

## **SURVEY OF THE INSECT PESTS INFESTING OLIVE WITH REFERENCE TO THE OLIVE FRUIT FLY *Bacterocera oleae* GMEL. AND ITS PARASITOIDS IN NORTH SINAI.**

Eid, F.M.

Biological Control Research Department, Plant Protection Research Institute, ARC, Egypt.

### **ABSTRACT**

The percentage of infestation caused by the larvae of *Bacterocera oleae* Gmel. Varied from 40 % and 86 % in the first season and from 0 % and 58 % in the second season at El-Arish locality. On the other hand, the percentage of infestation at Rafah locality ranged between (40 % and 94 %) and (20 % and 72 %) in the first season and the second season, respectively.

The average percentage of parasitism caused by the hymenopterous parasitoids at El-Arish locality were 16.27 % and 7.87 % during the first season 2002 and the second season 2003, respectively.

At Rafah locality, the average rates of parasitism were 15 % and 26.32 % during the first season and the second season, respectively.

### **INTRODUCTION**

Olive is an important economically subtropical endemic crop. The olive oil has high nutritional and medical importance. Olive trees are widely cultivated in many parts of the world. In Egypt, successful great efforts have been made to increase the growing areas, especially in the newly reclaimed lands, particularly in Western desert, Oases and in several Governorates. Several insect pests such as fruit flies, scale insects, stem borers, as well as mites causing various levels of damage attack Olive. In Egypt, the olive fruit fly, *Bacterocera (Dacus) oleae* Gmel. (Diptera: Tephritidae) recorded as a common and the most specific important olive pest (Atalla, 1958; Donia *et al.*, 1971; El-Ezaby, 1973; Amin and Saleh, 1975; Helal, 1979 and El-Hakim and Kishk, 1988). Losses of the crop by *B. oleae* were estimated as 30% in the Nile Valley and 80% in newly reclaimed areas (El-Ezaby, 1973 and Helal, 1979). Severe damage causes fruit dropping, declines oil contents and increases acidity in extracted oil (El-Ezaby, 1973). Moreover, the olive leaf moth, *Palpita unionalis* Hb. (Lepidoptera: Pyralidae) has also been recorded as one of the major olive pests in Egypt (Foda, 1973; El-Kifl *et al.*, 1974; Amin and Saleh, 1975; Badawi *et al.*, 1976; El-Hakim and Kishk, 1988). In nurseries, larvae may devour both young leaves and apical buds causing "stund growth" of the infested seedlings. In permanent orchards, attacked flower buds drop before setting. Fruits are also liable to be attacked. The olive kernel borer, *Prays oleae* Bern. (Hyponomeutidae : Lepidoptera) is also one of the major olive pests in Egypt. This pest has become a menace in practically all olive growing areas (Amin and Saleh, 1975). Few studies have been carried out on this pest in Egypt. The list of insect pests included 22 species belonging to 14 families and 6 orders. From world literature, 82 parasitoids belong to 2 and 7 families of orders Diptera and Hymenoptera

respectively. Predator species belong to 9 orders and class Insecta, in addition to birds and spiders, were attacking *B. oleae*, *P. unionalis* and *P. oleae* respectively. *B. oleae* parasitoids (El-Khawas,2000). Atalla (1958) recorded the maximum and minimum population of *D. oleae* flies counted from glass traps at Bourg El-Arab district during November and May, respectively. Donia et al. (1971) showed that the population of *D. oleae* reached its peak during the second half of September and a high population continued until middle of November. Awadallah (1973) reported that one peak of *D. oleae* was found by mid-September and that the pest existed all the year in Fayoum Governorate. El-Ezaby (1973) stated that the peak of *D. oleae* in the same Governorate was recorded by end of May.

## MATERIALS AND METHODS

Survey of common olive pests and associated natural enemies on olive trees was carried out in all localities of North Sinai i.e., Ber-El Abd, El-Arish, El-Sheikh Zewyed, Rafah, El-Hasana and El-Kusima. Sampling starting from March, 2002 to November 2003 to studies the percentage of infestation by *B. oleae* and percentage of parasitism in two areas, i. e, El-Arish and Rafah, an olive orchard (10 feddans) was cultivated with different olive varieties was chosen in each locality. Sampling was made in fixed area in the olive orchard in each locality biweekly intervals in 2002 and 2003 season. Twenty-five olive trees at each orchard were selected randomly for sampling and for data collection. Samples were obtained from new olive branches, each branch was about 25 cm long, taken from each tree during March - June. More than 100 fresh olive fruits were collected from the chosen trees and from ground during July – November. Collected samples were kept in paper bags and were transferred immediately to the laboratory for inspection and estimation of percentages of fruit infestation by the olive fruit fly, *B. oleae*. Studies were carried out at the Plant Protection Research laboratory, Agricultural Research Station at El-Arish. Major olive pests were identified by specialists of the Fruit Pest Research and Taxonomy Departments, PPRI, ARC, Giza.

### Percentage of infestation:

Number of fresh olive fruits, were collected biweekly at random from 25 olive trees at the two working sites (El-Arish and Rafah) throughout the period starting July to November (fruit formation season). Samples were kept in paper bags and were transferred to the laboratory for estimating percentages of fruit infestation by the olive fruit fly, *B. oleae*. Number of olive fruits were carefully examined and external percentage of infestation by *B. oleae* were recorded.

$$\text{Fruit infestation\%} = \frac{\text{No. of infested olive fruits}}{\text{No. of olive fruits examined}} \times 100$$

**Percentage of parasitism.**

Number of infested fresh olive fruits by *B. oleae* were collected biweekly from 25 olive trees in the two working sites (El-Arish and Rafah) and were kept in clean plastic jars (10 X 22.5 cm). The jars were covered with muslin kept in position by means of rubber bands until emergence of parasitoids. All emerging parasitoids were collected and were sent for identification.

$$\% \text{ Parasitism} = \frac{\text{No. of emerged parasitoids}}{\text{total No. of parasites + flays}} \times 100$$

**RESULTS AND DISCUSSION**

**Survey of pest's species infesting olive orchards:**

Survey of common and major olive pests in olive orchards was carried out in six localities in North Sinai. Data revealed that 11 insect pests species were recorded attacking olive trees. They belong to 9 families and 4 orders. These pests were recorded on different parts of the olive tree during different growth stages. They are *Zeuzera pyrina* L. (Cossidae: Lepidoptera), *palpita unionalis* Hb. (Pyralidae: Lepidoptera), *prays oleae* Bern. (Hyponomeutidae: Lepidoptera), *Lamoria Jordanis* Rag. (Pyralidae: Lepidoptera), *B. oleae* (Tephritidae: Diptera), *Euphyllura straminea* Log. (Psyllidae: Hemiptera) *Phloeotribus scarabaeoides* Bern. and *Phloeotribus oleae* Bern (Scolytidae: Coleoptera), *Aonidiella aurantii* Mask., *Leucaspis riccae* Targ. (Diaspididae: Homoptera) and *Dolycoris* sp. (Pentatomidae: Hemiptera)

**Ber-El Abd locality:**

*Z. pyrina*, *B. oleae*, *P. unionalis*, *P. oleae*, *P. scarabaeoides*, *A. aurantii*, and *L. riccae*

**El-Arish locality:**

*B. oleae*, *Z. pyrina*, *p. oleae*, *P. scarabaeoides*, *p. unionalis* and *A. aurantii*.

**El-Sheikh Zewyed and Rafah localities:**

*B. oleae*, *Z. pyrina*, *p. unionalis* and *P. oleae*.

**El-Hasana and El-Kusaima localities:**

*p. oleae*, *p. unionalis* and *B. oleae*.

**The hymenopterous parasitoids emerged in the laboratory:**

Samples of fresh infested olive fruits by *B. oleae* were collected from the trees and from fallen olive fruits during the two seasons 2002 and 2003 of investigation gave rise to the following species of parasitoids, (Table 1).

**Table (1): The hymenopterous parasitoids emerged from the infested fruits by *B. oleae* during**

Species	Family
<i>Cyrtotypx latipes</i> Rondani.	Pteromalidae
<i>Cyrtotypx</i> sp.	Pteromalidae
<i>Eurytoma</i> sp.	Eurytomidae
<i>Opius concolor</i> Szep	Braconidae
<i>Pnigalio agraulis</i> Walker	Eulophidae
<i>Macroneura</i> sp.	Eupelmidae

**Table (2): Percentages of infestation by *B. oleae* in olive orchards (25 olive trees examined per sample) in El-Arish, North Sinai during season 2002.**

Sampling date	No. of fruits in sample		Total no. of fruits in the sample	% Infestation
	Infested	Un infested		
1/7/2002	93	136	229	40.61
15/7	129	21	150	86
29/7	165	80	245	67.35
12/8	106	44	150	70.67
26/8	159	41	200	79.5
9/9	120	80	200	60
23/9	80	120	200	40
7/10	125	65	190	65.79
Total	977	587	1564	
Average percentage of infestation				62.47

**Table (3): Percentages of infestation by *B. oleae* in olive orchards (25 olive trees examined per sample) in El-Arish, North Sinai during season 2003.**

Sampling date	No. of fruits in sample		Total no. of fruits in the sample	% Infestation
	Infested	Un infested		
1/7/2002	0	0	0	0
15/7	2	48	50	4
30/7	3	47	50	6
16/8	19	31	50	38
30/8	20	30	50	40
13/9	13	37	50	26
27/9	19	31	50	38
11/10	26	24	50	52
25 / 10	29	21	50	58
Total	131	319	450	
Average percentage of infestation				29.11

**Table (4): Percentages of infestation by *B. oleae* in olive fruit orchards (25 olive trees examined per sample) in Rafah, North Sinai during season 2002.**

Sampling date	No. of fruits in sample		Total no. of fruits in the sample	% Infestation
	Infested	Un infested		
10/7/2002	36	14	50	72
24/7	35	15	50	70
7/8	36	14	50	72
21/8	47	3	50	94
4/9	36	14	50	72
18/9	32	18	50	64
9/10	20	30	50	40
23/10	29	21	50	58
Total	271	129	400	
Average percentage of infestation				67.75

**Table (5): Percentage of infestation by *B. Oleae* in olive fruit orchards (25 Olive trees examined per sample) in Rafah, North Sinai during season 2003.**

Sampling Data	No. of fruits in Sample		Total of fruits in the sample	% infestation
	infested	Uninfested		
9/7/2002	10	40	50	20
23/7	12	38	50	24
6/8	15	35	50	30
20/8	11	39	50	22
3/9	13	37	50	26
17/9	14	36	50	28
1/10	18	32	50	36
15/10	26	24	50	52
29/10	36	14	50	72
Total	155	295	450	
Average percentage of infestation				34.44

**El-Arish locality :**

The percentage of infestation ranged between 40 % in the fourth week of September 2002 and 86 % in the third week of July 2002 during the first season 2002. (Table 2). The average percentage of infestation was 62.47 %. On the other hand, the percentage of infestation in the second season 2003 at El-Arish locality ranged between 0 % and 58 % in the first week of July and in the fourth week of October 2003, respectively (Table 3). The average percentage of infestation in the second season 2003 at El-Arish locality was 29.11 %.

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**Rafah locality:**

The percentage of infestation ranged between 40 % and 49.25 % in the second week of October 2002 and the third week of August 2002, respectively (Table4). The average percentage of infestation during the first season 2002 at Rafah locality was 67.75 %.

On the other hand, the minimum percentage of infestation in the second season 2003 was 20 % at the beginning of this study, 2003, while the maximum percentage of infestation was 72 % in the end week of October, 2003 (Table5). The average percentage of infestation at Rafah locality during the second season 2003 recorded 34.44 %.

**Percentage of Parasitism:**

Data are shown in Tables (6, 7, 8 & 9)

**El-Arish locality:**

The percentage of parasitism caused by hymenopterous parasitoids varied from 3.05 % and 59.09% during the first season 2002 (Table 6).

On the other hand, the percentage of parasitism ranged between 0.0 % and 50 % during the second season 2003 at El-Arish locality (Table 7).

In conclusion, data presented in table 6 and 7 indicated at that, the average percentage of parasitism at the larvae of *B. o/eae* caused by the hymenopterous parasitoids at El-Arish locality were 16.27 % and 7.87 % during the first season 2002 and the second season 2003, respectively.

**Rafah locality:**

In conclusion, data presented in table 8 and 9 indicated at that, the average percentage of parasitism at the larvae of *B. o/eae* caused by the hymenopterous parasitoids at Rafah locality were 15 % and 26.32 % during the first season 2002 and the second season 2003, respectively.

**Table (6): Percentages of parasitism on *B. o/eae* in olive orchards (100 fresh infested olive fruits examined per sample) in El-Arish, North Sinai during season 2002**

Sampling Data	No. of parasitoids	No. of Flies	Total of flies and parasitoids	% parasitism
1/7/2002	9	13	22	95.09
15/7	34	56	90	37.78
29/7	6	9	15	40
12/8	8	28	36	22.22
26/8	6	12	187	33.33
9/9	2	30	32	6.25
23/9	6	84	90	6.67
7/10	5	159	164	3.05
Total	76	331	467	
Average percentage of parasitism				16.27

**Table (7): Percentages of parasitism on *B. Oleae* in olive orchards (100 fresh infested olive fruits examine per sample) in El-Arish , North Sinai during season 2003.**

Sampling Data	No. of parasitoids	No. of Flies	Total of flies and parasitoids	% parasitism
1/7/2002	0	0	0	0
15/7	1	1	2	50
30/7	0	0	0	0
16/8	0	13	16	0
30/8	2	13	15	13.33
13/9	0	4	4	0
27/9	1	16	9	11.11
11/10	1	14	15	6.67
25/10	2	26	28	7.14
Total	7	87	89	
Average percentage of parasitism				7.87

**Table (8): Percentages of parasitism on *B. Oleae* in olive orchards (100 fresh infested olive fruits examine per sample) in Rafah, North Sinai during season 2002.**

Sampling Data	No. of parasitoids	No. of Flies	Total of flies and parasitoids	% parasitism
10/7/2002	1	1	2	50
24/7	5	7	12	41.46
7/8	4	6	10	40
21/8	2	14	16	12.5
4/9	3	6	9	33.33
18/9	2	11	13	15.39
9/10	3	20	23	13.04
23/10	5	51	56	8.93
Total	21	119	140	
Average percentage of parasitism				15

Table (9): Percentages of parasitism on *B. Oleae* in olive orchards (100 fresh infested olive fruits examine per sample) in Rafah, North Sinai during season 2003.

Sampling Data	No. of parasitoids	No. of Flies	Total of flies and parasitoids	% parasitism
9/7/2002	2	4	6	33.33
23/7	4	4	8	50
6/8	1	0	1	100
20/8	1	1	2	50
3/9	3	5	8	37.5
17/9	2	1	3	66.67
1/10	3	5	8	37.5
15/10	1	17	18	5.56
29/10	3	19	22	13.64
Total	20	76	76	
Average percentage of parasitism				26.32

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حصص لآفات الحشرية التي تصيب الزيتون مع الإشارة إلى ذبابة ثمار الزيتون  
وطفيلياتها في شمال سيناء  
فوزى محمد عيد  
قسم بحوث المقاومة الحيوية- معهد بحوث وقاية النبات- مركز البحوث الزراعية

تتوزع النسبة المئوية للإصابة بذبابة ثمار الزيتون في مركز العريش من ٤٠% إلى ٦٨% في الموسم الأول، و صفر % إلى ٥٨% في الموسم الثاني. وعلى الجانب الآخر تراوحت نسب الإصابة في مركز رفح ما بين ٤٠% و ٩٤%، و ٢٠% و ٧٢% في الموسم الأول والثاني على الترتيب. وكان متوسط نسب التطفل بطفيليات الهمينويتروس في مركز العريش ١٦,٢٧% و ٧,٨٧% في الموسم الأول عام ٢٠٠٢ والموسم الثاني عام ٢٠٠٣ على الترتيب. أما في مركز رفح كان متوسط نسب التطفل يتراوح ما بين ١٥% و ٢٦,٣٢% أثناء الموسم الأول والثاني على الترتيب.