highest effective compounds were Chalinger (95.9%), Admiral (95%) and Mospilan (92.4%) respectively, whereas the other tested pesticides were less effective, they reduced the nymphal populations to 88.3% (Sulfer), 86.5% (Orion), 85.8% (Marshal) and 84.6% (Actara), respectively. According to the initial effect of the investigated pesticides Chalinger, Admiral and Mospilan were the highest effective pesticides on the adult populations, they reduced the nymphal populations to 94.1%, 92.7%, 90.5%, respectively.

The residual effect of the tested compounds on the nymphal populations was higher after 4 weeks of application, the highest effective pesticides were Chalinger (95.1%), Admiral (94%) and Mospilan (93%) whereas the other four pesticides were less effective on the nymphal populations, they reduced the populations to 88% (Marshal), 88% (Sulfer), 85.4% (Actara) and 84.5% (Orion), respectively. The residual effect on the adult populations were relatively higher after 4 weeks of application, the populations reduced to 94.5% (Chalinger), 92.9% (Admiral) and 91.7% (Mospilan) while the rest of the tested pesticides were less effective, they reduced the adult populations to 84.3% (Sulfer), 84.2% (Marshal), 82.4% (Actara) and 82.3% (Orion), respectively.

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Table 2. Efficiency of some pesticides on sugarcane soft scale insect, *P. tenuivalvata* infesting sugarcane in El-Sabeil village at Kom Ombo district, Aswan Governorate in the 1st year (2002).

Pesticide	Post-spraying counts and % of reduction																		Average percent of reduction in the 1 st year (2002)		
	Pre-spraying count						Initial effect						Residual effect						Nymph	Adult	Total
	5/9/2002			19/9/2002			3/10/2002			17/10/2002			Nymph	Adult	Total						
	Nymph	Adult	Total	Nymph	Adult	Total	Nymph	Adult	Total	Nymph	Adult	Total				Nymph	Adult	Total			
1-Challenger 36%EC	3507.5	425.0	3932.5	120.0	24.0	144.0	122.8	25.0	147.8	172.8	32.8	205.6	138.5	27.3	165.8	94.8% a	94.0% a	94.7% a			
2- Admiral 10% EC	3390.5	382.8	3773.3	139.5	26.5	166.0	144.0	29.0	173.0	218.0	40.5	258.5	167.2	32.0	199.2	93.6% a	92.1% a	93.3% b			
3- Mospilan 20% SP	3145.8	368.3	3514.1	197.3	33.3	230.6	156.0	32.5	188.5	102.0	25.5	127.5	151.8	30.4	182.2	93.9% a	92.0% a	93.5% b			
4- Actara 2.5 % WP	2809.3	308.8	3118.1	359.0	47.8	406.8	291.3	58.0	349.3	184.8	47.8	232.6	278.3	51.2	329.5	87.4% cd	84.8% bc	86.8% cd			
5- Marshal 25% WP	1957.5	377.8	2335.3	230.8	59.3	290.1	166.0	63.8	229.8	102.3	37.5	139.8	166.3	53.5	219.8	89.2% b	86.9% b	88.3% c			
6- Orion 30 % EC	3328.8	284.3	3613.1	372.5	50.5	423.0	365.3	53.5	418.8	336.3	51.3	387.6	358.0	51.8	409.8	85.7% d	82.6% c	85.5% d			
7- Sulfur 30% (liquid)	3287.3	329.5	3616.8	320.3	47.5	367.8	279.8	55.0	334.8	296.3	52.5	348.8	298.8	51.7	350.4	88.1% bc	85.2% bc	87.7% c			
Control	3697.5	340.0	4037.5	3068.3	323.5	3391.8	2619.8	362.3	2982.1	2717.0	379.8	3096.8	2801.7	355.2	3156.9	40.5**	14.8**	56.7**			
F value :																					
LSD at 0.05 level :																					

Note:

Percent of reduction were transferred to arc sine value before conducting analysis of variance.

Means in the same column not followed by the same letter is significantly different ($P < 0.05$) using LSD test in MSTATC computer Program.

After 6 weeks of application, the residual effect of the tested pesticides were varied on both nymphs and adults populations. The highly effective compounds on the nymphal populations were Mospilan (95.6%), Chalinger (93.3%), Marshal (92.9%), Admiral (91.2%) and Actara (91.1%) whereas the lowest ones were Sulfer (87.7%) and Orion (86.3%).

The residual effect was varied also on the adult populations after 6 weeks of application, the highest effective compounds were Mospilan (93.8%), Chalinger (93.1%), Marshal (91.1%) and Admiral (90.5%), whereas the lowest ones were Actara (86.2%), Sulfer (85.7%) and Orion (83.9%), respectively.

Data in Table 2 showed the average percent of reduction in the nymph and adult populations during the 1st year (2002). The statistical analysis revealed that, the most effective pesticides on the nymphal populations were Chalinger (94.8%), Mospilan (93.9%) and Admiral (93.6%). Marshal came in the 2nd order (89.2%) followed by sulfer (88.1%) and Actara (87.4%) whereas, Orion came in the last order (85.7%).

The efficiency of the tested pesticides on the adult, populations showed that, the highly effective pesticides were Chalinger, Admiral and Mospilan, they came in the 1st order (94%, 92.1%, 92%) while the lower ones were Marshal (86.9%), Sulfer (85.2%), Actara (84.8%) and Orion (82.6%), respectively.

B- 2nd year (2003)

Experiments were repeated for another year (September 16th 2003) at the same place to ensure the results of the 1st year (2002). The obtained results presented in Table 3 showed that, the initial effect of the evaluated pesticides were varied on the nymphal populations. The most effective pesticides were Chalinger, Admiral and Mospilan, they reduced the populations to 95.1%, 94.1% and 91.8%, respectively whereas, the other four tested pesticides *i.e.* Orion, Actara, Sulfer and Marshal reduced the populations to 88.5%, 88.1, 87.9% and 86.1%, respectively. The initial effect of the tested pesticides were relatively lower on the adult populations, the highest effective compounds were Chalinger (95.7%), Admiral (92.3%) and Mospilan (90.4%), respectively.

The residual effect of the tested compounds on the nymphal populations after 4 weeks of application could be arranged in descending order as follows: Chalinger (94.4%), Admiral (93.5%) and Mospilan (92.8%), Sulfer (88.8%), Actara (88.1%) Marshal (87.1%) and Orion (87.1%), respectively. According to the residual effect on the adult populations, the highest effective compounds were Chalinger (93.3%), Admiral (92.1%) and Mospilan (91.9%), while the lower ones were Sulfer (85.2%), Orion (84.3%), Marshal (84.2%) and Actara (83.4%), respectively.

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Table 3. Efficiency of some pesticides on sugarcane soft scale insect, *P. tenuivalvata* infesting sugarcane in El-Sabel village at Kom Ombo district, Aswan Governorate in the 2nd year (2003).

Pesticide	Pre-spraying count			Post-spraying counts and % of reduction												Average percent of reduction in the 2 nd year (2003)			
	16/9/2003			Initial effect 2 weeks 30/9/2003				Residual effect 4 weeks 14/10/2003				6 weeks 28/10/2003				Nymph	Adult	Total	
	Nymph	Adult	Total	Nymph	Adult	Total	Nymph	Adult	Total	Nymph	Adult	Total	Nymph	Adult	Total				
																			%
1-Challenger 36%EC	2232.0	333.0	2564.0	103.3	13.8	117.1	101.8	19.0	120.8	100.8	29.5	130.3	101.9	20.8	122.7	94.8% a	92.9% a	94.5% a	
2- Admiral 10% EC	2665.3	347.8	3013.1	147.0	25.8	172.8	140.8	23.5	164.3	154.8	17.0	171.8	147.5	22.1	169.6	93.5% a	92.8% a	93.5% ab	
3- Mospilan 20% SP	2203.0	375.8	2578.8	169.5	35.0	204.5	129.5	25.8	155.3	105.3	21.8	127.1	134.8	27.5	162.3	91.8% a	91.8% a	92.8% b	
4- Actara 25 % WP	2842.3	311.8	3154.1	318.0	50.8	368.8	274.8	44.0	318.8	250.5	34.5	285.0	281.1	43.1	324.2	88.1% a	88.1% a	88.1% c	
5- Marshal 25% WP	2194.5	345.0	2539.5	287.5	51.8	339.3	230.3	46.5	276.8	153.0	29.5	182.5	223.6	42.6	266.2	86.1% a	86.1% a	86.1% c	
6- Orion 30 % EC	3403.8	255.0	3658.8	369.5	36.0	405.5	358.0	34.0	392.0	340.0	34.8	374.8	355.8	34.9	390.8	88.5% a	88.5% a	88.5% c	
7- Sulfer 30% (liquid)	3029.0	308.0	3337.0	343.8	47.0	390.8	276.3	38.8	315.1	324.8	32.8	357.6	314.9	39.5	354.4	87.9% a	87.9% a	87.9% c	
Control	2622.3	303.8	2926.1	2468.0	293.3	2761.3	2134.8	258.3	2393.1	2171.5	240.3	2411.8	2258.1	263.9	2522.0	82.7% a	82.7% a	82.7% c	
IF value :																			
LSD at 0.05 level :																			

Note:

Percent of reduction were transferred to arc sine value before conducting analysis of variance.

Means in the same column not followed by the same letter is significantly different (P < 0.05) using LSD test. In MSTATC computer Program.

The highly residual effective compounds on the nymphal populations after 6 weeks of application were Chalinger (94.6%), Mospilan (94.2%), Admiral (93%) and Marshal (91.6%), respectively. The other tested compounds were less effective, they arranged in descending order as follows: Actara (89.4%), Orion (87.9%) and Sulfer (87.1%), respectively. Admiral and Mospilan gave the highest efficiency against the adult populations (93.8% and 92.7%), whereas Orion was the least one (82.8%).

Data in Table 3 showed the average percent of reduction in the nymph and adult populations in the 2nd year (2003). The statistical analyses of reduction percentages of the nymphal populations confirmed that, Chalinger was the highest effective compound (94.8%) followed by Admiral and Mospilan in the 2nd order (93.6% and 93 %). Actara, Marshal, Sulfer and Orion came in the last order (88.6%, 88.4%, 88% and 87.9%), respectively.

The same trend was achieved for the efficiency of the tested pesticides on the adult populations, Chalinger, Admiral and Mospilan were the highest effective pesticides, they came in the 1st order (92.9%, 92.8%, and 91.8%) whereas Marshal, Sulfer, Actara and Orion came in the 2nd order (86.2%, 85.6%, 84.4%, and 84.3%) respectively.

C- Combined effect of the tested pesticides on the insect populations in the two years:

Reduction percentages of the insect populations in 2002 and 2003 were statistically analyzed combined over the two years to determine the final effect of tested pesticides for control *P. tenuivalvata*.

The obtained results in Table 4 showed that, Chalinger was the highest effective compound on the nymphal populations (94.8%) followed by Admiral and Mospilan in the 2nd order (93.6% and 93.4%). Marshal came in the 3rd order (88.9%). Sulfer & Actara came in the 4th order (88.1% & 88%) and Orion was the least one (86.8%).

The effect of the tested pesticides on the adult populations combined over the two years (Table, 4) showed that, Chalinger, Admiral and Mospilan were the highest effective compounds on the adult populations, they came in the 1st order (93.5%, 92.5% and 91.9%), respectively. Marshal came in the 2nd order (86.6%) Sulfer, Actara and Orion were less effective on the adult populations (85.6%, 84.6% and 83.5%).

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Table 4. Efficiency of some pesticides on sugarcane soft scale insect, *P. tenuivalvata* infesting sugarcane at Kom Ombo district, Aswan Governorate combined over the two years (2002 & 2003)

Pesticide	Average % of reduction / year						% of reduction combined over the two years (2002 & 2003)		
	1 st Year (2002)			2 nd Year (2003)			Nymph	Adult	Total
	Nymph	Adult	Total	Nymph	Adult	Total			
1-Challenger 36%EC	94.8%	94.0%	94.7%	94.8%	92.9%	94.5%	94.8% a	93.5% a	94.6% a
2- Admiral 10% EC	93.6%	92.1%	93.3%	93.6%	92.8%	93.5%	93.6% b	92.5% a	93.4% b
3- Mospilan 20% SP	93.9%	92.0%	93.5%	93.0%	91.8%	92.8%	93.4% b	91.9% a	93.1% b
4- Actara 25 % WP	87.4%	84.8%	86.8%	88.6%	84.4%	88.1%	88.0% cd	84.6% bc	87.6% cd
5- Marshal 25% WP	89.2%	86.9%	88.3%	88.4%	86.2%	88.0%	88.9% c	86.6% b	88.2% c
6- Orion 30 % EC	85.7%	82.6%	85.5%	87.9%	84.3%	86.5%	86.8% d	83.5% c	86.6% d
7 Sulfer 30% (liquid)	88.1%	85.2%	87.7%	88.0%	85.6%	87.8%	88.1% cd	85.6% bc	87.7% c
F value :							75.4**	29.9**	101.7**
LSD at 0.05 level :							1.10	1.98	0.86

Note:

Percent of reduction were transferred to arc sine value before conducting analysis of variance.

Means in the same column not followed by the same letter is significantly different ($P < 0.05$) using LSD test in MSTATC computer Program.

The efficiency of the evaluated pesticides on the insect populations (nymphs and adults) combined over the two years showed in Table, 4. Results of statistical analysis indicate that, Chalinger was the highest effective compound (94.6%) on the insect populations followed by Admiral and Mospilan in the 2nd order (93.4% and 93.1%). Marshal and Sulfer came in the 3rd order (88.2% and 87.7%), Orion was the least one (86.6%).

Literature review showed that, Admiral 10% EC with rate of 0.05% gave 83.3% reduction after 6 weeks of application against *Parlatoria oleae* (Colvee) infesting plum trees in Wadi El-Natrun (El-Imery *et al.*, 1999) whereas, Helmy *et al.* (2002) showed that Admiral 10% EC at 0.05% gave 85.7% and 80.3% reduction percentages in *Ceroplastes floridensis* Comstock and *Aonidiella aurantii* (Maskell) populations on navel orange trees in Qalubiya governorate.

Tawfik, *et al.* (2002) showed that, Admiral 10% EC at rate of 0.05% gave 89.2% reduction percentage in the population of *Aonidiella aurantii* on acidless orange in Beni-Swaif governorate whereas, El-Amir (2002) shows that, Admiral 10% EC at rate of 0.05% gave 96.1% reduction after 3 months of application against *Parlatoria oleae* on olive trees in Ismailia governorate. Hassan (2003) showed that, Admiral 10% EC at rate of 0.05% gave 86.7% reduction for *Ferrisiana virgata* (Cockerell) and 94% reduction for *Hemiberlesia lataniae* (Signoret) and 88.5% for *Lepidosaphes tapleyi* infesting guava trees in Giza governorate.

El-Wan *et al.* (In Press) evaluated the efficiency of six organophosphorus insecticides for control *P. tenuivalvata* on sugarcane fields in Naga-Hammadi district, Qena governorate and showed that, Actellic 50% EC, Sumithion 50% EC, Dursban 48% EC and Dimethoate 40% EC (at rate of 0.15% for each one) reduced the insect populations (Nymphs and Adults) to 98.7%, 98.1%, 96.6% and 95.8%, respectively. Whereas Malatox 50% WP at rate 0.3% gave reduction percentage of 95.7% and Malathion 57% EC at 0.25% reduced the populations to 95.3%.

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تقييم حقلي لبعض المبيدات الحشرية في مكافحة حشرة القصب الرخوة
Pulvinaria tenuivalvata (Newstead) على قصب السكر في

كوم أمبو - محافظة أسوان

السيد عبد الحميد علوان ، شادية محمود عاصم ، محمود محمد خيوه ،
محمد سيد إبراهيم شلبي

معهد بحوث وقاية النباتات - مركز البحوث الزراعية - الدقي - الجيزة

تم إجراء البحث في كوم أمبو بمحافظة أسوان لمدة عامين متتاليين (٢٠٠٣/٢٠٠٢) لتقييم كفاءة سبع مركبات تمثل سبعة مجموعات مختلفة من المبيدات الحشرية في مكافحة حشرة قصب السكر الرخوة *Pulvinaria tenuivalvata* (Newstead) على قصب السكر لحماية محصول قصب السكر من الضرر الناتج عن الإصابة .

وإتضح من النتائج كفاءة المبيدات المختبرة في مكافحة حشرة القصب الرخوة في كلا العامين على التوالي . كان أكثر المبيدات فعالية في خفض أعداد الحوريات المبيد شالنجر (٩٤,٨%) حيث جاء في المرتبة الأولى ، ثم أدميرال وموسبيلان في المرتبة الثانية (٩٣,٦% & ٩٣,٤%) ومارشال في المرتبة الثالثة (٨٨,٩%) ، وجاء في المرتبة الرابعة الكبريت السائل ٣٠% واکتارا (٨٨,١% & ٨٨%) وكان اوريون الأقل تأثيرا (٨٦,٨%) .

وتبين من النتائج أيضا كفاءة المبيدات المختبرة في خفض أعداد الحشرة الكاملة ، وكانت أكثر المبيدات فعالية شالنجر، ادميرال وموسبيلان (٩٣,٥% ، ٩٢,٥% ، ٩١,٩%) وجاء مارشال في المرتبة الثانية (٨٦,٦%) وكان الكبريت السائل ٣٠% ، اکتارا ، اوريون في المرتبة الأخيرة (٨٥,٦% ، ٨٤,٦% ، ٨٣,٥%) .

كما اتضح من النتائج كفاءة المبيدات المستخدمة في خفض أعداد الحشرة بصفة عامة (حوريات وحشرات كاملة) حيث كان أعلاها كفاءة في خفض التعداد الكلي لأطوار الحشرة شالنجر في المرتبة الأولى (٩٤,٦%) ، وكان أدميرال وموسبيلان في المرتبة الثانية (٩٣,٤% & ٩٣,١%) ، وجاء مارشال والكبريت السائل ٣٠% في المرتبة الثالثة (٨٨,٢% & ٨٧,٧%) وفي المرتبة الأخيرة اوريون (٨٦,٦%) .