

Annals Of Agric. Sc., Moshtohor,
Vol. 42(4): 2061-2067, (2004).

**EFFECT OF CULTURAL AND CHEMICAL TREATMENTS ON THE
 OLIVE SCALE INSECT, *Leucaspis riccae* Targ. (HOMOPTERA,
 DIASPIDIDAE) AND ITS PARASITOID, *Aphytis libanicus* TRABOULSI
 (HYMENOPTERA, APHELINIDAE)**

BY

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ABSTRACT

Effect of pruning and spraying with KZ oil only or KZ oil 1.5 l / 100 l water and Malathion 150cm³/ 100 l water on the population of *Leucaspis riccae* Targ. and its parasitoid *Aphytis libanicus* Traboulsi was studied. Obtained results indicated that percentages of mortality in treated olive trees ranged between 70.93 ± 8.89 % and 82.95 ± 6.89 %, while it was 21.25 ± 5.74 % in the untreated trees.

Pruning more than once affected negatively the percentage of parasitism. On the other hand, pruning on Nov. and spraying with KZ oil was suitable for building up of the parasite population. In all treatments, percentage of parasitism reached its maximum (12 - 18 %) in February, while in untreated trees it reached its maximum (19 %) in November.

Key words: *Leucaspis riccae*, *Aphytis libanicus*, mineral oils, Malathion.

INTRODUCTION

The armored scale insects (Fam. Diaspididae) constitute one of the most economically important and destructive groups of pests to olive trees. More than 60 species have been recorded as infesting this host plant around the world (Borchsenius, 1966), one of these pests is the olive scale insect, *Leucaspis riccae* Targ. (Homoptera, Diaspididae), which have been found in Cyprus, Greece, Iraq, Israel, Italy, Morocco, Tunisia, Turkey and Egypt (Soliman, 1956 and Rosen, 1990). Outbreaks have been recorded in Israel and Italy (Panis and Marro, 1985), in Greece (Argyriou and Kourmadas, 1981) and in Iraq (Rizk and Mohamed, 1981).

El-Hakim and Kishk, 1988 mentioned that pruning as a method for suppressing *L. riccae* population was effective; however *Aphytis libanicus* Traboulsi was recorded as a parasitoid of this pest in Egypt (Moursi and Hegazi, 1983 and Abd-Rabou, 2002).

The aim of this work is to study the effect of pruning and chemical control treatments by using KZ oil and Malathion on the population of *L. riccae* and its parasitoid *A. libanicus* on olive trees at Epishway, Fayoum Governorate, Egypt.

MATERIALS AND METHODS

The present study was carried out in an unsprayed olive orchard located in Epishway district, Fayoum Governorate. The research area was divided to 5 treatments each of 196 m² and included 9 trees in 3 rows (3 trees x 3 rows). Each row represented one replicate.

Pesticides:

a- Mineral oil

KZ oil produced by Kafr El Zayat Company for chemicals and insecticides and used at a concentration of 1.5 l/100 l water.

b- Malathion

Malason 57 % EC, the active ingredient produced by Cheminova Agro / Denmark and manufactured by Kafr El Zayat Company and used at a concentration of 1.5 l/1000 l water.

Treatments: The five treatments were:

- Tr. 1: Pruning on Nov., 25th 2000 and Feb., 28th 2001 then spraying with mineral oil (KZ oil) on May, 9th 2001
- Tr. 2: Pruning on Nov., 25th 2000 and Feb., 28th 2001 then spraying with Malathion on May, 9th and mineral oil on June, 17th 2001.
- Tr. 3: Pruning on Nov., 25th 2000 then spraying with mineral oil on June, 17th 2001.
- Tr. 4: Pruning on Nov., 25th 2000 then spraying with Malathion on May, 9th 2001 and mineral oil on June, 17th 2001
- Tr. 5: Untreated control.

Sampling: Ten small branches, representing the cardinal directions and tree levels, were picked from each tree, from which 75 leaves were randomly chosen, so, 30 branches and 225 leaves (75 x 3) had been inspected per each replicate.

Sampling was carried out twice per month. Mortality percentages of *L. riccae* were recorded. From each sample 100 insects were randomly chosen and dissected to estimate percentage of parasitism.

Furthermore, samples from infested branches had been taken every two weeks from the untreated trees and kept under laboratory conditions in plastic jars (15×20cm) and covered with a piece of muslin for securing and identifying the emerging parasitoids.

The mean monthly temperature and relative humidity at the nearest meteorological station (Etsa, Fayoum Gov.) were recorded.

Statistical analysis:

Data were statistically analyzed using analysis of variance (ANOVA) to determine the significance of differences between treatments. F test ($P \leq 0.05$) was used.

RESULTS AND DISCUSSION

Effect of pruning and chemical treatments on *L. riccae*.

Data in Tables (1 and 2) indicated that in treatment of trees pruned on Nov. and Feb. and sprayed with KZ oil, mortality percent of *L. riccae* reached an average of $70.93 \pm 8.89\%$, while on trees pruned on the mentioned date and sprayed with KZ oil and Malathion, it reached an average of $81.48 \pm 9.74\%$.

From Tables (3 and 4) it can be concluded that when trees were pruned on Nov. and sprayed with KZ oil or KZ oil and Malathion, percentages of mortality reached $82.95 \pm 6.89\%$ and $78.66 \pm 6.71\%$ in average respectively. In the untreated control (Table 5) mortality percentage ranged between 11.82 and 30.48% with an average of $21.25 \pm 5.74\%$.

Statistical analysis showed that the differences between the control and treatments were highly significant ($P < 0.05$).

Obtained results are in agreement with those of El-Hakim and Kishk (1988) and Assem *et al.* (1993). El-Hakim and Kishk suggested that the removal of infested branches improve the air circulation into the tree, so that the hot air during May and June helps to kill the crawlers of the scales in spring. Assem *et al.* mentioned that when Malathion was used to control *L. riccae*, percentage of mortality reached 97.3 % in average in seasons 1991 and 1992.

Percentage of parasitism:

It is to be noted that, only one species of parasitoids has been emerged from the collected samples namely, *Aphytis libanicus* Traboulsi.

Obtained data indicated that percentage of parasitism was negatively affected when KZ oil and Malathion were used; it averaged $7.33 \pm 3.92\%$ and $7.92 \pm 4.28\%$ in treatments 2 and 4, respectively. While, it was $8.99 \pm 2.4\%$ and $10.77 \pm 4.45\%$ in average when KZ oil only was used (treatments 1 and 3) compared to $12.24 \pm 3.37\%$ in control treatment.

In conclusion pruning on Nov. and spraying with KZ oil was suitable for building up of the parasite population. Pruning more than once affected negatively percentage of parasitism. It was found also that percentage of parasitism reached its maximum in February (R.H. 61%) in all treatments except in control reached its maximum of 19 % in November (R.H. 64 %). The observed data are in agreement with those mentioned by Moursi and Hegazi (1983) who concluded that the parasitism by *Aphytis sp.* was pronounced during months in which R.H. tends to be relatively high.

Statistical analysis showed that the differences between treatments were significant ($P < 0.05$).

Table (1): Percentages of mortality and parasitism of *L. riccae* infested olives trees pruned on Nov. 2000 and Feb. 2001 and sprayed with KZ oil on May.

Month	Mean No. of individuals	Mean No. of alive individuals	Mortality %	Parasitism %	Temp. °C	R.H. %
Nov. 2000	63.0	13.0	79.37	12.0	20.9	64
Jan. 2001	197.5	71.0	64.05	11.55	15.5	66
Feb.	165.5	51.5	68.88	12.0	15.7	61
March	106.0	23.0	78.30	5.6	21.3	59
April	18.0	6.0	66.67	7.9	24.5	56
May	216.0	62.0	71.30	8.5	27.8	53
June	26.0	4.0	84.62	9.1	29.8	55
July	29.0	5.0	82.76	6.25	32.1	57
Aug.	27.0	11.0	59.26	8.0	32.5	58
Total	848.0	246.5				
Mean			70.93 ± 8.89	8.99 ± 2.4		

Table (2): Percentages of mortality and parasitism of *L. riccae* infested olives trees pruned on Nov. and Feb. and sprayed with Malathion and KZ oil.

Month	Mean No. of individuals	Mean No. of alive individuals	Mortality %	Parasitism %
Nov. 2000	36.0	14.0	61.11	4
Jan. 2001	39.5	6.5	83.54	4.5
Feb.	31.5	8.5	73.02	12.0
March	29.0	4.0	86.21	12.0
April	78.5	6.5	91.72	11.5
May	87.5	23	73.72	8.0
June	84.0	10	88.10	8.3
July	89.0	11	87.64	3.57
Aug.	46.0	13	71.74	2.1
Total	521	96.5		
Mean			81.48 ± 9.74	7.33 ± 3.9

Table (3): Percentages of mortality and parasitism of *L. riccae* infested olives trees pruned on Nov. 2000 and sprayed with KZ oil on June 2001.

Month	Mean No. of individuals	Mean No. of alive individuals	Mortality %	Parasitism %
Nov. 2000	30.0	7.0	76.67	15
Jan. 2001	63.5	17.0	73.23	13.95
Feb.	75	19.0	74.67	18.0
March	157	18.0	88.54	5.0
April	118	11.5	90.25	10.7
May	52.0	13.0	75.00	12.0
June	31	5.0	83.87	10.0
July	35	7.0	80.0	5.8
Aug.	28	3.0	89.29	6.5
Total	589.5	100.5		
Mean			82.95 ± 6.89	10.77 ± 4.45

Table (4): Percentages of mortality and parasitism of *L. riccae* infested olive trees pruned on Nov. 2000 and sprayed with malathion on May and KZ oil on June 2001.

Month	Mean No. of individuals	Mean No. of alive individuals	Mortality %	Parasitism %
Nov. 2000	91	24.0	73.63	12.5
Jan. 2001	79.5	9.5	88.05	10.0
Feb.	28.5	5.5	80.70	16.0
March	46.0	9.0	80.43	6.0
April	24.0	5.5	77.08	6.2
May	38.5	5.5	85.71	8.0
June	50.0	10.0	80.00	6.5
July	51.0	12.0	76.47	2.9
Aug.	46.0	16.0	65.22	3.2
Total	454.5	97		
Mean			78.66 ± 6.71	7.92 ± 4.28

Table (5): Untreated olive trees infested with *L. riccae*.

Month	Mean No. of individuals	Mean No. of alive individuals	Mortality %	Parasitism %
Nov. 2000	52.5	36.5	30.48	19
Jan. 2001	55	45	18.18	14
Feb.	41	32.5	20.73	12.5
March	51.5	41.5	19.42	13.5
April	55	48.5	11.82	9.15
May	59	46.5	21.19	11.5
June	53.5	43.5	18.69	7.98
July	62.5	48.5	22.40	9.0
Aug.	106.5	80.0	24.88	13.5
Total	536.5	422.5		
Mean			21.25 ± 5.74	12.24 ± 3.34

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تأثير الطرق الزراعية والمعاملات الكيماوية على كل من حشرة الزيتون المحارية
Aphytis libanicus Traboulsi والطفيل *Leucaspis riccae* Targ.
الذى يتطفل عليها

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تمت دراسة تأثير التقليم والرش بالزيت المعدنى KZ بتركيز ١,٥ ٪ فقط أو الزيت المعدنى (١,٥ ٪) والملاثيون بتركيز ١,٥ في الالف على تعداد الحشرة القشرية المحارية *Leucaspis riccae* Targ. التى تصيب الزيتون والطفيل *Aphytis libanicus* Traboulsi الذى يتطفل عليها وذلك فى مزارع الزيتون (موسم ٢٠٠١) بمنطقة ايشواى بمحافظة الفيوم.

أوضحت النتائج أنه عند التقليم مرتين (نوفمبر ٢٠٠٠ ، فبراير ٢٠٠١) والرش بالزيت المعدنى كانت النسبة المئوية لموت الآفة $٧٠,٩٣ \pm ٨,٨٩$ ٪ وهى أقل نسبة موت بين المعاملات بينما بلغت أعلى نسبة لموت الآفة $٨٢,٩٥ \pm ٦,٨٩$ ٪ وذلك عند التقليم فى نوفمبر والرش بالزيت المعدنى فى يونيه. وفى الجزء الغير معاملى كانت النسبة المئوية لموت الآفة $٢١,٢٥ \pm ٥,٧٤$ ٪ .

اتضح من النتائج أن التقليم لأكثر من مرة يؤثر تأثيرا ملبيا على النسبة المئوية للتطفل وكانت أفضل المعاملات بالنسبة للطفيل التقليم فى نوفمبر والرش بالزيت المعدنى حيث أن استخدام هذه الطريقة يساعد على زيادة أعداد الطفيل. فى جميع المعاملات بلغت النسبة المئوية للتطفل أقصاها (١٢ - ١٨ ٪) فى شهر فبراير وفى الجزء الغير معاملى كانت أعلى نسبة للتطفل ١٩ ٪ وذلك فى شهر نوفمبر.