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**ECOLOGICAL STUDIES ON THE IMPORTANT INSECT PESTS
ON APPLE TREES AT EL-BEHEIRA GOVERNORATE**

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By

Adnan Abdel-Fattah El-Sayed Darwish

Faculty of Agriculture, Damanhour, Alexandria University

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SUMMARY

Apple, *Malus domestica*, is one of the important fruit in Egypt. Available statistics refer that apple orchards in Noharia district occupy 70 % from the total area of apple orchard in Egypt. These orchards are infested by the many of insect pests. Some of these pests may cause serious economic damage to apple trees

:Survey of the insect pests on apple trees at El-Beheira Governorate-1

The aim of this study was to make a survey of insect pests infesting apple trees at two districts in El-Beheira Governorate during the two successive seasons 2004/05 and 2005/06

:(Noharia district (Newly reclaimed desert land A)

Twenty six insect species belonging to seventeen families and five orders were recorded as follow; Seven species appeared to be important pests (Major Insect Pests), Fig scale insect, (*Russelaspis pustulans*); Apple wooly aphids, (*Eriosoma lanigerum*); Leopard moth, (*Zeuzera pyrina*); Pubescent rose chafer, (*Tropinota squalida*); Shot hole bark beetle, (*Scolytus amygdali*); Peach fruit fly, (*Bactrocera zonata*); Mediterranean fruit fly, (*Ceratitidis capitata*). Secondary Pests, Oyster shell scale, (*Lepidosaphes ulmi*); San Jose scale, (*Quadraspidiotus perniciosus*); Cotton aphids, (*Aphis gossypii*); Apple clear wing moth, (*Synathedon myopaeformis*); California red scale, (*Aonidiella aurantii*). Occasional Pests, Retithrips syiacus, Parltoria olea, Hemiberlesia latania, Ceroplastes floridensis, Dysaphes plantaginea, Iceria purchasi, Iceria seychellarum, Pseudococcus citri, Leyonetia clerkella, Anarsia lineatella, Pachnoda fasciata, Pentodon disbar, Carpophilus hemipterus, Drosophila melanogaster

:(B) Abou El-Matamir district (Old delta land

Sixteen insects belonging to 13 families and four order were recorded; Hemiptera (eight species, *Aonidiella aurantii*, *Quadraspidiotus perniciosus*,

Iceria aegyptiaca, *Eriosoma lanigerum*, *Emposca faba*, *Nezara viridula*,
Iceria seychellarm, *Aphis gossypii*), Lepidoptera (*Synathedon*
myopaeformis, *Zeuzera pyrina*) Coleoptera (*Carpophilus hemipterus*,
Tropinota squalida , *Scolytus amygdali*) Diptera (*Bactrocera zonata*,
(*Ceratitidis capitata* , *Drosophila melanogaster*

:Population studies on main economic insect pests on apple trees - ٢

Fig Scale Insect *Russelaspis postulans* .٢.١

:Seasonal abundance of *R. pustulans* total population

Four peaks of the total population recorded in the two seasons; November 11th, May 5th, July 14th and August 25th throughout the first season from October 21st 2004 till October 20th 2005. In the consecutive season (2005/06) the four peaks were recorded in November 17th, April 6th, July 13th and October 19th

:Population dynamic of immature

The first nymphal instar (Crawlers), three peaks of infestation with the first nymphal instar of *R. pustulans* were recorded in November 18th, June 30th and October 6th in the 1st season, in the 2nd season, three peaks with this instar were recorded in November 17th, June 29th and October 19th

The second nymphal instar, there are two peaks of infestation for the 2nd nymphal stage at the two seasons, recorded in the first season in January 13th and July 17th respectively, in the 2nd season in December 15th and July 13th respectively

:Population dynamics of adult stage

Non gravid female, the non gravid female of *R. pustulans* had two peaks in the 1st season, in January 13th and August 11th. This instar recorded three peaks in the 2nd season 2005/06, in December 1st, March 23rd and September 21st, the variation in number of peaks in the two seasons was due to the influence of the environmental factor, Similar trend were noticed in the 2nd season

The gravid female stage, maximum occurrence of the gravid female (deposited eggs) was recorded in October 21st, May 5th and August 11th.

Only two peaks for the gravid female were recorded in the 2nd season (2005/06) in March 23rd and July 27th. There wasn't any individuals of this instar during the period from December 16th till February 24th in the 1st year, in the 2nd season the period from November 17th till January 26th the sample were free of this instar, these results mean that the insect overwinter as a gravid female

The fig scale insect has two annual generation on apple trees at El-Beheira Governorate, the first begin at September until May of the following year (Overwintering generation) and the second generation begin at May and continues until August (summer generation). The period of the summer generation was very low than the period of the Overwintering generation in the two years

٢.٢. Woolly apple aphid, *Eriosoma lanigerum* Hausman

:Population fluctuation

In the first year 2005, two peaks of infestation, the first occurred at May 5th, the second peak was occurred at August 4th. In the second year 2006, the first peak was recorded in May 11th, the second peak occurred in mid August

:"Infestation rate "IR

The infestation rate "IR" increased gradually to reach 52% in the latest week of July (the peak of "IR") in the first year 2004/05. In 2005/06 year the "IR" increased gradually to reach 62% in the latest week of May and ("early of June (the peak of "IR

٢.٣. Leopard moth, *Zeuzera pyrina*

Two methods were used to estimate the population fluctuation of the adult stage

:A) The empty pupal skin protruding from the apple trees

The pupal skins protruding from the tunnels of the wood indicate that the moth emergence and determine the periods of the occurrence of *Z. pyrina*

At Nobaria district, in 2005 season the emergence of the first moth started to appear late in April, the highest abundance was reached early in July, while the lowest count was obtained in October 6th. There wasn't any sign of pupal exuviae during the period from the first week of November 2004 to the third week of April 2005. In 2006 there wasn't any pupal exuviae during the period from the second week of October 2005 to the second week of April 2006. Emergence of the first moth started in the third week of April, then increased gradually throughout the season to reach a peak in late July, the number of the emerged adults decreased gradually until the latest week of September, and the last empty pupal exuviae was collected in September 28th

About El-Matamir district, there wasn't any pupal exuviae during the period from the first week of November 2004 to the first week of May 2005, emergence the first moth started in May 13th, then this numbers increased gradually and fluctuated throughout the season to reach a peak in July 8th, the last empty pupal exuviae was collected on mid September. In 2006 season, during the period from the first week of November 2005 to the first week of May there wasn't any sign of pupal exuviae. Emergence the first moth started in May 19th, the collected pupal exuviae was increased gradually throughout the season to reach a peak in mid July, and the last empty pupal exuviae was collected on September 22nd

:B) Pheromone traps

Nobaria district, weekly caught moths by pheromone traps during 2005 year indicate that April 21st was the time of the earliest flight of *Z. pyrina* in Noubaria district and October 20th was the latest, during the season activity the number of trapped moths increased gradually to reach maximum by June 30th and July 21st. In 2006 year three peaks of the trapped moths were observed where the earliest peak was in June 15th, the second peak in July 13th and August 3rd was the latest peak, the season activity in 2006 year extended from the third week of April to the latest week of September

Abou El-Matamir district, in another hand in Abou El-Matamir district the weekly trapped moths by pheromone traps during 2005 indicated that the season activity extended from May 13th to September 16th with two peaks throughout the season activity in July 8th and August 5th. In 2006 year this result becomes confirmed, where the season activity extended from May 13th to September 16th, the number of moths increased gradually to reach the peak in July 14th

.Pubescent rose chafer *Tropinota squalida* Scop .٢.٤

-:A) Abundance and population fluctuation of *T. squalida*

Weekly caught insects by blue water traps during 2005 year indicate that February 3rd was the time of the earliest flight of *T. squalida* adults in Nobaria district and April 7th was the latest traps, during the flowering time the number of trapped beetle increased gradually to reach maximum by March 17th. Almost this trend was repeated in 2006 year with a little difference where the earliest flight was in January 26th, the number of the trapped insect increased gradually to reach maximum by March 9th and April 20th was the latest

In another hand in Abou El-Matamir district the weekly trapped insects by blue water traps during 2005 season indicate that, February 11th was the time of the earliest appearance of this insect. The maximum number of trapped beetles was found on March 25th, the number of beetles decreased gradually and the latest flight was in mid April; This trend was repeated in 2006 where February 3rd was the earliest appearance, March 17th the maximum of beetles were trapped and April 14th was the latest appearance

‘B) Population density of *T. squalida*

The mean numbers of *T. squalida* caught by the two methods (for estimating the density of *Tropinota squalida*), was 2.1 and 0.33 beetles caught by the hand picking per tree per day and one blue water trap per day respectively

At Abou El-Matamir district this means was 1.24 and 0.223 caught by the .hand picking and blue water trap respectively

This trend also could be seen in the case of 2006, the recorded mean number of adults per tree (Hand picking technique) and per blue water trap in Nobaria district was 2.27 and 0.413 beetles respectively, meanwhile this .means was 1.01 and 0.176 at Abou El-Matamir district respectively

‘Shot hole bark beetles, *Scolytus amygdali* Guér .٢.٥

The present work was conducted to study the population fluctuation, population density and the number of generations of the shot hole bark beetles *Scolytus amygdali* on apple trees in the two districts (Nobaria and Abou El-Matamir) at El-Beheira Governorate under the laboratory .condition

A) In Nobaria district, the weekly numbers of *S. amygdali* beetles emerged from apple branches at Nobaria district indicated that, in the first season (2004/05), the population of *Scolytus amygdali* recorded five activity period. The first activity period extended from the first week of November to the 3rd week of January, with a peak in the latest week of November. The 2nd activity period extended from the 2nd week of March to the latest week of May with a peak observed during 2nd week of May. Followed by the 3rd activity period, that extended from the 1st week of June to the latest week of the same month. The 4th peak was recorded at the 2nd week of July during the 4th period of activity that extended from the latest week of June to the latest week of July. Thereafter, the population fluctuated slightly during the latest activity period that covered the period from the 1st week of August to the latest week of October with a peak in the 3rd week .of October

In the 2nd season (2005/06), five peaks of 78, 85, 100, 110 and 92 beetles/5 cutting branches. These peaks observed at the third week of November, the first week of May, mid June, the third week of July and the third week of .September, respectively

B) In Abou El-Matamir district, the population of *S. amygdali* was subjected to variable fluctuations during the period of study to record five period of activity, the first period extended from first week of November to the first week of December. The 2nd activity period extended from the 2nd week of April to the latest week of May with a peak recorded on the first week of May. The third activity period was extended from the 4th week of May to 17th June with a peak at the 2nd week of June. The 4th period of activity covered the period from the 3rd week of June to the latest week of July with a peak recorded on mid July, followed by the latest period of activity from the latest week of July to the 4th week of October with a peak .at mid of October

Similar trend were noticed in the second season 2005/06, the population curve showed five peaks of abundance. The five peaks were 46, 60, 52, 46 and 49 beetles/5 cutting branches at mid November, May 18th, July 6th, .August 10th and October 19th respectively

The obtained results on the adult population of the shot hole bark beetles *Scolytus amygdali* during 2005 and 2006 in two locations at El-Beheira Governorate demonstrated that this species having five overlapping .generations annually

٦.٢ Peach fruit fly, *Bactrocera zonata*

Population fluctuation of male flies, *Bactrocera zonata* through two successive season, from November 4th 2004 to November 3rd 2005 (the first season) and continued until October 26th 2006 (the second season). Jackson traps baited with Methyl eugenol were distributed in the orchard to .record the weekly number of males through the mentioned periods

A) Nobaria district, the 1st period of activity of *B. zonata* extended from November 11th until January 13th with two peaks in November 25th and December 16th. The 2nd appearance of males of *B. zonata* were extended from March 31st to May 19th, with a peak on April 28th, the 3rd main activity period extended from June 2nd to July 14th, with a peak on June 23rd. During the periods from January 27th to March 24th and from July .21st to September 22nd the insect were completely disappeared

The population activity in the second season 2005/06 was similar with the first season, where the longest period of activity extended from the latest week of September in the preceding year 2005 to January 26th 2006 with a peak in December 8th. The second period of activity was extended from March 23rd to May, with a peak on April 20th and 27th, followed by the third period activity that extended from May 25th to July 20th, with a peak on June 25th. The fourth period of activity extended from September 14th to October 26th with a peak on October 19th. As well as the first year, the insect were completely hidden during the periods from February 2nd to March 16th, from May 11th to May 18th and from July 27th to September .7th

B) Abou El-Matamir district, the 1st activity period of *B. zonata* extended from November 12th to December 17th, and then completely disappeared until April 22nd. The 2nd period of activity was extended from April 29th .to July 22nd with a peak on June 10th

The population activity in the second season (2005/06), was similar with the 1st season, where the longest period of activity extended from September 16th in the preceding year 2005 to December 23rd, then completely disappeared until the 1st week of April. The 2nd activity period that extended from April 14th to June 30th with a peak on June 2nd, the latest activity period was extended from August 25th to October 27th , with .a peak on September 22nd

«Mediterranean fruit fly, *Ceratitidis capitata* .٧.٧

Three Jackson traps baited with Trimedlure were distributed in the orchard .to record the weekly number of male through the mentioned period

A) In Nobarria district, the 1st period of activity of *C. capitata* extended from November 11th until January 27th with a peak in December 16th. The 2nd activity period of males of *C. capitata* were extended from February 10th to March 24th, with a peak on March 3rd. The 3rd main activity period (the longest period of activity), extended from June 2nd to September 15th, with the highest peak on July 14th. During the periods

from March 31st to May 19th and from September 22nd to October 13th
.the insect were completely disappeared

The population dynamics in the second season 2005/06 was similar with the first season, where the 1st period of activity extended from October 20th in the preceding year 2005 to January 26th 2006 with a peak in December 15th and 22nd. The 2nd period of activity was extended from February 23 to April 6th, with a peak on March 16th, followed by the longest period of activity that extended from June 1st to September 14th, with the highest peak on July 20th. As well as the first year, the insect males were completely hidden during the February month, during the period from April 13th to May 25th and from September 21st to October 12th

B) In Abou El-Matamir district, the 1st activity period extended from November 12th to December 10th, and then completely disappeared until January 28th. The 2nd period of activity was extended from February 4th to March 25th with a peak on February 18th. The 3rd period of activity was extended from April 29th to August 19th with the highest peak on July 22nd , the latest activity period extended from September to October 28th
. with a peak on October 7th and 14th

In the same time, the population activity in the 2nd season (2005/06), was similar with the 1st season, where the 1st period of activity extended from November 4th to December 16th, with a peak on November 18th. The insect completely disappeared until the latest week of January, followed by the 2nd activity period that extended from February 3rd to March 10th with a peak on March 10th, the insect males were completely hidden during the period from March 17th to May 5th. The 3rd activity period was extended from May 12th to August 11th, with a peak on July 7th. The latest activity period that extended from September 22nd to October 27th, with a peak on
.October 20th

This results indicated that the population of *C. capitata* was dominant on *B. zonata* population through the two seasons 2004/05 and 2005/06 In contrast to the earlier occurrence to *B. zonata* (ripening stage for apple fruits), the *C. capitata* occurrence was high in June and July (maturity stage for apple fruits).