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EFFICIENCY OF THE PARASITOID *Coccophagus Scutellaris* (DALMAN) AND SOME INSECTICIDES AGAINST THE SOFT SCALE INSECT *Pulvinaria tenuivalvata* (NEWSTED) IN SUGARCANE FIELDS AT ASWAN GOVERNORATE, EGYPT.

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ABSTRACT

The present investigation was carried out at Awadlab village-Edfu district, Aswan Governorate during 2003& 2004 seasons to magnifying the role of parasitoid *Coccophagus scutellaris* (Dalman) as element from (IPM) and evaluated seven insecticide from different groups for control the soft scale insect *Pulvinaria tenuivalvata* (Newsted) in sugarcane fields. The obtained results clearly showed that, percentage of parasitism significantly increased from 17.64% before release to 60.44% after release in the 1st season while in the 2nd season increased from 27.45% to 73.88%, also percentage of estimated parasitism recorded 32.62%& 37.87% in the 1st & 2nd seasons respectively. On the other hand in the 1st season the highest effect after15 days and 30 days in total individual (nymph & adult) observed in Actellic (95.77% & 98.21%) flowed by Malathio (91.47% & 95.63%) , Sulfur (89.01% & 94.37%) , Admiral(88.94% & 93.86%) (Malathion+ Sulfer) (87.86 % & 94.37 %) Agrieen (86.52 % & 92.11%) and Manf(84.81 % & 89.59 %) respectively, while in the 2nd season the data showed that the highest effect after 15 days in total individual (nymph & adult) observed in Actellic which recorded 95.55% followed by Malathion, Sulfer, Admiral, Agrieen , (Malathion + Sulfer) and manf which recorded 91.33%, 87.96 % , 87.51 %, 86.17 %, 85.33% and 84.71% respectively. while after 30 days the highest one was Actellic which recorded 98.3% followed by Sulfer, Malathion, Agrieen, Admiral, (Malathion+ Sulfer) and manf which recorded 94.79 %, 94.71%, 94.61%, 94.36%, 93.44% and 92.2% respectively.

INTRODUCTION

Sugarcane (*Saccharum officinarum* L.) is one of the most important sources of sugar production that should be grown in large scale in tropical and sub tropical countries. In Egypt sugarcane is the second most important economic crop, cultivated area about 312 thousand feddans. Numerous and serious pests infesting sugarcane plants and cause a lot of damage which affect sugarcane yield and juice quality, the main piercing sucking insect the red striped soft scale *Pulvnaria tenuivlvata* (Newstead), Watson & Foldi, (2001) are considered recently the key pests of sugarcane production in Egypt.

The pest suck the cell of the leaves and excrete a large of honeydew, that cover plant leaves and encourages the growth of sooty mould fungus which give the infested plants dirty blake appearance that effect on photosynthesis and respiration processes of sugarcane plants Ali et *et al*., (2000) , Shalaby, (2002) and Saleh, (2005). This pest in the field infected by

Coccophagus scutellaris (Dalman) which was parasitism on the soft scale insect *P. tenuivalvata* cased reduced in population of nymphal and adults stages in sugarcane field Hendawy *et al*., (2002). Shalaby, (2002) and Abd El-Samea (2003).

Under severe attack, the pest caused economic loss in both sugarcane quantity(yield) and quality (juice extraction) so that the present study directed to estimated seven insecticide against *P. tenuivalvata*

The aim of this study to evaluate the role of the parasitoid *C. scutellaris* in reduced the pest population and estimated seven chemical compounds from different groups for control the soft scale insects *P. tenuivalvata* in sugar cane fields.

MATERIALS AND METHODS

1-Distribution of parasitoid.

An area about one feddan were cultivated by C9/54 sugarcane variety at Awadlab village-Edfu district, Aswan Governorate in November 2003 (first ratoon) while in the second, it was in August 2004 (second ratoon)this area were infested with soft scale insect, *P. tenuivalvata* about half feddan was chosen to be a treatment. Another half feddan, far with about 500 m from the treatment, was also chosen to be a control. Each of both areas was divided into four equal plots 525 m^2 for each. An infested sugarcane field was chosen to collect leaves with scale insects hosted black color stage of parasitoid. The leaves were transferred to the laboratory and kindly tested to remove all uninfested scales. A group of 1000 infected insects was randomly distributed, in each specialized area in the treatment, as 3-5 insects per plant. One month later, 100 leaves were randomly collected from each plot in the control or in the treatment to count numbers of infected and uninfected scales.

Estimated increase in the parasitism was calculated as follows:

$$\% \text{ increase} = (T_a - T_b) - (C_a - C_b)$$

Whereas: T_a = % parasitism in the treatment after releasing
T_b = % parasitism in the treatment before releasing
C_a = % parasitism in the control after releasing
C_b = % parasitism in the control before releasing

2-Chemical control

This experiments carried out at Awadlab village-Edfu district, Aswan Governorate to evaluate the efficiency of seven insecticides from deferent groups to control of the soft scale insects in sugarcane field compared with untreated treatment (Chick) .this insecticides were tabulated in next table

Table (1): List of evaluated insecticides in Awadlab village at Edfu district, Aswan Governorate during 2003/2004 seasons.

No.	Trade name	Common name	Pesticide group	Rate of application
1	Actellic50%Ec	Pirimiphos-methel	OP	150ml/100 liter of water
2	Malathion 57%EC	Malathion	OP	250ml/100 liter of water
3	Malathion +Sulfur	Malathion + Sulfur	OP* Natural (Mixed-up)	100 ml(Malathion)+400g(Sulfur)ml /100 liter of water
4	Sulfur 30%EC	Sulfur	Natural	Liter/100 liter of water
5	Agrieen	Agrieen	Bio(BT)	250g/100 liter of water
6	Manf (6) 10% Ec	Manf	Natural Oils	300ml/100 liter of water
7	Admiral 10%EC	Pyriproxyfen	Juvenile hormone mimic	50ml/100 liter of water

This treatment were percent in 1680 m^2 were cultivated by the commercial variety C9/54, in November 2003 (first ratoon) while in the second, it was in August 2004 (second ratoon) randomized complete block design with three replicates 70 m^2 for each, all the experimental plots received the normal agricultural treatments, the samples were picked up to random with rate of 10 leaves/ replicate (40 leaves /treatment) before spraying then after 15 and 30 days of spraying. The collected samples transferred to laboratory in paper pages and inspected , nymphs and adults were counted and recorded.

Percent of reduction in the soft scale insect population was estimated using Henderson and Tilton equation (1955) to determine the effect after 15 days and the effect after 30 days intervals. All the statistical analyses of the present work were conducted using COSTAT computer program.

RESULTS AND DISCUSSION

1-Effect of parasitoid in decreasing *P.tenuivalvata* number

Effect of released the parasitoid *C. scutellaris* in sugarcane fields to determine the role of parasitoid as element of protection the crop from the soft scale insect during two successive seasons are shown in Table (2). The data evident that, in 1st season the percent of parasitism recorded 17.64 % in treatment before the releasing while in control recorded 20.93% this value increased significantly after the releasing which recorded 60.44% and 31.11%in treatment and control respectively, the same trend was evident in the 2nd season which recorded 27.45% in treatment and 25.67% in control before the releasing this value increased after the releasing which recorded 73.8% and 34.24% in treatment and control respectively. On the other hand the data in the same table evident that, the releasing process increased the number of parasitoids in the distribution area of parasitoids more than the natural parasitoids which were 182 (in treatment) and 129 (in natural) before releasing, this number increasing significantly after releasing which recorded 970 (in treatment) and 298 (in the chick) in the 1st season. The data showed the same trained in the 2nd season which were 395 (in treatment) and 337 (in natural) before releasing this number increasing significantly after releasing which recorded 1930 in treatment and 809 in natural.

Table (2) : Percent of parsitism in the *P.tenuivalvata* at Aswan Governorate during 2003 & 2004 seasons

Seasons	Releasing	Area	No. soft scale/100 leaf		% prasitism	Total no. parasitism	% of Estimated parasitism
			Total	Infected			
2003	Befor	Treat.	578	102	17.64	182	32.62
		control	387	81	20.93	129	
	After	Treat.	852	515	60.44	970 a	
		control	646	201	31.11	298 b	
2004	Befor	Treat.	783	215	27.45	359	37.78
		control	701	180	25.67	337	
	After	Treat.	1470	1088	73.88	1930a	
		control	1241	425	34.24	809 b	

Calculated T. value = 17.20 (2003) season. Calculated T. value = 13.75 (2004) season.

Aim from this work magnifies the role of the parasitoid *C. scutellaris* against the soft scale insects of sugarcane in fields. It cleared significant increased in the infected scales population recorded a maximum of 60.44% and 73.8% in the two seasons, respectively. The estimated increase in the parasitism due to release ranged between 32.62% in the 1st season and 37.78% in the 2nd one.

Paramonova *et al.*, (1984) reported that 50% of females and 56% of larvae of *Pulvinaria ribesiae* were infected with parasite complex. Also Shalaby (2002) reported that, in 1997 sugarcane season the rate of parasitism with *C. scutellaris* in *P. tenuivalvata* population was 22.2% in July, 33.3% in September and 60.15% in August. In 1998 sugarcane season, Abd-rabou (2002) reported 26 and 22 % only as a maximum parasitism in *Saissetia coffeae* (Walker) and *S. oleae* (Olivier) with the same parasitoid, respectively. In the same time, the releasing not only increased the parasitism percentages but also increased the mean number of parasitoid per a host, while it ranged 1.19 – 1.29 in the natural infestation, it raised to 1.57 – 1.82 after releasing. In this respect, Abd-El Samea (2003) recorded 1 – 10 parasitoids emerged from one host according to the stage in the laboratory.

2-Effect of some insecticides in decreasing *P. tenuivalvata* number

Evaluate the efficiency of seven insecticides from different groups and check to control of the soft scale insect *P.tenuivalvata* in sugarcane field during 2003 and 2004 seasons tabulated in Tables (3 & 4) the data showed that, the population of nymphs, adults and total individual of *P.tenuivalvata* as well as effect of tested insecticides after 15 days of application and the effect after 30 days of application. In the 1st season the data showed in Table (3) and indicated that, the highest effect after 15 days on nymph population recorded in Actellic flowed by Malathion, Sulfur and Admiral which recorded highest of reduction reached to (96.22%) , (92.57%), (90.29%)and (90.03%) respectively, whereas the other tested insecticides recorded less effective, Malathion+ Sulfer (89.71%) Agrieen (89.87%), and Manf(87.9%) respectively, while Actellic was the highest one in case of adult population

which recorded (94.54%) fowloed by Malathion ,Sulfur, Admiral, Malathion+ Sulfur , Agrieen and Manf which recorded (91.1%),(85.4%), (83.8%), (81.1%), (77.02%), and (69.85%) respectively. On the other hand the effect after 30 days of the tested insecticides on the nymph and adult population were recorded in the same Table which showed that, the highest reduction of nymph population were in Actellic (98.5%) followed by Malathion, , Sulfer, Admiral, Malathion + Sulfsr, Agrieen and Manf which recorded (95.94%), (94.24%), (94.74%), (94.19%), (93.69%) and (92.7%) respectively while in the adult population Actellic was the highest one which recorded (97.37%) followed by Malathion, Sulfur, Admiral, Malathion+Sulfur, Agrieen, and Manf which recorded (94.86%) , (91.99%), (91.24%), (87.69%),(85.58%) and (73.45%) respectively,

Statistical analysis of data showed the highly significant differences between chick treatment and all tested insecticides but not found significant deference between tested insecticides.

The efficiency of the tested insecticides was clear in the same Table the data evident that, an average percent of reduction which recorded the highest value in Actellic which were (96.99%) followed by Malathion (93.55%), Sulfur (91.69%), Admiral(91.17%), Malathion+Sulfur (90.35%), Agrieen(89.31%) and the last one Manf which recorded (87.2%).The data in the 2nd season showed in Table (4) and indicated that, the highest effect after 15 days on nymph population recorded in Actellic flowed by Malathion, Admiral and Sulfur which recorded highest of reduction reached to (96.06%) , (92.31%), (90.44%)and (90.38%) respectively, whereas the other tested insecticides recorded less effective, Agrieen (89.87%), Malathion+ Sulfer (88.04%)and Manf(87.92%) respectively, while Actellic was the highest one on adult population which recorded (95.16%) fowloed by Malathion ,Sulfur, Admiral, Malathion+ Sulfur, Manf and Agrieen which recorded (90.65%), (83.16%), (81.69%), (80.14%), (77.53%), and (76.51%) respectively. On the other hand the effect after 30 days of the tested insecticides on the nymph and adult population were recorded in the same table which showed that, the highest reduction of nymph population were in Actellic (98.46%) followed by Malathion, Agrieen, Sulfer, Admiral, Malathion + Sulfsr and Manf which recorded (96.73%), (96.22%), (95.72%), (95.54%), (94.77%) and (93.4%) respectively, while in the adult population Actellic was the highest one which recorded (98.35%) followed by Sulfur, Admiral, Malathion Agrieen, Malathion+Sulfur, and Manf which recorded (93.52%) , (92.7%), (92.47%), (91.56%) , (91.29%) and (90.86%) respectively, Statistical analysis of data showed the highly significant differences between chick treatment and all tested insecticides but not found significant deference between tested insecticides.

T 3

T4

The efficiency of the tested insecticides was clear in the average percent of reduction which recorded the highest value in Actellic which were 96.92% followed by Malathion (93.02%) Sulfur (91.37%) Admiral (90.93%) Agrieen (90.39%) Malathion+Sulfur (89.38%) and the last one Manf which recorded (88.45%).

Many authors data agreed with the above mentioned data they showed that, Admiral 10% EC with rate 0.05% gave 83.3% reduction after 6 weeks of application against Parlatoria oleae infesting plum tree in wadi El-natrun (El-Imery *et al*.1999) whereas, Helmy *et al*.(2002) showed that 80.3% reduction percentages in *Ceroplastes floridensis* Comstock and *Aonidiella aurantii* (Maskell) population on navel orange tree in Qalubiya Governorate. Tawfik, *et al*. (2002) showed that, Admiral 10% EC at rate 0.05% gave 89.2% reduction percentage in the population of *Aonidiella aurantii* on acid less orange in Bni-Swaif Governorate whereas , El-Amir (2002) showed that Admiral 10% EC at rate 0.05 % gave 96.1% reduction after 3 months of application agents *Parlatoria oleae* on olive trees in Ismailia governorate.

ElWan *et al.* (2005a) evaluated the efficiency of six organophosphorus insecticide 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 .15% for each one) reduced the insect population (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 population to 95.3%.

ElWan *et al*. (2005b) evaluated the efficiency of seven insecticide for control *P. tenuivalvata* on sugarcane fields in Kom-Ombo district, Aswan Governorate and 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 3rd order (88.9%) . sulfer & Actara came in the 4th order (88.1% & 88%) and Orion was the last one 86.8%). Moreover, Chalinger Admiral and Mospilan were the highest effective compound on the adult populations 93.5,92.5 and 91.9 followed by Marshal in 2nd order (86.6%) . sulfer & Actara and Orion were less effective pesticide on adult populations (85.6, 84.6 and 83.5).

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كفـاءة الطفيـل *Coccophagus scutellaris* (Dalman) وبعـض المبيـدات الحشـرية فـى مكافحـة الحشـرة القشـرية *الرخـوة Pulvinaria tenuivalvata* (newsted) فى حقول قصب السكر بمحافظة اسوان

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تم اجراء هذا البحث بقرية العوضلاب مركز ادفو محافظة اسوان خلال الموسمين ٢٠٠٣ ، ٢٠٠٤ لدراسة الدور الذى يلعبه الطفيل *Coccophagus scutellaris* كعنصر من عناصر المكافحة المتكاملة كذلك تقييم سبعة مبيدات حشرية تنتمى الى مجموعات مختلفة لمكافحة الحشرة القشرية الرخوة *P.tenuivalvata* فى حقول قصب السكر.

حيث تم دراسة كفاءة الطفيل عن طريق جمع الحشرات القشرية المتطفل عليها فى الحقول المصابة بشدة وإطلاقها في حقول أخرى مصابة ذات مستوى تطفل منخفض ولقد أوضحت النتائج المتحصل عليها ان نسبة التطفل زادت زيادة معنوية من ١٧,٦٤% قبل الاطلاق الى ٦٠,٤٤% بعد الاطلاق فى الموسم الاول بينما فى الموسم الثانى زادت نسبة التطفل من (٢٧,٤٥% الى ٧٣,٨٨ %) كما سجلت النسبة الفعلية للتطفل (٣٢,٦٢ % - ٣٧,٨٧ %) فى الموسمين الاول والثانى على التوالى .

من ناحية اخرى فان النتائج المتحصل عليها اظهرت كفاءة المبيدات المختبرة فى مكافحة الحشرة القشرية الرخوة فى كلا الموسمين ، ففى الموسم الاول اظهر الاكتيليك اعلى تاثير بعد ١٥ ،٣٠ يوم حيث سجل خفضا (٩٥,٧٧ % - ٩٨,٢١ %) يليه الملاثيون الذى سجل (٩١,٤٧ % - ٩٥,٦٣ %)، الكبريت (٨٩,٠١% - ٩٤,٣٧ %) ، الادميرال (٨٨,٤٩% - ٩٣,٨٦ %)، مخلوط الملاثيون مع الكبريت (٨٧,٨٦ % - ٩٢,٨٤ %) الاجرين (٨٦,٥٢ % - ٩٢,١١ %) واخيرا سجل منف (٨٤,٨١ % - ٨٩,٥٩ %) بعد ١٥ ، ٣٠ يوم على التوالي . بينما فى الموسم الثانى سجل الاكتليك اعلى تأثر بعد ١٥ يوم ٩٥,٥٥ % يليه الملاثيون ، الكبريت ، الادميرال ، الاجرين ،(الملاثيون + كبريت) ، ثم منف حيث سجلت نسب الخفض ٩١,٣٣ % ،٨٧,٩٦ % ، ٨٧,٥١ % ، ٨٦,١٧ % ، ٨٥,٣٣ % ، ٨٤,٧١ % على التوالى. كذلك بالنسبة للتأثير بعد ٣٠ يوم سجل الاكتليك اعلى اثر باقى ٩٨,٣% يليه الكبريت ، الملاثيون ، الاجرين ، الادميرال ، (الملاثيون + الكبريت) ، منف حيث كانت نسب الخفض ٩٤,٧٩ % ، ٩٤,٧١ % ، ٩٤,٦١ % ، ٩٤,٣٦ % ، ٩٣,٤٤ % ، ٩٢,٢ % على التوالى .

Table (3): Efficiency of some insecticides on the soft scale insect, *P. tenuivalvata* infested sugarcane plants in Awadlab village at Edfu district,Aswan Governorate in 2003 season

Insecticides	Pre-spraying count			Initial effect after 15 days			Residual effect after 30 days			Average percent of reduction		
	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total
Actellic50%Ec	1214	462	1676	57 b	23 b	80	24 b	13 b	37	40.5	18	58.5
				96.22	94.54	95.77	98.5	97.37	98.21	97.36	95.95	96.99
Malathion 57% Ec	1101	382	1483	112 b	31 b	143	59 b	21 b	80	85.5	26	111.5
				92.57	91.1	91.47	95.94	94.86	95.63	94.25	92.98	93.55
Malathion + Sulfer	1096	296	1392	140 b	51 b	191	84 b	39 b	123	112	45	147
				89.71	81.1	87.86	94.19	87.69	92.84	91.95	83.39	90.35
Sulfer 30% L	813	338	1151	98 b	45 b	143	51 b	29 b	80	74.5	37	111.5
				90.29	85.4	89.01	95.24	91.99	94.37	92.76	88.69	91.69
Agrieen	1093	272	1365	151 b	57 b	208	91 b	42 b	133	121	49.5	170.5
				88.87	77.02	86.52	93.69	85.58	92.11	91.28	81.3	89.31
Manf	1018	211	1229	153 b	58 b	211	98 b	60 b	158	125.5	59	184.5
				87.9	69.85	84.81	92.7	73.45	89.59	90.3	71.65	87.2
Admiral 10%Ec	994	352	1346	123 b	52 b	175	69 b	33 b	102	96	42.5	138.5
				90.03	83.8	88.49	94.74	91.24	93.86	92.38	87.52	91.17
Control	1044	534	1578	1297 a	487 a	1784	1378 a	572 a	1950	1337.5	529.5	1867
F value				92.11**	126.12**		254.44**	128.52**				
LSD at 0.05				43.99	14.1		29.39	17.01				

Table (4): Efficiency of some insecticides on the soft scale insect, *P. tenuivalvata* infested sugarcane plants in Awadlab village at Edfu district,Aswan Governorate in 2004 season

Insecticides	Pre-spraying count			Initial effect after 15 days			Residual effect after 30 days			Average percent of reduction		
	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total	Nymphs	Adults	Total
Actellic50%Ec	1296	426	1676	60 b	20 b	80	25 b	8 b	33	42.5	14	56.5
				96.06	95.16	95.55	98.46	98.35	98.3	97.26	96.75	96.92
Malathion 57% Ec	1095	397	1492	99 b	36 b	135	45 b	34 b	89	72	35	107
				92.31	90.65	91.33	96.73	92.47	94.71	94.52	91.59	93.02
Malathion + Sulfer	1032	332	1364	145 b	64 b	209	68 b	33 b	101	106.5	48.5	155
				88.04	80.14	85.33	94.77	91.29	93.44	91.4	85.7	89.38
Sulfer 30% L	929	312	1241	105 b	51 b	156	50 b	23 b	73	77.5	37	114.5
				90.38	83.16	87.96	95.72	93.52	94.79	93.05	88.34	91.37
Agrieen	1008	307	1315	120 b	70 b	190	48 b	32 b	80	84	51	135
				89.87	76.51	86.17	96.22	91.56	94.61	93.04	84.03	90.39
Manf	986	298	1284	140 b	65 b	205	82 b	31 b	133	111	48	159
				87.92	77.53	84.71	93.4	90.86	92.2	90.6	84.19	88.45
Admiral 10%Ec	908	349	1257	102 b	62 b	164	51 b	29 b	80	76.5	45.5	122
				90.44	81.69	87.51	95.54	92.7	94.36	92.99	87.19	90.93
Control	1161	513	1674	1365 a	498 a	1749	1463 a	584 a	1891	1414	541	1955
F value				111.39**	68.59**		218.03**	229.2**				
LSD at 0.05				42.57	19.33		34.15	13.16				