

STONE FRUIT TREE PESTS: (1) SURVEY OF INSECT PESTS IN PEACH ORCHARDS

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Abstract

In Egypt, survey of the insects associated with peach trees was carried out during 4 seasons of 3 successive years (2000-2002). Studies were conducted in ecologically different growing areas. The existing insects, their status (major/minor), and the attacked part(s) were inspected and recorded. More than 23 dominating insect species belonging to 13 families and 6 orders were surveyed in peach orchards. Eight species were first recorded in Egypt. Woodborers were the dominant pests that cause serious damage to the roots (*Capnodis carbonaria*), the stem and branches (*Chlorophorus varius* and *Ptosima undecimmaculata*) the stem, branches and twigs (*Scolytus amygdali*), and the twigs (*Anarsia lineatella*). Moreover, *Sphenoptera trispinosa*, *Chrysobothris dorsata*, *Macrotoma palmata*, and *Xyleborinus saxeseni* were of less importance and abundance. Fruit flies (*Ceratitis capitata* and *Bactrocera zonata*) and fruit worm (*A. lineatella*) were major pests and were much abundant. They caused economic damage to fruit production. Adults of *Tropinota squalida* sometimes attacked the flowers. *Carpophilus hemipterus* and *Drosophila melanogaster* infested over ripening and fallen fruits. Different parts of peach trees were affected with the *Thrips major*, *Empoasca decedens*, *Bemesia tabaci*, *Aphis gossypii*, *Aphis punicae*, *Hyalopterus amygdali*, *Myzus persicae*, *Parlatoria oleae*, and *Aonidiella orientalis*.

INTRODUCTION

Peach (*Prunus persica*) is the most important stone-fruit species in Egypt as well as all over the world. The area under cultivation approximated 78500 feddans producing almost 224200 tons yearly.

Literature refers that, in the different parts of the world, more than 110 insects could be surveyed in peach orchards as Ciampolini *et al.*, 1988, Cinti *et al.*, 1993, Lo *et al.*, 1995, Hull and Felland, 1999, Andoni *et al.*, 2002, Hasey *et al.*, 2002, and Johnson *et al.*, 2002). In Egypt, some of these insects are pests especially boring insects cause serious and economic damage (many authors, mainly, Ismail *et al.*, 1991, Hashem *et al.*, 1992, Tadros *et al.*, 1993, Tadros, 1994 a, Tadros, 1994 b, Saafan and Tadros, 1995, Batt, 1999, Attalla and Eweis, 2002). However, studies of these borers are few and scattered.

In an attempt to contribute to such a gap in the knowledge, the present comparative ecological survey studies are aimed. The broad objective of investigation is to add new information that may help in planning of rather effective integrated control programs for the management of tree borers in peach orchards.

MATERIALS AND METHODS

Survey of the insects associated with peach trees was carried out during three successive years from early January of 2000 until late December of 2002. Five orchards, scattered all over the country and representing ecologically different growing areas at both old valley lands (Nile Delta and Valley) or the newly reclaimed desert lands were selected. The first district was at Behera governorate, representing the west Delta while the second was at Dakahlia, Sharkia, Ismailia and / or Suez governorates representing east Delta. The third was at Menoufia and / or Qalubia governorates representing middle Delta. In the north valley, the fourth district was represented at Giza and / or Fayoum governorates whereas in the south valley, the fifth district was represented at Minia, Asuit, and / or Sohag governorates.

Any selected orchard was at least 3 feddans in area, with trees more than 5 years old. Every selected orchard was visited 4 times each year, i.e., in winter (January to March), spring (April to June), summer (July to September) and autumn (October to December) seasons.

During every visit, about 50 trees, randomly distributed in every selected orchard were examined for insect infestation. Samples of all parts of the tree (e.g., root, stem, branches, leaves, flowers and fruits) were carefully inspected. The existing season of each insect, status (major / minor), and the attacked part(s) were recorded.

Surveyed insect species were identified in the orchard as far as possible. However, in case of uncertainty, samples of the plant part(s) and / or existing insects were transferred to the laboratory for further examination. Whenever, taxonomic assistance was required, specimens were referred to the appropriate specialist(s) at "Insects Identification Research Division", Plant Protection Research Institute, ARC, MOA, Dokki, Giza governorate.

On the other hand, the scientific name, order and family of insects attacking peach trees together with the status of infestation (major and minor), affected plant part(s) (root, stem, branches, twigs, buds, leaves, flowers and / or fruits), activity period and number of annual generation in addition to the references cited were listed.

RESULTS AND DISCUSSION

1. Literature survey of insects attacking peach trees all over the world

Data in Table (1, appendix) reviewed the literature of insects attacking peach trees all over the world including Egypt. The list was classified according to the number of insects, scientific name, order, and family together with the status of infestation (major and minor), affected plant part(s), activity period, and number of annual generations.

The available and most recent literature concluded that peach orchards could be subjected to 110 insect species belonging to 26 families and 9 orders all over the world, including Egypt (examples of the numerous authors are Ciampolini *et al.*, 1988, Ismail *et al.*, 1991, Hashem *et al.*, 1992, Tadros *et al.*, 1993, Cinti *et al.*, 1993, Tadros, 1994 a, Tadros, 1994 b, Lo *et al.*, 1995, Saafan and Tadros, 1995, Hull and Felland, 1999, Batt, 1999, Andoni *et al.*, 2002, Hasey *et al.*, 2002, Attalla and Eweis, 2002, and Johnson *et al.*, 2002).

Among these species, the following 94 species were major pests:

Forficula auricularia (Dermaptera: Forficulidae).

Frankliniella occidentalis, *Frankliniella tritici*, *Taeniothrips meridionalis*, *Thrips major*, *Thrips imagines*, and *Thrips tabaci* (Thysanoptera: Thripidae).

Lygus rugulipennis, *Lygus lineolaris* (Hemiptera : Pentatomidae), *Euschistus servus*, *Euschistus tristigmus*, *Acrosternum hilare*, and *Halyomorpha halys* (Hemiptera-Heteroptera: Pentatomidae).

Empoasca decedens [*Asymmetrascan decedens*], *Homalodisca coagulate* (Homoptera : Cicadellidae), *Parabemisia myricae* From Family , *Aphis spiraecola*, *Brachycaudus schwartzi*, *Macrosiphum euphorbiae*, *Rhopalosiphum nymphaeae*, *Hyalopterus pruni*, *Hyalopterus amygdali* *Pterochloroides persicae*, , *Brachycaudus persicae*, *Brachycaudus helichrysi*, *Myzus persicae*, *Myzus cerasi* and *Myzus varians* (Hemiptera-Heteroptera: Aphididae).

Pseudococcus longispinus, *Pseudococcus marilimus* (Homoptera: Pseudococcidae), *Sphaerolecanium prunastri*, *Lecxanium persicae* (Hemiptera-Heteroptera: Coccidae), *Parlatoria oleae*, *Parlatoria crypta*, *Pseudaulacaspis pentagona*, *Aspidiotus nerii*, *Diaspidiotus ancyclus*, *Hemiberlesia rapax*, *Quadraspidiotus perniciosus*, *Mesolecanium nigrofasciatum*, and *Aonidiella orientalis* (Hemiptera-Heteroptera: Diaspididae).

Anarisa lineatella (Lepidoptera: Gelechiidae), *Anthophila pariance* [*Choreutis pariana*] (Lepidoptera: Choreutidae), *Lyonetia clerkella* (Lepidoptera: Lyonetiidae), *Synantheden exitiosa*, *Synantheden pictipes*, *Leucostoma canker* (Lepidoptera: Sesiidae), *Cydia* [*Gropholita*] *molesta*, *Cydia* [*Gropholita*] *funebrana*, *Epiphyas postvittana*, *Planotortrix octo*, *Ctenopseustis obliquana*, *Adoxophyes orana*, and *Choristoneura rosaceana* (Lepidoptera: Tortricidae).

Xystrocera globosa, *Aromia bungii*, *Capnodis carbonaria*, *Sphenoptera dadkhani*, *Sphenoptera lafertei*, *Chrysobothris octocola* (Coleoptera: Buprestidae), *Neocerambyx oenochrous*, *Linda fraternal*, *Bachisa fortunei*, *Anoplophora glabripennis* (Coleoptera: Cerambycidae), *Scolytus japonicus*, *Scolytus amygdali*, *Phloeosinus aubei* (Coleoptera: Scolytidae), *Carpophilus* spp. (Coleoptera: Nitidulidae), and *Conotrachelus nenuphar* (Coleoptera: Curculionidae).

Bactrocera zonata, *Bactrocera dorsalis*, *Rhagoletis completa*, *Putoniella gracilis*, *Putoniella pruni* (Diptera: Tephritidae), *Anastrepha fraterculus*, *Anastrepha suspense*, *Anastrepha ludens*, *Anastrepha oblique*, *Anastrepha serpentine*, *Anastrepha striata* and *Ceratitis capitata* (Diptera: Tephritidae).

However, the following 27 species insects' species were of minor importance:

Frankliniella occidentalis and *Thrips australis*, (Thysanoptera: Thripidae).

Colladonus geminatu, *Colladonus montanus*, *Fieberiella florii*, *Scaphytopius acutus* (Hemiptera-Homoptera: Cicadellidae), *Myzus persicae* (Hemiptera-Homoptera: Aphididae), and *Nezara vididula* (Hemiptera-Homoptera: Pentatomidae).

Conogethes punctiferalis, *Euzophera semifuneralis*, *Cryptoblabes gnidiella* (Lepidoptera: Pyralidae), and *Cydia [Gropholita] molesta* (Lepidoptera: Tortricidae).

Anoplophora nobilis (Coleoptera: Cerambycidae), *Scolytus mediterraneus* [*S. rugulosus*], *Xyleborinus saxeseni* (Coleoptera: Scolytidae), *Carpophilus hemipterus*, *Carpophilus mutilatus*, *Carpophilus davidsoni* (Coleoptera: Nitidulidae), and *Cotinis nitida* (Coleoptera: Scarabaeidae).

Hoplocampa minuta, (Hymenoptera: Tenithredinidae).

Ceratitis capitata (Diptera: Tephritidae), and *Drosophila melanogaster* (Diptera: Drosophilidae).

In Egypt, more than 22 species belonging to 7 families and 4 orders were surveyed in peach orchards (Table, 1). The dominant pests were the aphids, *Aphis gossypii*, *Aphis punicae*, *Aphis craccivora*, *Aphis nerii*, *Pentalonia nigronervosa*, *Hyalopterus pruni*, *Hyalopterus amygdali*, *Pterochloroides persicae*, and *Myzus persicae* (Hemiptera-Homoptera: Aphididae). The fruit and twig worm was *Anarisa lineatella* (Lepidoptera: Gelechiidae). The dipterous fruit warms were *Bactrocera zonata* (Diptera: Tephritidae) and *Ceratitis capitata* (Diptera: Tephritidae).

Actually, in Egypt, woodborers were the most abundant and seriously damaging the stem, branches and twigs of peach trees all over the year round. These recorded wood-borers were *Agrilus lituratus*, *Ptosima undecimmaculata*, *Sphenoptera tappesi*, *Sphenoptera trispinosa*, *Capnodis carbonaria* (Coleoptera: Buprestidae), *Macrotoma palmata*, *Chlorophorus varius* (Coleoptera: Cerambycidae), *Scolytus amygdali* and *Xyleborinus saxeseni* (Coleoptera: Scolytidae).

APPENDIX

Table 1. List of major (M) and minor (m) insects attacking peach trees together with status (S), activity period (A. P.), damage plant parts (P. P.) and number of annual generations (G) as revealed in different countries (C) from literature in Egypt (E) and other countries (O).

No	Scientific name	C	S	A. P.	P. P.	G	References
I. Order: Dermoptera							
i. Family: Forficulidae							
1	<i>Forficula auricularia</i>	O	M	Mar.- Jun.	Fr	1	Santini (1995)
II. Order: Thysanoptera							
i. Family: Thripidae							
2	<i>Frankliniella occidentalis</i>	O	M m	May- Sep.	L, Bu, Fl, Fr	5-7	Espinosa <i>et al.</i> (2002) Guarino <i>et al.</i> (2001)
3	<i>Frankliniella tritici</i>	O	M	May- Sep.	L, Bu, Fl, Fr	5-7	Felland <i>et al.</i> (1995)
4	<i>Taeniothrips meridionalis</i>	O	m	May- Sep.	L, Bu, Fl, Fr	5-7	Cinti <i>et al.</i> (1993)
5	<i>Thrips major</i>	O	M	May- Sep.	L, Bu, Fl, Fr	5-7	Cinti <i>et al.</i> (1993)
6	<i>Thrips imaginis</i>	O	M	May- Sep.	L, Bu, Fl, Fr	5-7	Milne & Walter (2003)
7	<i>Thrips australis</i>	O	m	May- Sep.	L, Bu, Fl, Fr	5-7	Milne & Walter (2003)
8	<i>Thrips tabaci</i>	O	M	May- Sep.	L, Bu, Fl, Fr	5-7	Milne & Walter (2003)
III. Order: Hemiptera: Heteroptera							
i. Family: Miridae							
9	<i>Lygus rugulipennis</i>	O	M	Jun.- Sep.	L, Fr	2	Tavella <i>et al.</i> (1997)
10	<i>Lygus lineolaris</i>	O	M	Jun.- Sep.	L, Fr	2	Atanassov <i>et al.</i> (2002)
ii. Family: Pentatomidae							
11	<i>Euschistus servus</i>	O	M	Jun.- Sep.	L, Fr	2	Atanassov <i>et al.</i> (2002)
12	<i>Euschistus tristigmus</i>	O	M	Jun.- Sep.	L, Fr	2	Atanassov <i>et al.</i> (2002)
13	<i>Acrosternum hilare</i>	O	M	Jun.- Sep.	L, Fr	2	Atanassov <i>et al.</i> (2002)
14	<i>Halyomorpha halys</i>	O	M	Jun.- Sep.	L, Fr	2	Hoebcke & Carter (2003)
15	<i>Nezara viridula</i>	O	m	Mar.- Oct.	Fr	6	Ciampolini <i>et al.</i> (1988)
iii. Family: Cicadellidae							
16	<i>Empoasca</i> [<i>Asymmetrasca</i>] <i>decedens</i>	A	M	May-Oct.	Br, L	>3	Cravedi <i>et al.</i> (1995)

R : root

Sh: shoot

L : leaf

St : stem

Tw : twig

Fl : Flower

Br : branches

Bu : bud

Fr : Fruit

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Table 1-2: Cont.

No	Scientific name	C	S	A. P.	P. P.	G	References
17	<i>Homalodisca coagulata</i>	O	M	May-Oct.	L	>3	Triapitsyn & Phillips (2000)
18	<i>Colladonus geminatus</i>	O	m	May-Oct.	Br, L	>3	Welch & Kondratieff (1993)
19	<i>Colladonus montanus</i>	O	m	May-Oct.	Br, L	>3	Welch & Kondratieff (1993)
20	<i>Fieberiella florii</i>	O	m	May-Oct.	Br, L	>3	Welch & Kondratieff (1993)
21	<i>Scaphytopius acutus</i>	O	m	May-Oct.	Br, L	>3	Welch & Kondratieff (1993)
iv. Family: Aleyrodidae							
22	<i>Parabemisia myricae</i>	O	M	Mar.-Oct.	L	many	Ulusoy <i>et al.</i> (1999)
v. Family: Aphididae							
23	<i>Aphis spiraeicola</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	many	Stoetzel & Miller (1998)
24	<i>Aphis gossypii</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
25	<i>Aphis punicae</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
26	<i>Aphis craccivora</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
27	<i>Aphis nerii</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
28	<i>Pentalonia nigronervosa</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
29	<i>Hyalopterus pruni</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Ismail <i>et al.</i> (1991)
		O	M	May-Oct.		many	Stoetzel & Miller (1998)
30	<i>Brachycaudus schwartzi</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	many	Stoetzel & Miller (1998)
31	<i>Macrosiphum euphorbiae</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	many	Stoetzel & Miller (1998)
32	<i>Rhopalosiphum nymphaeae</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	many	Stoetzel & Miller (1998)
33	<i>Hyalopterus amygdali</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	many	Darwish (1992)
		O	M	May-Oct.		many	Wilkaniec & Karczewska (1994)
34	<i>Brachycaudus persicae</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	many	Saljoqi <i>et al.</i> (2002)
		O	m	May-Oct.		many	Shearer & Frecon (2002)

Table 1-3: Cont.

No	Scientific name	C	S	A. P.	P. P.	G	References
35	<i>Brachycaudus helichrysi</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	man y	Singh <i>et al.</i> (2003)
36	<i>Pterochloroides persicae</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	man y	El-Salam (2001)
		O	M	May-Oct.		man y	Stoetzel and Miller (1998)
37	<i>Myzus persicae</i>	E	M	Mar.-Oct.	Tw, Bu, L, Fl, Fr	man y	Ismail <i>et al.</i> (1991)
		O	M	May-Oct.		man y	Nikolakakis (2003)
		O	m	May-Oct.		man y	Fenton <i>et al.</i> (2003)
38	<i>Myzus cerasi</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	man y	Stoetzel & Miller (1998)
39	<i>Myzus varians</i>	O	M	May-Oct.	Tw, Bu, L, Fl, Fr	man y	Stoetzel & Miller (1998)
vi. Family: Pseudococcidae							
40	<i>Pseudococcus longispinus</i>	O	M	Mar.-Nov.	Br, Tw, Bu, L, Fr	4-6	Salazar & Solis (1990)
41	<i>Pseudococcus marilimus</i>	O	M	Mar.-Nov.	Br, Tw, Bu, L, Fr	4-6	Salazar & Solis (1990)
vii. Family: Coccidae							
42	<i>Sphaerolecanium prunastri</i>	O	M	Apr.-Dec.	St, Br, Tw	1	Ulgenturk <i>et al.</i> (2001)
43	<i>Lecxanium persicae</i>	O	m	Apr.-Dec.	Br, Tw, L	1	Salazar & Solis (1990)
viii. Family: Diaspididae							
44	<i>Parlatoria oleae</i>	O	M	Apr.-Dec.	Br, Tw, L	1	Fowjhan & Kozar (1994)
45	<i>Parlatoria crypta</i>	O	M	Apr.-Dec.	Br, Tw, L	1	Fowjhan & Kozar (1994)
46	<i>Pseudaulacaspis pentagona</i>	O	M	Jan.-Dec.	L, Br, Fr, Fl	2-3	Panis <i>et al.</i> (1995)
47	<i>Aspidiotus nerii</i>	O	m	Jan.-Dec.	Tw, L, Fr	4	Salazar & Solis (1990)
48	<i>Diaspidiotus ancylus</i>	O	M	Jan.-Dec.	Tw, L, Fr.	2	Salazar & Solis (1990)
49	<i>Hemiberlesia rapax</i>	O	m	Jan.-Dec.	Tw, L, Fr	3	Salazar & Solis (1990)
50	<i>Quadraspidiotus perniciosus</i>	O	M	Jan.-Dec.	Tw, L, Fr	3	Paloukis <i>et al.</i> (1995)
51	<i>Mesolecanium nigrofasciatum</i>	O	M	Jan.-Dec.	Tw, L, Fr	3	Pless <i>et al.</i> (1995)
52	<i>Aonidiella orientalis</i>	O	M	Jan.-Dec.	Tw, L, Fr	3	Rajagopal & Krishnamoorthy (1996)
IV. Order: Lepidoptera i. Family: Choreutidae							
53	<i>Anthophila [Choreutis] pariana</i>	O	M	May-Nov.	L	1	Yin <i>et al.</i> (1987)

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Table 1-4: Cont.

No	Scientific name	C	S	A. P.	P. P.	G	References
ii. Family: Lyonetiidae							
54	<i>Lyonetia clerkella</i>	O	M	Mar.-Oct.	L	1	Adachi (2002)
iii. Family: Gelechiidae							
55	<i>Anarisa lineatella</i>	E	M	Mar.-Oct.	Tw, Fr	3	Saffan & Tadros (1995)
		O	M	Jun.-Jul.		2	Cravedi <i>et al.</i> (2001)
iv. Family: Pyralidae							
56	<i>Conogethes punctiferalis</i>	O	m	Summer	Tw	1	Kimura <i>et al.</i> (2002)
57	<i>Euzophera semifuneralis</i>	O	m	May-Nov.	St, Bu	2-3	Kain & Agnello (1999)
58	<i>Cryptoblabes gnidiella</i>	O	m	Jun.-Aug.	Fr	3	Talhok (1963)
v. Family: Sesiidae							
59	<i>Synanthedon exitiosa</i>	O	M	Apr.-Oct.	St, Bu, Tw	1	Hull & Felland (1999)
60	<i>Synanthedon pictipes</i>	O	M	Apr.-Oct.	St, Bu, Tw	1	Pfeiffer <i>et al.</i> (1991)
61	<i>Leucostoma canker</i>	O	M	Apr.-Oct.	St, Bu, Tw	1	Puterka <i>et al.</i> (1993)
vi. Family: Tortricidae							
62	<i>Cydia</i> [<i>Grapholita</i>] <i>molesta</i>	O	M	May-Jul.	Fr	1-2	Natale <i>et al.</i> (2003)
		O	m	Mar.-Oct.		2	Lo <i>et al.</i> (1995)
63	<i>Cydia</i> [<i>Grapholita</i>] <i>funebrana</i>	O	M	Mar.-Oct.	Fr	2	Hrady <i>et al.</i> (1994)
64	<i>Epiphyas postvittana</i>	O	M	May-Jul.	Fr	1-2	Lo <i>et al.</i> (1995)
65	<i>Planotortrix octo</i>	O	M	May-Jul.	Fr	1-2	Lo <i>et al.</i> (1995)
66	<i>Ctenopseustis obliquana</i>	O	M	May-Jul.	Fr	1-2	Lo <i>et al.</i> (1995)
67	<i>Adoxophyes orana</i>	O	M	May-Jul.	Fr	1-2	Stamenkovic <i>et al.</i> (1999)
68	<i>Choristoneura rosaceana</i>	O	M	May-Jul.	L	1-2	Hasey <i>et al.</i> (2002)
V. Order: Coleoptera							
i. Family: Buprestidae							
69	<i>Agrilus lituratus</i>	E	M	May-Aug.	St, Br	1	Batt (1999)
70	<i>Ptosima undecimmaculata</i>	E	M	Mar.-Sep.	St, Br	1	Batt (1999)
71	<i>Capnodis carbonaria</i>	E	M	Apr.-Sep.	R, St	1	Girgis & Batt (1998)
		O	M	Spring		1	Andoni <i>et al.</i> (2002)
72	<i>Sphenoptera dadkhani</i>	O	M	Apr.-Sep.	St, Br, Tw	1	Chaudhary <i>et al.</i> (1993)
73	<i>Sphenoptera lafertei</i>	O	M	Apr.-Sep.	S, Br, Tw	1	Sharma & Gautam (1994)
74	<i>Sphenoptera tappesi</i>	E	M	Apr.-Sep.	St, Br	1	Batt (1999)
75	<i>Sphenoptera trispinosa</i>	E	M	Apr.-Sep.	St, Br	1	Batt (1999)
76	<i>Chrysobothris octocola</i>	O	M	Apr.-Sep.	St, Br, Tw	1	Westcott (1990)

Table 1-5: Cont.

No	Scientific name	C	S	A. P.	P. P.	G	References
ii. Family: Cerambycidae							
77	<i>Aromia bungii</i>	O	M	Apr.-Sep.	St, Br, Tw	1	Qian (1987)
78	<i>Xystrocera globosa</i>	O	M	Apr.-Sep.	St, Br, Tw	1	Qian (1987)
79	<i>Neocerambyx oenochrousx</i>	O	M	Jun.-Sep.	St, Br	1	Qian (1987)
80	<i>Linda fraterna</i>	O	M	Jun.-Sep.	St, Br	1	Qian (1987)
81	<i>Bacchisa fortunei</i>	O	M	Jun.-Sep.	St, Br	1	Qian (1987)
82	<i>Macrotoma palmata</i>	E	M	Jun.-Oct.	St	1 per 3 yr	Tadros <i>et al.</i> (1993)
83	<i>Chlorophorus varius</i>	E	M	Apr.-Oct.	St, Br	1	Tadros (1994 b)
84	<i>Anoplophora nobilis</i>	O	m	Jun.-Sep.	St, Br	1	Shang <i>et al.</i> (2000)
85	<i>Anoplophora glabripennis</i>	O	M	Jun.-Sep.	St, Br	1	Shang <i>et al.</i> (2000)
iii. Family: Scolytidae							
86	<i>Scolytus japonicus</i>	O	M	Apr. – Oct.	St, Br, Tw	3- 4	Yang (1989)
87	<i>Scolytus amygdali</i>	E	M	Feb. Dec.	St, Br, Tw	5- 6	Tadros (1994 a)
		O	M	Apr. – Oct.	Bu, Br	3- 4	Ben Yehuda <i>et al.</i> (2002)
88	<i>Scolytus mediterraneus</i> [<i>S. rugulosus</i>]	O	m	Mar.-Oct.	St, Br, Tw	3- 4	Mustaga (1991)
89	<i>Xyleborinus saxeseni</i>	E	M	Whole year	R	<5	Batt (2000)
		O	m	Mar.-Oct.		3- 4	Kovach & Gorsuch (1988)
90	<i>Phloeosinus aubei</i>	O	M	Mar.-Oct.	St, Br, Tw	3- 4	Yang (1989)
iv. Family: Nitidulidae							
91	<i>Carpophilus hemipterus</i>	O	m	Jun.-Sep.	Fr	1	Bartelt & James(1994)
92	<i>Carpophilus mutilatus</i>	O	m	Jun.-Sep.	Fr	1	Bartelt & James(1994)
93	<i>Carpophilus davidsoni</i>	O	m	Jun.-Sep.	Fr	1	Bartelt & James(1994)
94	<i>Carpophilus spp.</i>	O	M	Jun.-Sep.	Fr	1	Michailides <i>et al.</i> (1992)
v. Family: Curculionidae							
95	<i>Conotrachelus nenuphar</i>	O	M	Jun.-Sep.	Fr	1	Johnson <i>et al.</i> (2002)
vi. Family: Scarabaeidae							
96	<i>Cotinis nitida</i>	O	m	Jun.-Sep.	R	1	Johnson & Vishniac (1991)
VI. Order: Hymenoptera							
i. Family: Tenthredinidae							
97	<i>Hoplocampa minuta</i>	O	m	Jul –Oct.	Fr	1	Hohn <i>et al.</i> (1996)

Table 1-6: Cont.

No	Scientific name	C	S	A. P.	P. P.	G	References
VII. Order: Diptera							
i. Family: Cecidomyiidae							
98	<i>Putoniella gracilis</i>	O	M	Jun.-Sep.	Fr	4	Gagne & Payne (1992)
99	<i>Putoniella pruni</i>	O	M	Jun.-Sep.	Fr	4	Gagne & Payne (1992)
ii. Family: Tephritidae							
100	<i>Bactrocera dorsalis</i>	O	M	Jun.-Sep.	Fr	4	Benschoter (1988)
101	<i>Bactrocera zonata</i>	E	M	Jun.-Sep.	Fr	4	Iwahashi & Routhier (2001), Mohamed (2000) & Attalla & Eweis (2002)
		O	M	Jun.-Sep.		3	Hurtrel <i>et al.</i> (2002)
102	<i>Rhagoletis completa</i>	O	M	Jun.-Sep.	Fr	4	Yokoyama & Miller (1993)
103	<i>Anastrepha fraterculus</i>	O	M	Jun.-Sep.	Fr	4	Lima <i>et al.</i> (1994)
104	<i>Anastrepha suspensa</i>	O	M	Jun.-Sep.	Fr	4	Benschoter (1988)
105	<i>Anastrepha ludens</i>	O	M	Jun.-Sep.	Fr	4	Leyva <i>et al.</i> (1991)
102	<i>Rhagoletis completa</i>	O	M	Jun.-Sep.	Fr	4	Yokoyama & Miller (1993)
103	<i>Anastrepha fraterculus</i>	O	M	Jun.-Sep.	Fr	4	Lima <i>et al.</i> (1994)
104	<i>Anastrepha suspensa</i>	O	M	Jun.-Sep.	Fr	4	Benschoter (1988)
106	<i>Anastrepha obliqua</i>	O	M	Jun.-Sep.	Fr	4	Jesus <i>et al.</i> (2000)
107	<i>Anastrepha serpentina</i>	O	M	Jun.-Sep.	Fr	4	Jesus <i>et al.</i> (2000)
108	<i>Anastrepha striata</i>	O	M	Jun.-Sep.	Fr	4	Jesus <i>et al.</i> (2000)
109	<i>Ceratitis capitata</i>	E	M	Jun.-Sep.	Fr	4-5	Hashem <i>et al.</i> (1992) & Adam & Mohamed (1997)
		O	M	Jun.-Sep.		3-4	Mustafa & Abdel-Jabbar (1996)
		O	m	Jul.-Nov		3-4	Hernandez <i>et al.</i> (1999)
iii. Family: Drosophilidae							
110	<i>Drosophila melanogaster</i>	O	m	Jul. Oct.	Fr	<4	Michailides <i>et al.</i> (1992)

2. Survey of insects attacking peach trees in Egypt

Table (2) presented the results of survey studies of insects attacking peach trees in the different localities of Egypt at both old Delta and new reclaimed lands during three successive years (from January 2000 to December 2002). Data clarified the scientific name, order, and family of insect species, status of infestation (major or minor), the attacked and affected part of the tree and the activity season(s).

During the present field investigation, more than 23 species belonging to 13 families and 6 orders were surveyed in peach orchards in Egypt (Table, 2). Eight species were first recorded in Egypt. The dominating pests were the woodborers, the leaf and flower eaters, the fruit worms and flies and the sucking and scale insects.

Actually, woodborers were the most abundant and damaging insect pests in

Table 2. Major (M) and minor (m) insect pests status (S) attacking peach trees in Egypt with the damage plant parts and activity period (winter: W, spring: Sp, summer: Su, autumn: A). (R: root, St: stem, Br: branches, Sh: shoot, Tw: twig, Bu: bud, L: leaf, Fl: flower, Fr: fruit).

No	Scientific name	Order	Family	S	Damaged plant parts	Activity period			
						W	Sp	Su	A
1	<i>Thrips major</i> **	Thysanoptera	Thripidae	M	Bu, L, Fl, Fr		*	*	
2	<i>Empoasca decedens</i> **	Hemiptera: Homoptera	Cicadellidae	m	L		*	*	
3	<i>Bemesia tabaci</i> **	Hemiptera: Homoptera	Aleyrodidae	m	L		*	*	
4	<i>Aphis gossypii</i>	Hemiptera: Homoptera	Aphididae	M	Tw, L, Fl, Fr		*		
5	<i>Aphis punicae</i>	Hemiptera: Homoptera	Aphididae	M	Tw, L, Fl, Fr		*		
6	<i>Hyalopterus amygdali</i>	Hemiptera: Homoptera	Aphididae	M	Tw, L, Fl, Fr		*		
7	<i>Myzus persicae</i>	Hemiptera: Homoptera	Aphididae	M	Tw, L, Fl, Fr		*		
8	<i>Parlatoria oleae</i> **	Hemiptera: Homoptera	Coccidae	M	Br, Tw, L, Fr		*	*	*
9	<i>Aonidiella orientalis</i> **	Hemiptera: Homoptera	Diaspididae	M	Br, Tw, L, Fr		*	*	*
10	<i>Anarisa lineatella</i>	Lepidoptera	Gelechiidae	M	Tw, Fr	*	*	*	*
11	<i>Tropinota squalida</i> **	Coleoptera	Scarabaeidae	M	Fl	*	*		
12	<i>Ptosima undecimmaculata</i>	Coleoptera	Buprestidae	M	St, Br	*	*	*	*
13	<i>Capnodis carbonaria</i>	Coleoptera	Buprestidae	M	R	*	*	*	*
14	<i>Sphenoptera trispinosa</i>	Coleoptera	Buprestidae	M	St, Br	*	*	*	*
15	<i>Chrysobothris dorsata</i>	Coleoptera	Buprestidae	m	St, Br	*	*	*	*
16	<i>Macrotoma palmata</i>	Coleoptera	Cerambycidae	m	St, Br	*	*	*	*
17	<i>Chlorophorus varius</i>	Coleoptera	Cerambycidae	M	St, Br	*	*	*	*
18	<i>Scolytus amygdali</i>	Coleoptera	Scolytidae	M	St, Br, Tw, Bu	*	*	*	*
19	<i>Xyleborinus saxeseni</i>	Coleoptera	Scalytidae	m	R	*	*	*	*
20	<i>Carpophilus hemipterus</i> **	Coleoptera	Nitidulidae	m	Fr		*	*	
21	<i>Ceratitis capitata</i>	Diptera	Tephritidae	M	Fr		*	*	
22	<i>Bactrocera zonata</i>	Diptera	Tephritidae	M	Fr		*	*	
23	<i>Drosophila melanogaste</i> **	Diptera	Tephritidae	m	Fr			*	

** First record.

peach orchards. They caused serious damage to the root (*Capnodis carbonaria*), the stem and branches (*Chlorophorus varius* and *Ptosima undecimmaculata*), the stem, branches and twigs (*Scolytus amygdali*), and the twigs (*Anarisa lineatella*) of peach trees. Larvae of woodborers harbor the wood of trees all the year round, whereas, adults were active during spring, summer and / or autumn according to the insect species and the weather factors affecting the adult activity (see the next part in this series of researches). The other woodborers (*Sphenoptera trispinosa*, *Chrysobothris dorsata*, *Macrotoma palmata*, and *Xyleborinus saxeseni*) were of less importance and abundance.

These results agree with the record of Tadros *et al.* (1993), Tadros (1994 a), Tadros (1994 b), Saffan and Tadros (1995), and Batt (1999) who reported *C. carbonaria* infesting the roots and *C. varius*, *P. undecimmaculata*, *S. amygdali*, *A. lineatella*, *S. trispinosa*, *M. palmata* and *X. saxeseni* infesting stems and branches.

On the other hand, *A. lituratus*, and *S. tappesi* borers (Batt, 1999) were not reported from this survey.

The fruit flies (*Ceratitis capitata* and *Bactrocera dorsalis*) and the fruit worm (*Anarisa lineatella*) were also major insect pests and were much abundant in peach orchards. They were severely attacked fruits and caused economic damage to fruit production. Adults of the scarabaeid *Tropinota squalida* attacked the flowers of peach trees but scarcely and in some years caused considerable damage. *Carpophilus hemipterus* and *Drosophila melanogaster* infested over ripening and fallen fruits.

These results agree with Hashem *et al.* (1992) who recorded *C. capitata*, Attalla and Eweis (2002), who recorded *B. dorsalis*, and Saffan and Tadros (1995) who recorded *A. lineatella*. On the other hand, *Tropinota squalida*, *Carpophilus hemipterus*, and *Drosophila melanogaster* were first recorded in Egypt.

Different parts of peach trees were affected with the Thripid *Thrips major*, the Cicadellid *Empoasca decedens*, the Aleyrodid *Bemesia tabaci*, aphids *Aphis gossypii*, *A. punicae*, *Hyalopterus amygdali* and *Myzus persicae*, the scale *Parlatoria oleae* and *Aonidiella orientalis*. These results agree with Ismail *et al.* (1991) who recorded *A. gossypii*, *A. punicae*, *M. persicae*, and *H. amygdali*. On the other hand, *Bemesia tabaci*, *Thrips major* and *Empoasca decedens*, *Parlatoria oleae*, and *Aonidiella orientalis* were first recorded in Egypt.

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آفات أشجار الفاكهة ذات النواة الحجرية: (١) حصر الآفات الحشرية في حدائق الخوخ

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تم إجراء حصر للآفات الحشرية التي تصيب أشجار الخوخ في مصر، خلال ثلاث سنوات متعاقبة (٢٠٠٠ - ٢٠٠٢). أجريت الدراسة في مناطق بيئية مختلفة في غرب وشرق ووسط الدلتا وشمال وجنوب الوادي. وقد تم فحص وتسجيل الآفات المتواجدة في فصول السنة الأربعة، ومدى أهميتها الاقتصادية (آفة أو حشرة)، والأجزاء النباتية المصابة. تم تسجيل أكثر من ٢٣ نوعا حشرياً، تتبع ١٣ عائلة، من ٦ رتب في حدائق الخوخ، منها ثمانية أنواع سجلت للمرة الأولى. وكانت الآفات السائدة هي حفارات الأشجار، حيث تسبب أضراراً للجذور (حفار جذور الخوخ *Capnodis carbonaria*)، والسوق والأفرع (حفار ساق الخوخ ذو القرون الطويلة *Chlorophorus varius*)، وحفار ساق البرقوق (*Ptosima undecimmaculata*)، والسوق والأفرع واللباليب (خنافس قلف الحلويات *Scolytus amygdali*)، واللباليب (الأنارسيا *Anarsia lineatella*). أيضاً تسبب الحفارات ذات القرون القصيرة (*Sphenoptera trispinosa*, *Chrysobothris dorsata*) وحفار ساق السنط *Macrotoma palmata* والخنافس (*Xyleborinus saxeseni*) أضراراً ولكن بدرجة أقل. تسبب ذبابة الفاكهة *Ceratitis capitata* وذبابة ثمار الخوخ *Bactrocera zonata* والأنارسيا *A. lineatella* أضراراً شديدة للثمار. أحياناً تهاجم حشرات جعل الورد الزغبى *Tropinota sqalida* الأزهار. أما خنافس الثمار *Carpophilus hemipterus* وذبابة الدروسوفيلا *Drosophila melanogaste* فتهاجم الثمار في مرحلة ما بعد النضج والثمار المتساقطة على الأرض. تتأثر أجزاء مختلفة من الأشجار بالإصابة بالتربس *Thrips major*، والجاسيد *Empoasca decedens*، والمن *Aphis gossypii* و *Aphis punicae* و *Hyalopterus amygdali* و *Myzus persicae*، والذبابة البيضاء *Bemesia tabaci*، والحشرات القشرية *Parlatoria oleae* و *Aonidiella orientalis*.