

The Whiteflies in Egypt (Hemiptera: Aleyrodidae)

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(Received: 18 May 2020; accepted: 25 May 2020)

Whiteflies are the most important pests of economic crops in Egypt causing huge damage to them by their direct feeding, formation of sooty mold on plants and vectoring of plant viruses. An updated list of the 25 species of whiteflies (Hemiptera: Aleyrodidae) known to occur in Egypt and an identification key are provided.

Keywords: Whiteflies, Hemiptera, Aleyrodidae, crops, Egypt.

The family Aleyrodidae is worldwide in distribution and comprises about 1556 species in 161 genera (Martin and Mound, 2007). All whiteflies are phytophagous and have six developmental stages: egg, four larval/nymphal instars and adult. Many species are economically important plant pests in both indoor and outdoor environments. Feeding by immature whiteflies reduces plant vigor by the depletion of plant sap, and foliage becomes contaminated black sooty mold which grows on the honeydew they secrete, thereby reducing the photosynthetic capacity and lowering the aesthetic appearance of the plant. Adults of a small number of species, most notably species within the *Bemisia tabaci* complex, are important vectors of plant viruses (Jones, 2003). Abd-Rabou (2001) reviewed the whitefly species in Egypt, and Abd-Rabou and Evans (2009, 2013 and 2014) added three new species to the Egyptian list. The purpose of this short communication is to provide an updated list of whiteflies in Egypt and a key to aid in their identification.

Key to the genera of Aleyrodidae in Egypt (puparia)

1. Dorsum with long, stout spines or siphons 2
- 1b. Dorsum without long, stout spines or siphons 3
- 2(1) Dorsum with many large, thick spines; operculum almost filling vasiform orifice;
1 species in Egypt, common on *Ziziphus spina-christi* (Fig. 1A).

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- ***Aleurocanthus zizyphi* Priesner and Hosny**
- 2b. Dorsum with many, long siphons; 1 species in Egypt (Fig. 1J).
 ***Siphoninus phillyreae* (Haliday)**
- 3(1b) Pupal case dark brown or black and heavily sclerotized..... 4
- 3b Pupal case pale or yellowish, usually not heavily sclerotized..... 10
- Pupal case black and heavily sclerotized***
- 4(3) Operculum filling about one quarter of vasiform orifice; submedial region of cephalothorax with a pair of longitudinal sutures; 1 species in Egypt (Fig. 1J) ***Acaudaleyrodes rachipora* (Singh)**
- 4b. Operculum almost filling vasiform orifice; submedial region of cephalothorax without a pair of longitudinal sutures..... 5
- 5(3b) Dorsum with a submargin furrow; 1 species in Egypt (Fig. 1C).
 ***Tetraleurodes leguminicola* Bink-Moenen**
- 5b. Dorsum without a submargin furrow 6
- 6(5b) Tracheal pore areas mostly differentiated from margin by a comb; area surrounding the vasiform orifice forming a trilobed structure; 2 species in Egypt ***Aleurolobus*** 7
- 6b. Tracheal pore areas not differentiated from margin; area surrounding the vasiform orifice not forming a trilobed structure..... 8
- 7(6) Body nearly round, about 1.1× as long as wide; only found on Oleaceae (*Olea* and *Phillyrea* (Fig. 1D) ***A. olivinus* (Silvestri)**
- 7b. Body oval, about 1.3× as long as wide; found on many hosts (Fig. 1E).
 ***A. marlatti* (Quaintance)**
 **A. niloticus* Priesner and Hosny (Fig. 1F), a synonym of *A. marlatti*
- 8(6b) Median moulting suture reaching margin or nearly so, first abdominal segment with 1 pair of setae; 1 species, on oak (*Quercus*) in Egypt (Fig. 1G).
 ***Aleuroviggianus adrianae* Iaccarino**
- 8b. Median moulting suture not reaching margin or nearly so, first abdominal segment without setae; 2 species, in Egypt.
 ***Aleuroplatus* Quaintance and Baker** 8
- 9(8b) Body almost round, vasiform orifice very small, caudal furrow very distinct, on *Cadaba* in Egypt (Fig. 1H) ***A. cadabae* Priesner and Hosny**
- 9b. Body oval shaped, vasiform orifice normal size, caudal furrow not very distinct; on *Acacia* in Egypt (Fig. 1I) ***A. acaciae* Bink-Moenen**

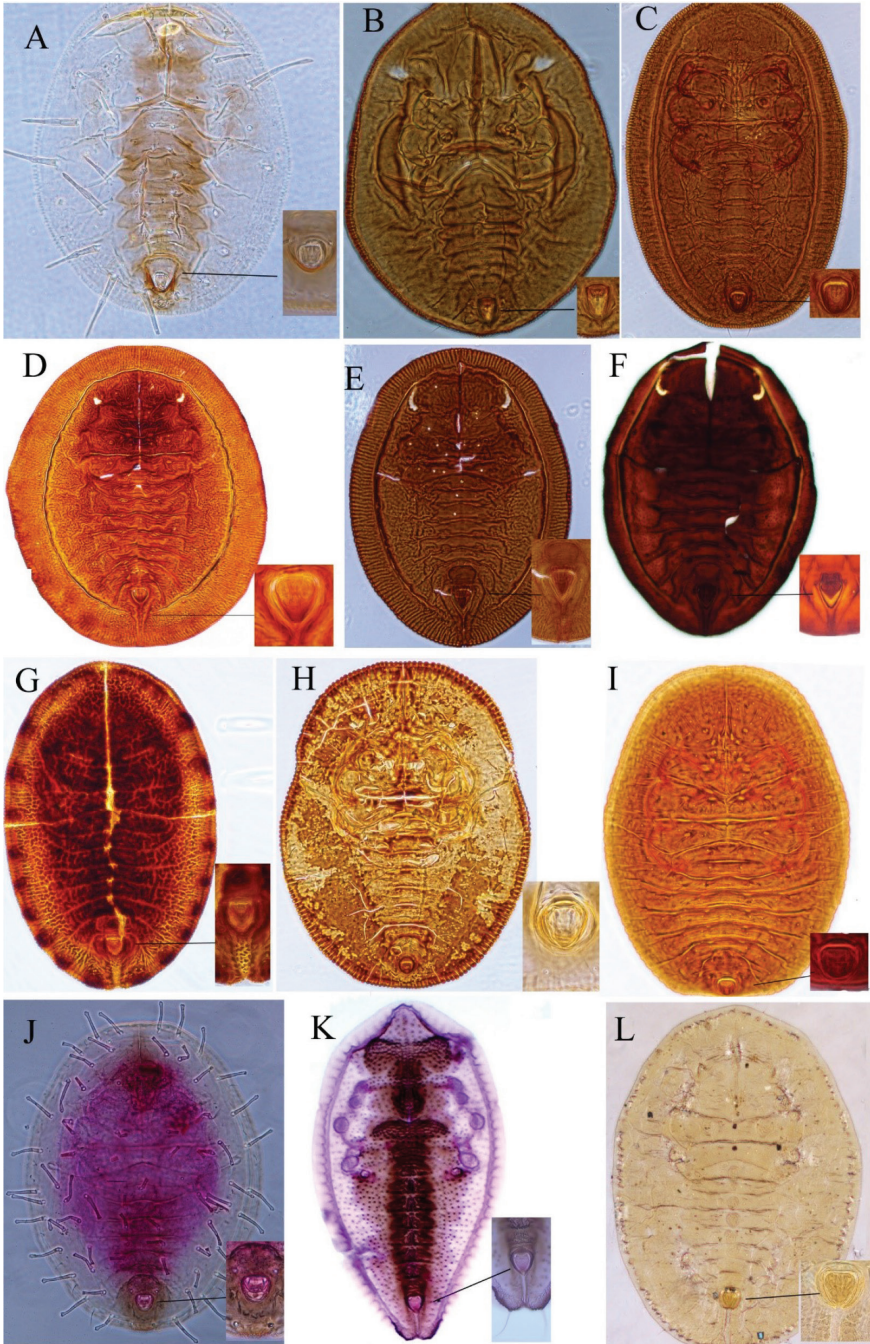


Fig. 1. A) *Aleurocanthus zizyphi*, B) *Acaudaleyrodes rachipora*, C) *Tetraleurodes leguminicola*, D) *Aleurolobus olivinus*, E) *Aleurolobus marlatti*, F) *Aleurolobus niloticus*, G) *Aleuroviggianus adrianae*, H) *Aleuroplatus cadabae*, I) *Aleuroplatus acaciae*, J) *Siphoninus phillyreae*, K) *Aleuroclava psidii*, L) *Aleuroclava porosus*

Pupal case pale or yellowish, usually not heavily sclerotized

- 10(3b) Opening of tracheal furrow along the lateral margin terminating in a pore or cleft; vasiform orifice cordate with operculum filling almost the entire orifice. 11
- 10b. Opening of tracheal furrow along the lateral margin not terminating in a pore or cleft rather undifferentiated from margin or with a few teeth; vasiform orifice cordate or triangular, operculum filling from about half to almost the entire orifice 16
- 11(10) Opening of tracheal furrow along the lateral margin terminating in a cleft; lateral margin crenulate; 3 species, in Egypt ***Aleuroclava***.... 12
- 11b. Opening of tracheal furrow along the lateral margin terminating in a pore; lateral margin crenulate..... 14
- 12(11) Body very elliptical and narrow shaped; head with a distinct large, T-shaped pattern; most commonly found on *Psidium guajava* (Fig. 1K)
..... ***A. psidii* (Singh)**
- 12b. Body oval shaped; head without a T-shaped pattern 13
- 13(12b) Submedial region of cephalothorax with 7 large pores-like structures; on *Ziziphus spina-christi* in Egypt (Fig. 1L ***A. porosus* Priesner and Hosny**
- 13b. Submedial region of cephalothorax without 7 large pores, but with about 7 tubercle like structures; most commonly found on *Gardenia* or *Jasminum*. (Fig. 2A) ***A. jasmini* Takahashi**
- 14(11b) Tracheal pore toothed internally; caudal and tracheal ventral areas not lined with spinules or nodules (usually smooth); head region not delimited by faint suture; 13-15 pairs of submarginal setae present, 1 species described on *Ficus* from Egypt (Fig. 2B ***Singhiella elbaensis* (Priesner and Hosny)**
- 14b. Tracheal pore nearly smooth internally; caudal and tracheal ventral area lined with spinules or nodules; head region delimited by faint suture; 10-12 pairs of submarginal setae present; 2 species, in Egypt ***Dialeurodes***..... 15
- 15(14b) Dorsum with median line normally with some pigmentation from mouthparts to level of first abdominal segment; first abdominal setae usually present; eighth abdominal setae located opposite, or posterior to, widest part of operculum (Fig. 2C) ***D. kirkaldyi* (Kotinsky)**
- 15b. Dorsum entirely pale; first abdominal setae absent; eighth abdominal setae located anterior to the widest part of operculum (Fig. 2D)
..... ***D. citri* (Ashmead)**
- 16(10b) Dorsum divided along the submargin, or submedial region of abdomen by a long, longitudinal suture; vasiform orifice transverse to slightly longer than wide ... 17
- 16b. Dorsum entire, not divided along the submargin by a long, longitudinal suture; vasiform orifice triangular, longer than wide in most species..... 18

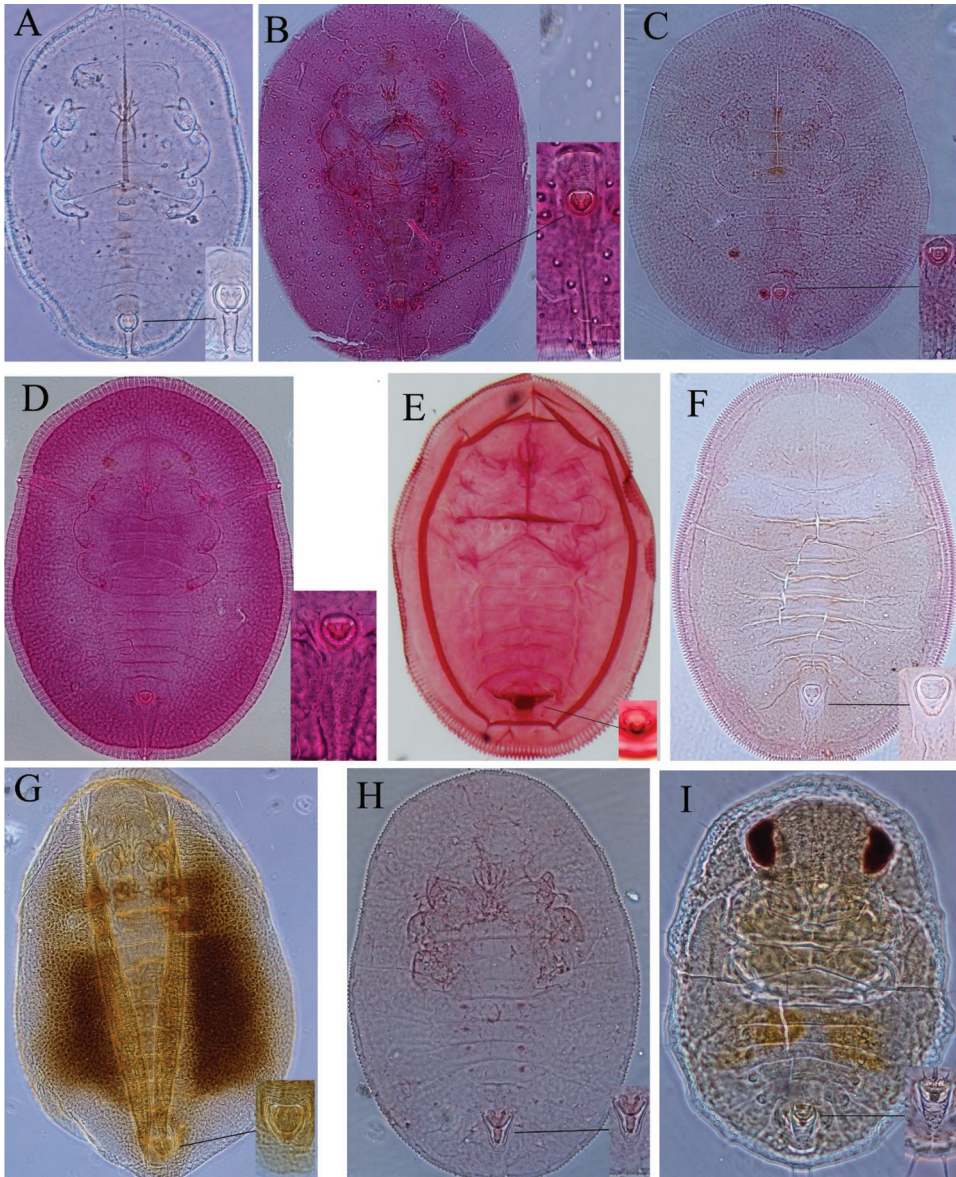


Fig. 2. A) *Aleuroclava jasmini*, B) *Singhiella elbaensis*, C) *Dialeurodes kirkaldyi*, D) *Dialeurodes citri*, E) *Aleurothrixus floccosus*, F) *Aleuromarginatus tephrosiae*, G) *Ramsesseus folloti*, H) *Parabemisia myricae*, I) *Pealius mori*

- 17(16) Dorsum divided along the submargin by a long, longitudinal suture from the anterior margin connecting underneath the vasiform orifice to the other side; vasiform orifice transverse, wider than long, 1 species in Egypt (Fig. 2E)
 *Aleurothrixus floccosus* (Maskell)
- 17b. Dorsum divided along the submedial region of only the abdomen, not connecting underneath the vasiform orifice to the other side; vasiform orifice longer than wide, 1 species in Egypt (Fig. 2F)
 *Aleuromarginatus tephrosiae* Corbett
- 18(16b) Lateral margins strongly deflexed (folded over the dorsal shield); transverse suture extending to the lateral margin; vasiform orifice cordate; submargin with 13 relatively long, thick setae; 1 species, on *Acacia* in Egypt (Fig. 2G)
 *Ramsesseus follioti* Zahradnik
- 18b. Lateral margins not deflexed (folded over the dorsal shield); other characters variable 19
- 19(18b) Transverse moulting suture extending to the lateral margin; submarginal setae long, extending well beyond the lateral margin 20
- 19b. Transverse moulting suture not extending to the lateral margin; submarginal setae short to moderately long, not extending well beyond the lateral margin. 21
- 20(19) Vasiform orifice triangular, tapering to a point posteriorly; anterior part of lingula with a protuberance on each side; 1 species in Egypt (Fig. 2H).
 *Parabemisia myricae* (Kuwana)
- 20b. Vasiform orifice nearly quadrate, appearing to be separated into 2 parts, one part terminating just below the lingula, followed by another quadrate area with ornate sculpturing underneath; lingula without a protuberance on each side; 1 species in Egypt (Fig. 2I) *Pealius mori* (Takahashi)
- 21(19b) Lingula trilobed, dorsum usually with papillae; 1 species in Egypt (Fig. 3A)
 *Trialeurodes ricini* (Misra)
- 21b. Lingula not trilobed, dorsum without papillae 22
- 22(21b) Median part of abdominal segments 6 and 7 subequal in length; 1 species in Egypt (Fig. 3B) *Aleyrodes proletella* (Linnaeus)
- 22b. Median parts of abdominal segment 6 much wider (about 2×) than that of segment 7 subequal in length; 3 species, in Egypt.
 *Bemisia Quaintance and Baker* 22
- 23(22b) Body elongate and narrow, about 1.8× longer than wide; on grasses (Poaceae) (Fig. 3C) *B. formosana* Takahashi
- 23b. Body broad, oval to almost round, less than 1.3× longer than wide; not on rasses 24

- 24(23b) Submedial region of first abdominal segment (A1) with 2 geminate pores/porettes on each side of A1, between the median tubercle and the first abdominal seta-bearing tubercle; caudal setae relatively short, about 2× the length of the operculum and not on large tubercles; vasiform orifice with emarginate sides and inset from the posterior margin of the puparium by at least its own length (Fig. 3D) ***B. afer* (Priesner and Hosny)**
- 24b. Submedial region of first abdominal segment (A1) with 1 geminate pore/porette on each side of A1, between the median tubercle and the first abdominal seta-bearing tubercle; caudal setae long, about 3× or more the length of the operculum and set on large tubercles; vasiform orifice with straight sides and inset from the posterior margin of the puparium by less than its own length (Fig. 3E)
..... ***B. tabaci* (Gennadius)**

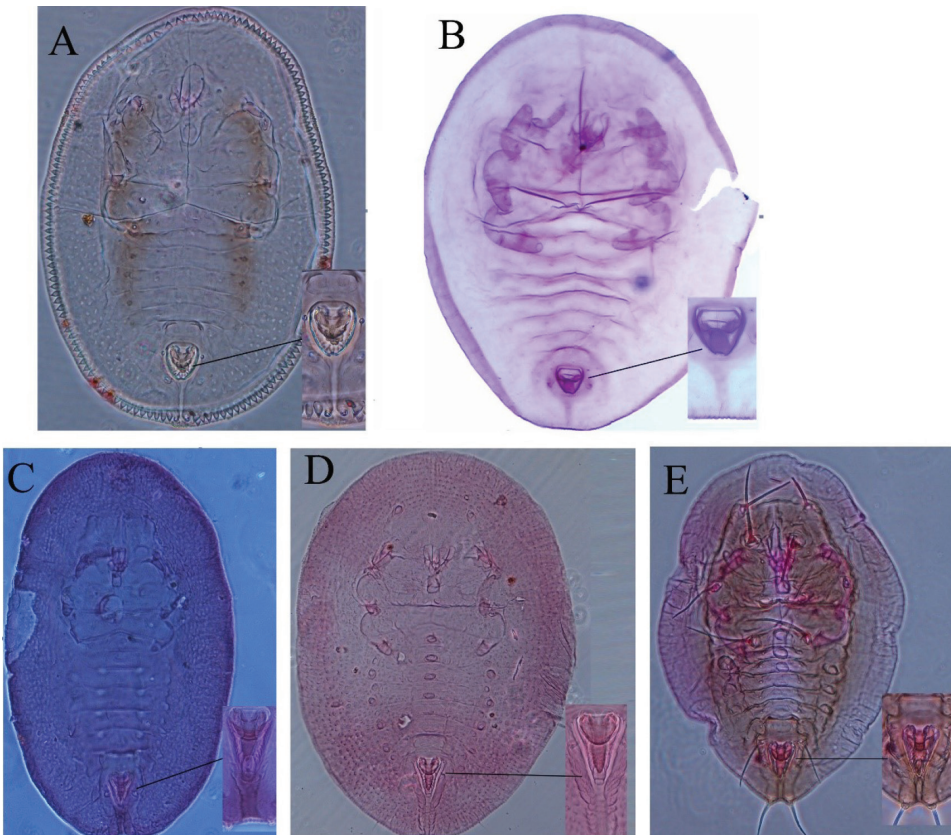


Fig. 3. A) *Trialeurodes ricini*, B) *Aleyrodes proletella*, C) *Bemisia formosana*, D) *Bemisia afer*, E) *Bemisia tabaci*

List of whiteflies (Aleyrodidae) in Egypt

1. *Acaudaleyrodes rachipora* (Singh)

Distribution in Egypt: Aswan (Idfu); Beni-Suef (Beni-Adi); Cairo (Maadi); Daqahliya; Dakhla Oasis; Eastern desert (Gable Elba); El-Minya (Mallawi); Gharbiya (Kafr El-Zayat); Giza; Kafr El-Sheikh (Biyala); Minufiya (Shebin El-Kom); Qena (Luxor); Sharqiya (Zagazig) and Sohag (Girga).

Host Plants: **Anacardiaceae:** *Rhus albid*a; **Asclepiadaceae:** *Leptadenia heterophylla*; **Caprifoliaceae:** *Sambucus nigra*; **Euphorbiaceae:** *Euphorbia cuneata*; **Fabaceae:** *Acacia nilotica*, *Acacia tortilis*, *Acacia* sp., *Alhagi maurorum*, *Alhagi* sp.; *Cassia italica*, *Prosopis spicigera*, *Prosopis stephaniana*, *Prosopis* sp., *Tephrosia apollinea*, *Tephrosia leptostachya*; **Lythraceae:** *Lawsonia alba*, *Lawsonia inermis*; **Myrtaceae:** *Psidium guajava*; **Punicaceae:** *Punica granatum*; **Rhamnaceae:** *Ziziphus spina-christi*; **Rosaceae:** *Rosa* sp.; **Rutaceae:** *Citrus aurantium* var. *amara*; **Salvadoraceae:** *Dodonaea viscosa*; **Solanaceae:** *Solanum esculentum*; **Malvaceae:** *Grewia tenax* and **Zygophyllaceae:** *Balanites aegyptiaca* (Evans 2008).

Remarks: First reported in Egypt by Priesner and Hosny (1934).

2. *Aleurocanthus ziziphi* Priesner and Hosny

Distribution in Egypt: Assiut; Aswan (Elefantine Island); Dakhla Oasis (Qalamun) and El-Minya.

Host Plants: **Lythraceae:** *Lawsonia inermis*; **Myrtaceae:** *Psidium guajava*; **Rhamnaceae:** *Ziziphus jujuba*, *Ziziphus spina-christi* and **Zygophyllaceae:** *Balanites aegyptiaca*.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

3. *Aleuroclava jasmini* (Takahashi)

Distribution in Egypt: Qalyubiya.

Host Plants: **Rutaceae:** *Citrus* spp.

Remarks: First reported in Egypt by Amin et al. (1997).

4. *Aleuroclava porosus* (Priesner and Hosny)

Distribution in Egypt: Aswan (Elefantine Island) and Qalyubiya.

Host Plants: **Rhamnaceae:** *Ziziphus jujuba* and *Ziziphus spina-christi*.

Remarks: First reported in Egypt by Priesner and Hosny (1937).

5. *Aleuroclava psidii* (Singh)

Distribution in Egypt: Qalyubiya.

Host Plants: **Myrtaceae:** *Psidium guajava* and *Psidium* sp.

Remarks: First reported in Egypt by Abd-Rabou and Evans (2014)

6. *Aleurolobus marlatti* (Quaintance)

Distribution in Egypt: Assiut; Aswan (Kom Ombo); Cairo (Helwan); Dakhla Oasis; astern desert (Gabal Elba)

Host Plants: Lythraceae: *Lawsonia inermis*; **Moraceae:** *Ficus sycomorus*;

Salvadoraceae: *Dodonaea viscosa*, *Salvadora persica*, *Salvadora* sp., and

Zygophyllaceae: *Balanites aegyptiaca*, *Balanites* sp.

Remarks: First reported in Egypt by Abd-Rabou (2011)

7. *Aleurolobus niloticus* Priesner and Hosny

Distribution in Egypt: Assiut.

Host Plants: Rhamnaceae: *Ziziphus jujuba*, *Ziziphus* sp.

Remarks: First reported in Egypt by Willcocks (1922). Martin (1999) synonymized this species with *Aleurolobus marlatti*, but the status of *A. niloticus* as a distinct valid species remains debatable.

8. *Aleurolobus olivinus* (Silvestri)

Distribution in Egypt: El-Fayoum and North Sinai (El-Arish).

Host Plants: Oleaceae: *Olea* sp.

Remarks: First reported in Egypt by Abd-Rabou (1996).

9. *Aleuromarginatus tephrosiae* Corbett

Distribution in Egypt: Eastern desert (Wadi Aideb).

Host Plants: Fabaceae: *Indigofera* sp.

Remarks: First reported in Egypt by Abd-Rabou (1996).

10. *Aleuroplatus acaciae* Bink-Moenen

Distribution in Egypt: Aswan (Elefantine Island).

Host Plants: Fabaceae: *Acacia tortilis*.

Remarks: First reported in Egypt by Bink-Moenen (1983).

11. *Aleuroplatus cadabae* (Priesner and Hosny)

Distribution in Egypt: Eastern Desert.

Host Plants: Capparaceae: *Cadaba rotundifolia*, *Cadaba* sp., and **Salvadoraceae:** *Salvadora persica*.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

12. *Aleurothrixus floccosus* (Maskell)

Distribution in Egypt: Not available data.

Host Plants: Not available data.

Remarks: First reported in Egypt by Vulić and Beltran (1977).

13. *Aleuroviggianus adrianae* Iaccarino

Distribution in Egypt: Alexandria.

Host Plants: Fagaceae: *Quercus* sp.

Remarks: First reported in Egypt by Abd-Rabou (1996).

14. *Aleyrodes proletella* (Linnaeus)

Distribution in Egypt: Alexandria; Cairo; Giza and Qalyubiya

Host Plants: Asteraceae: *Cichorium intybus*, *Cichorium* sp., *Chondrilla juncea*; **Brassicaceae:** *Brassica oleracea botrytis*, *Brassica oleracea capitata*;

Fabaceae: *Vicia faba* and **Solanaceae:** *Solanum nigrum*.

Remarks: First reported in Egypt by El-Helaly et al. (1972).

15. *Bemisia afer* Priesner and Hosny

Distribution in Egypt: Assuit; Aswan (Kom Ombo); Beheira; El-Minya; Qalyubiya and Sharqiya.

Host Plants: Fabaceae: *Acacia nilotica*, *Albizia* sp.; **Lythraceae:** *Lawsonia alba*, *Lawsonia inermis*; **Moraceae:** *Ficus nitida*, *Ficus sycomorus*; **Rhamnaceae:** *Ziziphus spina-christi*; **Rutaceae:** *Citrus limon* var. *dulcis*, *Citrus limon* var. *vulgaris*, *Citrus sinensis*; **Salicaceae:** *Salix subserrata* and **Verbenaceae:** *Lantana camara*.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

16. *Bemisia formosana* Takahashi

Distribution in Egypt: Qena Governorate.

Host Plants: Poaceae: *Saccharum officinarum*.

Remarks: First reported in Egypt by Abd-Rabou and Evans (2009).

17. *Bemisia tabaci* (Gennadius)

Distribution in Egypt: *B. tabaci* is distributed in Egypt according to Abd-Rabou and Simmons (2012) in all the Egyptian Governorates.

Host Plants: this is an extremely polyphagous species known to occur on over 250 species of host plants in many different families. In Egypt, it is an important pest of all vegetable crops, ornamental plants and weeds.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

18. *Dialeurodes citri* (Ashmead)

Distribution in Egypt: Beheira; Daqahyia; Qalyubiya and Sharqiya.

Host Plants: Rutaceae: *Citrus aurantium* var. *amara*, *Citrus aurantium*, *Citrus limon* var. *dulcis deliciosa*, *Citrus limon* and *Citrus sinensis*.

Remarks: First reported in Egypt by Abd-Rabou (1996).

19. *Dialeurodes kirkaldyi* (Kotinsky)

Distribution in Egypt: Alexandria; Assiut; Aswan; Cairo; Giza; Ismailia; Qalyubiya and Portsaid.

Host Plants: Combretaceae: *Terminalia chebula*, *Terminalia* sp.; **Convolvulaceae:** *Convolvulus arvensis*; **Malvaceae:** *Malva rotundifolia*, *Malva sylvestris*; **Myrtaceae:** *Psidium guajava*; **Oleaceae:** *Jasminum grandiflorum*, *Jasminum officinale*, *Jasminum sambac*; **Ranunculaceae:** *Ranunculus repens* and **Rubiaceae:** *Coffea arabica*, *Coffea* sp.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

20. *Parabemisia myricae* (Kuwana)

Distribution in Egypt: Gharbiya; Kafr El-Shikh and Qalyubiya.

Host Plants: Rutaceae: *Citrus aurantium*, *Citrus aurantium* var. *amara*, *Citrus limon* var. *dulcis deliciosa*, *Citrus limon* and *Citrus sinensis*.

Remarks: First reported in Egypt by Abd-Rabou (1996).

21. *Pealius mori* (Takahashi)

Distribution in Egypt: Giza and Qalyubiya.

Host Plants: Euphorbiaceae: *Euphorbia* sp.

Remarks: First reported in Egypt by Abd-Rabou and Evans (2013).

22. *Ramsesseus follioti* Zahradnik

Distribution in Egypt: Aswan and Qena.

Host Plants: Fabaceae: *Acacia nilotica*, *Acacia* sp.

Remarks: First reported in Egypt by Zahradnik (1970)

23. *Singhiella elbaensis* (Priesner and Hosny)

Distribution in Egypt: Eastern Desert.

Host Plants: Moraceae: *Ficus salicifolia*.

Remarks: First reported in Egypt by Priesner and Hosny (1934).

24. *Siphoninus phillyreae* (Haliday)

Distribution in Egypt: Assiut; Beheira and Sinai.

Host Plants: Punicaceae: *Punica granatum*; **Rosaceae:** *Cydonia* sp., *Pyrus communis*, *Pyrus malus* and *Pyrus* sp.

Remarks: First reported in Egypt by Priesner and Hosny (1932).

25. *Tetraleurodes leguminicola* Bink-Moenen

Distribution in Egypt: Aswan.

Host Plants: Fabaceae: *Acacia nilotica*.

Remarks: First reported in Egypt by Bink-Moenen (1983).

26. *Trialeurodes ricini* (Misra)

Distribution in Egypt: Beni-Suef; Giza and Qalyubiya.

Host Plants: Convolvulaceae: *Convolvulus arvensis*; **Chenopodiaceae:** *Chenopodium ambrosioides*; **Euphorbiaceae:** *Ricinus communis* and **Solanaceae:** *Solanum nigrum*.

Remarks: First reported in Egypt by Abd-Rabou (1999).

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