

**MAXIMIZING THE PARASITISM ROLE OF *COCCOPHAGUS SCUTELLARIS* AGAINST THE SOFT SCALE INSECT; *PULVINARIA TENUIVALVATA* (NEWSTEAD) (HOMOPTERA: COCCIDAE) IN EGYPTIAN SUGAR-CANE FIELDS**

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**Abstract**

Field trials were carried out in Quena Governorate, Egypt, to maximize the role of the Aphelinid parasitoid; *Coccophagus scutellaris* to control the sugarcane soft scale insect; *Pulvinaria tenuivalvata* in 2003 and 2004 seasons. The work was attempted by collecting the natural parasitized scales from high infested field and releasing them in another field with low parasitism level. Results showed that parasitism level significantly increased with 3.7 and 3.1 times after releasing in 2003 and 2004 seasons, respectively. Also the mean number of parasitoids/infected scale increased in the treatment than in the control. Using the given equation, the actual increasing percent of parasitism were 27.7 and 34.7% in 2003 and 2004 seasons, respectively.

**INTRODUCTION**

The soft scale insect; *Pulvinaria tenuivalvata* (Newstead) is considered one of the main sugar cane pests in Egypt. It was recorded for the first time on sugar cane in Giza Governorate by Ali *et al.*, 1997. It attacks many of the fields in the region of sugar production causing severe damage for the foliage due to its feeding and fungi growing (Ali *et al.*, 2000). The chemical control in sugar cane fields is very difficult due to foliage intensity and crowded plants and the relative high temperature. The Aphelinid parasitoid; *Coccophagus scutellaris* (Dalman) is considered the main bio-mortality factor and attack a big portion of this insect population (Hendawy *et al.*, 2002.). In Byelorussia, Paramonova *et al.* 1984, reported that, *Pulvinaria ribesiae* was attacked with parasitoid complex, mainly *C. scutellaris*.

So, it is useful to maximize the role of the parasitoids against this pest, the target of this research to avoid the difficult application of the insecticides and minimize the pollution of the environment. In the same time this work is considered the first trial in this respect.

## MATERIALS AND METHODS

This work was carried out in sugarcane fields in Quena Governorate during two successive seasons. In the first season, the experiment was done in November 2003 (first ratoon cultivation) while in the second, it was in August 2004 (second ratoon cultivation). In each season an area of about half feddan, infested with soft scale insect, was chosen to be a treatment. Another half feddan, far with about 1 km from the treatment, was also chosen to be a check. Each of the two areas was divided to four equal plots with 10 m apart between each other. In the treatment area, 100 m<sup>2</sup> (in each plot) were subjected to receive collected parasitized soft scale insects.

### Parasitoid collection and releasing:

An infested sugarcane field was chosen to collect leaves with scale insects hosted black color stage of parasitoid. They were transferred to the laboratory and kindly tested to remove all healthy scales. A group of 1000 infected insects was randomly released, in each specialized area in the treatment, as 3-5 insects per plant. One month after releasing, 100 plant leaves were randomly collected from each plot of the check and the treatment to count numbers of those parasitized versus unparasitized scales to calculate the actual increase in the percent of parasitization 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 check after releasing

$C_b$  = % parasitism in the check before releasing

Number of parasitoids per insect was also recorded. All numbers were similarly counted directly before the releasing and T-test was used to analyze the differences between percent parasitization in the check and treatment.

## RESULTS AND DISCUSSION

Results obtained from the different experiments during the two successive seasons are shown in Table (1). The data revealed that, the parasitism level, in the first season, ranged 12.7 – 14.7% before releasing, significantly increased (3.7 times) to 47.0% after releasing. In the second season, the parasitism was generally higher; 17.3 – 20.7% and significantly increased by releasing the infected scales to reach a maximum of 63.9% i.e. 3.1 times as before releasing.

Data in the same table showed that, the releasing process increased the mean number of parasitoids/one host insect comparing with that of the natural parasitism. While this mean, in the first season, ranged 1.20 – 1.28 parasitoid individuals/a host, before releasing and increased to 1.57 with releasing compared with 1.27 in the natural parasitism. In the second season, this mean ranged 1.19 – 1.29, increased to 1.82 parasitoids /ISSI in the releasing treatment while was 1.41 in the check.

In general, the releasing of parasitoids in this work magnified the biological control potential against the soft scale insects in fields. It significantly increased the parasitism percentages to a maximum of 47.0 and 63.9% in the two seasons, respectively. The actual increase in the parasitism due to releasing ranged between 27.7% in the first season and 34.7% in the second one. Pramonova *et al.*, (1984) reported that 50% of females and 56% of nymphs of *Pulvinaria ribesiae* were parasitized with parasite complex, mainly, *C. scutellaris*. In Egypt, Abd-rabou (2002) reported 26 and 22 % only as a maximum parasitism in *Saissetia coffeae* and *S. oleae* with the same parasitoid, respectively. In the same time, the releasing not only increased the parasitism percentages but also increased the mean number of parasitoids / 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, Abdel Samea (2003) recorded 1 – 10 parasitoids emerged from one host according to the stage in the laboratory.

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Table (1) : Percent parasitization in the soft scale insect before and after releasing of parasitoids in the field during 2003/2004 and 2004/2005 seasons.

Season	Inspection time	Area	No. soft scale insect / 100 leaf			Actual parasitism increase (%)	Average No. Parasitoid/one host
			Total	parasitized	Parasitized %		
2003/4	Before releasing	Treat.	733	93	12.7	1.28	1.28
		Check	328	48	14.7	1.20	1.20
	After releasing	Treat.	745	350	47.0(34.3 a)	1.57	1.57
		Check	403	86	21.3 (6.6 b)	1.27	1.27
2004/5	Before releasing	Treat.	966	200	20.7	1.19	1.19
		Check	968	167	17.3	1.29	1.29
	After releasing	Treat.	1369	875	63.9(43.2 a)	1.82	1.82
		Check	1066	275	25.8 (8.5 b)	1.41	1.41

- Means had different letters within each season are statistically different and represents the difference from the similar before releasing.

- Calculated T = 7.08(2003/4 season) & 19.77 (2004/5 season).

- Number between brackets refer to increasing rate of % parasitism

## تعظيم دور طفيل كوكوفاجس سكيوتيلارس في مقاومة الحشرة القشرية الرخوة *PULVINARIA TENUIVALVATA* في حقول قصب السكر

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معهد بحوث وقاية النباتات ، مركز البحوث الزراعية ، الدقي.

أجريت تجربة حقلية بمحافظة فنا خلال موسمي ٢٠٠٣ و ٢٠٠٤ لتعظيم دور طفيليات الحشرات القشرية الرخوة في المكافحة البيولوجية للحشرة القشرية الرخوة على قصب السكر. وأجريت التجربة بجمع الحشرات القشرية الرخوة المتطفل عليها من حقول القصب المصابة بشدة وإطلاقها في حقول أخرى بها نسبة تطفل اقل. وأوضحت النتائج أن مستوى التطفل ازداد بدرجة معنوية عنه قبل الإطلاق بحوالي ٣,٧ و ٣,١ مرة في الموسم الأول والثاني على الترتيب. وأيضا ازدادت شدة التطفل في المعاملة عن المقارنة. وتم حساب الزيادة الفعلية في النسبة المؤية للتطفل باستخدام معادلة حسابية حيث كانت ٢٧,٧ و ٣٤,٧% في موسم ٢٠٠٣ و ٢٠٠٤ على الترتيب.