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Check list and zoogeographic analysis of the scale insect fauna (Hemiptera: Coccomorpha) of Greece

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Abstract

This paper presents an updated checklist of the Greek scale insect fauna and the results of the first zoogeographic analysis of the Greek scale insect fauna. According to the latest data, the scale insect fauna of the whole Greek territory includes 207 species; of which 187 species are recorded from mainland Greece and the minor islands, whereas only 87 species are known from Crete. The most rich families are the Diaspididae (with 86 species), followed by Coccidae (with 35 species) and Pseudococcidae (with 34 species). In this study the results of a zoogeographic analysis of scale insect fauna from mainland Greece and Crete are also presented. Five species, four from mainland Greece and one from Crete are considered to be endemic. Comparison with the scale insect fauna of other countries is provided.

Key words: biogeography, chorotypes, Crete, mainland Greece

Introduction

The compilation of faunistic check lists provides a deeper knowledge on the local distribution of autochthonous and alien species and gives important information on the faunal history of a territory and on environmental changes.

With regard to the Western-Palaeartic scale insects (Hemiptera: Coccomorpha) fauna, recent check lists for the following countries are available: France (Foldi 2001), Italy (Pellizzari & Russo 2005), Croatia (Masten Milek & Simala 2008), Slovenia (Seljak 2010), Portugal (Franco *et al.* 2011), Israel (Ben-Dov 2012), Hungary (Kozár *et al.* 2013), Iran (Moghaddam 2013), Malta (Mifsud *et al.* 2014) and Turkey (Kaydan *et al.* 2013).

The scale insects fauna of Greece has been studied in the past by Lindinger (1912), Koroneos (1934), Paloukis (1979), Argyriou (1983) and Argyriou & Kourmadas (1980). Faunistic researches throughout the country have been carried out also by Kozár (1985, 1991) and Kozár *et al.* (1991), etc.

The first check list of the scale insect species recorded in Greece up to 2006 was presented by Milonas *et al.* (2008). At that time the number of scale insect species known from Greece was 168 and included species occurring both on mainland Greece and Crete.

Additional more recent faunistic papers added several new records, including new, undescribed species (Ben-Dov 2006; Jansen *et al.* 2010; Stathas & Kozár 2010; Pellizzari *et al.* 2011; Kozár *et al.* 2012; Milonas *et al.* 2013; Stathas *et al.* 2013 a, b; Kaydan *et al.* 2014).

Here we have gathered and checked all known distributional data to provide an updated checklist of scale insects recorded from mainland Greece and Crete. Moreover, this study has stimulated a first approach to a

zoogeographic analysis of the scale insect fauna of Greece and a comparison with the faunas of other Mediterranean countries.

Material and methods

The previous lists of scale insect faunas of Greece and Crete (Milonas *et al.* 2008; Pellizzari *et al.* 2011) have been checked and updated by adding all new records since 2008. All references reported in ScaleNet (Ben-Dov *et al.* 2015) referring to species recorded in Greece or Crete have been checked by reading the original papers and, if erroneous, corrected in the present lists.

From a biogeographic point of view, the flora and fauna of the major islands have been studied separately to those on the mainland as they can host endemic species. For this reason, the species recorded in Greece have been assessed in two different columns in the Tables according to whether the species has been recorded from mainland Greece and/or from Crete (Table 1). The very few records from the minor islands have been included in the mainland Greece column. With regard to the literature, each species is listed together with the reference of its first record for mainland Greece and/or Crete. Some recent or relevant references have been also added.

The synonymies proposed by Kozár *et al.* (2013) for species in Acanthococcidae *sensu stricto* (= Eriococcidae *sensu lato* by Miller & Gimpel, 2000), by Danzig & Gavrilov-Zimin (2014) for species in Phenacoccinae, by Kaydan (2015) or reported in ScaleNet (Ben-Dov *et al.* 2015) for species in the other families, have been accepted.

In the present paper we have adopted the chorotype classification proposed by Vigna-Taglianti *et al.* (1999) for the Western Palaearctic fauna and assigned to each scale insect species a chorotype based on its distributional pattern, according to distributional data reported in ScaleNet (Ben-Dov *et al.* 2015), in faunistic papers and check-lists. Each distributional data reported in the text devoid of citations are taken from ScaleNet (Ben-Dov *et al.* 2015).

The terms chorotype and element are widely used in biogeography to indicate biogeographic units; they are here used according to their original meaning, very recently clarified by Passalacqua (2015) as follows: the term “Chorotype” identifies a group of species with a similar pattern of distribution, “element” denotes the species that occurs in a previously defined region.

According to Vigna Taglianti *et al.* (1999), the Western Palaearctic fauna is divided into the following major groups of chorotypes:

- Chorotypes of species widely spread in the Holarctic Region
- Chorotypes of species widely spread in Europe
- Chorotypes of species widely spread in the Mediterranean countries
- Chorotypes of species widely spread in the Palaeotropics and extending into Mediterranean countries

Each of the above major groups includes several different chorotypes with a more restricted distributional pattern. The many chorotypes present in scale insect fauna of mainland Greece and Crete are reported in the tables 2–7, grouped according to their major chorotype.

Species introduced by human activity, either in the remote past or in recent years, and which are presently acclimatized and widely distributed in the world, are grouped as either Cosmopolitan or Cultural immigrants (Bodenheimer, 1935) or are listed according to their origin (i.e., Australasian, Asiatic, Nearctic). These invasive species are off any zoogeographic interest.

The species known so far only from restricted areas of mainland Greece or Crete are considered as Endemic species.

Data and comments are presented as those were used in the previous zoogeographical analyses on Italian and Sicilian scale insect faunas by Longo *et al.* (1999) and Mazzeo *et al.* (2011).

Results

According to the present revised census, the scale insect fauna of the whole Greek territory includes 207 species, an

increase of 39 species over the previous check-list by Milonas *et al.* (2008). While 187 species of the all scale insects are recorded from mainland Greece and minor islands, only 87 species are known from Crete so far. Mainland Greece and Crete share 67 species (Table 1). More specifically, species from 18 families are currently recorded from throughout Greece, with all represented on mainland Greece but only 12 families from Crete. Most species (86) belong to the Diaspididae: 77 species are recorded in mainland Greece and 39 in Crete; 30 species are shared. The second most numerous family is the Coccidae with 35 species, followed by the Pseudococcidae with 34 species. Mainland Greece has 33 Coccidae species and Crete 16. Six families are represented by only one species (Acleridae, Cryptococcidae, Lecanodiaspididae, Marchalinidae, Margarodidae, Matsucoccidae and Putoidae).

TABLE 1. Check list of scale insect species recorded from mainland Greece and on the island of Crete.

Family	Species	Mainland Greece	Crete	Validation
Acanthococcidae	<i>Anophococcus agropyri</i> (Borchsenius, 1949)	*	*	Kozár <i>et al.</i> 1991
	<i>Anophococcus evelinae</i> (Kozár, 1983)	*		Kozár 1985
	<i>Anophococcus formicicola</i> (Newstead, 1897)	*	*	Kozár 1985; Kozár <i>et al.</i> 1991
	<i>Anophococcus herbaceus</i> (Danzig, 1962)	*		Kozár 1985
	<i>Anophococcus kotejai</i> Kozár & Kaydan, 2013	*		Kozár <i>et al.</i> 2013
	<i>Gossyparia spuria</i> (Modeer, 1778)	*		Kozár <i>et al.</i> 1991
	<i>Kaweckia hellenica</i> (Kozár, 1999)	*		Pellizzari & Kozár 1999
	<i>Rhizococcus baldonensis</i> (Rasina, 1966)	*		Kozár <i>et al.</i> 2013
	<i>Rhizococcus coccineus</i> (Cockerell, 1894)	*		Stathas 2004
	<i>Rhizococcus desertus</i> (Matesova, 1957)		*	Pellizzari <i>et al.</i> 2011
	<i>Rhizococcus greeni</i> Newstead, 1898	*		Kozár <i>et al.</i> 1991
	<i>Rhizococcus istresiamus</i> (Goux, 1989)	*		Kozár <i>et al.</i> 2013
	<i>Rhizococcus munroi</i> (Boratynski, 1962)	*	*	Kozár <i>et al.</i> 1991
	<i>Rhizococcus reynei</i> (Schmutterer, 1952)	*		Kozár <i>et al.</i> , 2013
	<i>Rhizococcus thymelaeae</i> Newstead, 1897)	*		Hodgson & Trenkeva 2008
<i>Uhleria araucariae</i> (Maskell, 1879)	*		Hoy 1963	
Acleridae	<i>Aclerda berlesii</i> Buffa, 1897	*		Santas 1989
Asterolecaniidae	<i>Asterodiaspis bella</i> (Russell, 1941)	*		Russell 1941
	<i>Asterodiaspis ilicicola</i> (Targioni Tozzetti, 1888)	*		Stathas <i>et al.</i> 2013a
	<i>Asterodiaspis quercicola</i> (Bouché, 1851)	*		Bodenheimer 1928
	<i>Asterodiaspis repugnans</i> (Russell, 1941)	*		Russell 1941
	<i>Asterodiaspis variolosa</i> (Ratzeburg, 1970)	*		Milonas <i>et al.</i> 2008a
	<i>Pollinia pollini</i> (A. Costa, 1857)	*	*	Bodenheimer 1928; Alexandrakis 1980
Cerochocidae	<i>Cerococcus cistarum</i> Balachowsky, 1927		*	Kozár & Nagy 1998
	<i>Cerococcus longipilosus</i> (Archangelskaya, 1830)	*		Kozár 1985
Coccidae	<i>Anapulvinaria pistaciae</i> (Bodenheimer, 1926)	*		Argyriou 1983
	<i>Ceroplastes cirripediformis</i> Comstock, 1881	*		Argyriou 1983
	<i>Ceroplastes floridensis</i> Comstock, 1881	*	*	Argyriou 1979; Argyriou & Kourmadas 1980; Pellizzari <i>et al.</i> 2011

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TABLE 1. (Continued)

Family	Species	Mainland Greece	Crete	Validation
	<i>Ceroplastes rusci</i> (Linnaeus, 1758)	*	*	Bodenheimer 1928; Ayoutantis 1940
	<i>Ceroplastes sinensis</i> Del Guercio, 1900	*	*	Pellizzari <i>et al.</i> 2011; Argyriou <i>et al.</i> 1976
	<i>Coccus hesperidum</i> Linnaeus, 1758	*	*	Bodenheimer 1928; Podsiadlo 1983; Ayoutantis, 1940
	<i>Coccus pseudomagnoliarum</i> (Kuwana, 1914)	*		De Lotto 1973
	<i>Eulecanium ciliatum</i> (Douglas, 1891)	*		Kozár <i>et al.</i> 1991
	<i>Eulecanium sericeum</i> (Lindinger, 1906)	*		Argyriou 1983
	<i>Eulecanium tiliae</i> (Linnaeus, 1758)	*		Bodenheimer 1928; Argyriou 1983
	<i>Filippia follicularis</i> (Targioni Tozzetti, 1867)	*	*	Bodenheimer 1928; Argyriou 1967; Pellizzari <i>et al.</i> 2011
	<i>Lecanopsis formicarum</i> Newstead, 1893		*	Pellizzari <i>et al.</i> 2011
	<i>Lecanopsis turcica</i> (Bodenheimer, 1951)	*		Milonas <i>et al.</i> 2008a
	<i>Lichtensia viburni</i> Signoret, 1873	*	*	Argyriou 1983; Argyriou <i>et al.</i> 1976
	<i>Luzulaspis dactylis</i> Green, 1928	*		Kozár 1985
	<i>Nemolecanium graniforme</i> (Wünn, 1921)	*		Stathas 2001
	<i>Parthenolecanium corni</i> (Bouché, 1844)	*		Argyriou 1983; Kozár, 1985; Santas 1983
	<i>Parthenolecanium persicae</i> (Fabricius, 1776)	*		Kozár 1985
	<i>Parthenolecanium rufulum</i> (Cockerell, 1903)	*	*	Kozár <i>et al.</i> 1991
	<i>Physokermes hellenicus</i> Kozár & Gounari, 2012	*		Kozár <i>et al.</i> 2012
	<i>Physokermes hemicyphus</i> (Dalman, 1826)	*		Argyriou 1983
	<i>Physokermes inopinatus</i> Danzig & Kozár, 1973	*		Stathas & Kozár 2010
	<i>Physokermes piceae</i> (Schrank, 1801)	*	*	Santas 1989
	<i>Poaspis intermedia</i> (Goux, 1939)		*	Kozár & Nagy 1998
	<i>Poaspis jahandiezi</i> (Balachowsky, 1932)	*		Koteja 1979
	<i>Pulvinaria vitis</i> (Linnaeus, 1758)	*	*	Argyriou 1983
	<i>Pulvinariella mesembryanthemi</i> (Vallot, 1830)	*	*	Argyriou 1983
	<i>Saissetia coffeae</i> (Walker, 1852)	*	*	Argyriou, 1983; Ben-Dov 1993
	<i>Saissetia oleae</i> (Olivier, 1791)	*	*	Ayoutantis 1940; Argyriou 1963
	<i>Saissetia privigna</i> De Lotto, 1965	*		De Lotto 1976; Argyriou 1983
	<i>Scythia festuceti</i> (Šulc, 1941)	*		Kozár <i>et al.</i> , 1991
	<i>Sphaerolecanium prunastri</i> (Boyer de Fonscolombe, 1834)	*	*	Argyriou & Paloukis 1976
Cryptococcidae	<i>Pseudochermes fraxini</i> (Kaltenbach, 1860)	*		Köhler 1998
Diaspididae	<i>Abgrallaspis cyanophylli</i> (Signoret, 1869)	*	*	Kozár <i>et al.</i> 1991
	<i>Acanthomytilus intermittens</i> (Hall, 1924)		*	Kozár <i>et al.</i> 1991
	<i>Acanthomytilus jablonowskii</i> Kozár & Matile-Ferrero, 1975	*		Kozár <i>et al.</i> 1991
	<i>Adiscodiaspis ericicola</i> (Marchal, 1909)		*	Pellizzari <i>et al.</i> 2011
	<i>Aonidia lauri</i> (Bouché, 1833)	*	*	Bodenheimer 1928; Koroneos 1934; Pellizzari <i>et al.</i> 2011

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TABLE 1. (Continued)

Family	Species	Mainland Greece	Crete	Validation
	<i>Aonidia maroccana</i> Balachowsky, 1949	*		Kozár <i>et al.</i> 1991
	<i>Aonidia mediterranea</i> (Lindinger, 1910)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Aonidiella aurantii</i> (Maskell, 1879)	*	*	Bodenheimer 1928; Ayoutantis 1940
	<i>Aonidiella citrina</i> (Coquillet)	*		Kozár <i>et al.</i> 1991
	<i>Aonidiella yehudithae</i> Ben-Dov, 2006		*	Ben-Dov 2006
	<i>Aspidiotus hedericola</i> Leonardi, 1920	*		Koroneos 1934
	<i>Aspidiotus nerii</i> Bouché, 1833	*	*	Bodenheimer 1928; Ayoutantis 1940
	<i>Aulacaspis rosae</i> (Bouché, 1833)	*	*	Koroneos 1934; Kozár <i>et al.</i> 1991; Pellizzari <i>et al.</i> 2011
	<i>Carulaspis juniperi</i> (Bouché, 1851)	*		Koroneos 1934
	<i>Carulaspis minima</i> (Signoret, 1869)	*	*	Kozár 1985; Pellizzari <i>et al.</i> 2011
	<i>Carulaspis visci</i> (Schrank, 1781)	*		Koroneos 1934
	<i>Chionaspis etrusca</i> Leonardi, 1908	*		Danzig & Pellizzari 1998
	<i>Chrysomphalus dictyospermi</i> (Morgan, 1889)	*	*	Ayoutantis 1940; Bodenheimer 1928
	<i>Diaspidiotus cecconii</i> (Leonardi, 1908)	*		Koroneos 1934
	<i>Diaspidiotus degeneratus</i> (Leonardi, 1896)	*		Koroneos 1934
	<i>Diaspidiotus gigas</i> (Thiem & Gerneck, 1934)	*		Argyriou 1983
	<i>Diaspidiotus labiatarum</i> (Marchal, 1909)	*		Lindinger 1909; Koroneos 1934
	<i>Diaspidiotus lenticularis</i> (Lindinger, 1912)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Diaspidiotus osborni</i> (Newell & Cockerell, 1898)		*	Pellizzari <i>et al.</i> 2011
	<i>Diaspidiotus ostreaeformis</i> (Curtis, 1843)	*		Koroneos 1934
	<i>Diaspidiotus perniciosus</i> (Comstock, 1881)	*		Paloukis 1979
	<i>Diaspidiotus pyri</i> (Lichtenstein, 1881)	*		Paloukis 1979
	<i>Diaspidiotus thymbrae</i> (Koroneos, 1934)	*		Koroneos 1934
	<i>Diaspidiotus wuenni</i> (Lindinger, 1923)	*		Trencheva <i>et al.</i> 2009
	<i>Diaspidiotus zonatus</i> (Frauenfeld, 1868)	*		Bodenheimer 1928; Koroneos 1934
	<i>Diaspis echinocacti</i> (Bouché, 1833)	*		Argyriou <i>et al.</i> 1976
	<i>Diaspis syriaca</i> Lindinger, 1912	*		Koroneos 1934
	<i>Discodiaspis salicorniae</i> (Gómez-Menor Ortega, 1928)	*		Koroneos 1934
	<i>Duplachionaspis berlesii</i> (Leonardi, 1898)	*	*	Pellizzari <i>et al.</i> 201; Koroneos 1934
	<i>Duplachionaspis natalensis</i> (Maskell, 1896)	*	*	Kozár <i>et al.</i> 1991; Milonas <i>et al.</i> 2008; Pellizzari <i>et al.</i> 2011
	<i>Dynaspidiotus abieticola</i> (Koroneos, 1934)	*		Koroneos 1934
	<i>Dynaspidiotus abietis</i> (Schrank, 1776)	*		Koroneos 1934; Stathas 2007-2008
	<i>Dynaspidiotus britannicus</i> (Newstead, 1898)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Dynaspidiotus ephedrarum</i> (Lindinger, 1912)	*		Koroneos, 1934
	<i>Dynaspidiotus greeni</i> (Balachowsky, 1951)		*	Kozár <i>et al.</i> 1991
	<i>Epidiaspis gennadii</i> (Leonardi, 1898)	*		Leonardi 1898; Koroneos 1934
	<i>Epidiaspis leperii</i> (Signoret, 1869)	*		Koroneos 1934; Milonas <i>et al.</i> 2008a

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TABLE 1. (Continued)

Family	Species	Mainland Greece	Crete	Validation
	<i>Hemiberlesia lataniae</i> (Signoret, 1869)	*	*	Bodenheimer 1928; Koroneos 1934; Rosen & DeBach 1979
	<i>Hemiberlesia rapax</i> (Comstock, 1881)	*		Koroneos 1934
	<i>Koroneaspis aegilopos</i> (Koroneos, 1934)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Lepidosaphes beckii</i> (Newman, 1869)	*	*	Hall 1922; Pellizzari <i>et al.</i> 2011
	<i>Lepidosaphes conchiformis</i> (Gmelin, 1789)	*	*	Bodenheimer 1928; Koroneos 1934; Kozár <i>et al.</i> 1991
	<i>Lepidosaphes flava</i> (Signoret, 1870)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Lepidosaphes gloverii</i> (Packard, 1869)	*		Stathas 2003-2004
	<i>Lepidosaphes granati</i> Koroneos, 1934	*		Koroneos 1934
	<i>Lepidosaphes juniperi</i> Lindinger, 1912	*		Bodenheimer 1928
	<i>Lepidosaphes malicola</i> Borchsenius, 1947	*		Kozár <i>et al.</i> 1991
	<i>Lepidosaphes pinnaeformis</i> (Bouché, 1851)	*		Koroneos 1934
	<i>Lepidosaphes pistaciae</i> Archangelskaya, 1930	*		Katsoyannos & Stathas 1995
	<i>Lepidosaphes ulmi</i> (Linnaeus, 1758)	*	*	Koroneos 1934; Katsoyannos & Stathas 1995a; Pellizzari <i>et al.</i> 2011
	<i>Leucaspis loewi</i> Colvée, 1882	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Leucaspis pini</i> (Hartig, 1839)	*		Bodenheimer 1928
	<i>Leucaspis pusilla</i> Löw, 1883	*	*	Bodenheimer 1928; Podsiadlo 1983
	<i>Leucaspis riccae</i> Targioni Tozzetti, 1881	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Lineaspis striata</i> (Newstead, 1897)	*	*	Koroneos, 1934; Kozár <i>et al.</i> 1991; Panis 1981; Pellizzari <i>et al.</i> 2011
	<i>Lopholeucaspis cockerelli</i> (Grandpré & Charmoy, 1899)	*		Nakahara 1982
	<i>Lopholeucaspis japonica</i> (Cockerell, 1897)	*		Kozár 1985
	<i>Melanaspis inopinata</i> (Leonardi, 1913)	*		Koroneos 1934
	<i>Mercetaspis halli</i> (Green, 1923)	*	*	Koroneos 1934; Podsiadlo 1983;
	<i>Mohelnaspis massiliensis</i> (Goux, 1937)	*		Kozár <i>et al.</i> 1991
	<i>Oceanaspidiotus spinosus</i> (Comstock, 1883)		*	Pellizzari <i>et al.</i> 2011
	<i>Odonaspis ruthae</i> Kotinsky, 1915	*	*	Kozár 1985; Pellizzari <i>et al.</i> 2011
	<i>Parlatoria theae</i> Cockerell, 1896	*		Balachowsky 1953
	<i>Parlatoria ziziphi</i> (Lucas, 1853)	*	*	Koroneos 1934; Ayoutantis 1940
	<i>Poliaspis media</i> Maskell, 1880	*		Milonas <i>et al.</i> 2008a
	<i>Prodiaspis tamaricicola</i> (Malenotti, 1916)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011
	<i>Pseudaulacaspis pentagona</i> (Targioni Tozzetti, 1886)	*	*	Balachowsky 1954; Paloukis 1979
	<i>Rhizaspidiotus donacis</i> (Leonardi, 1920)		*	Kozár <i>et al.</i> 1991
	<i>Salicicola kermanensis</i> (Lindinger, 1905)	*		Kozár 1985
	<i>Suturaspis pistaciae</i> (Lindinger, 1906)	*		Koroneos 1934
	<i>Targionia vitis</i> (Signoret, 1876)	*		Koroneos 1934
	<i>Unaspis euonymi</i> (Comstock, 1881)	*	*	Koroneos 1934; Pellizzari <i>et al.</i> 2011

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TABLE 1. (Continued)

Family	Species	Mainland Greece	Crete	Validation
Eriococcidae	<i>Eriococcus buxi</i> (Boyer de Fonscolombe, 1834)	*		Kozár <i>et al.</i> 1991
	<i>Eriococcus williamsi</i> Danzig, 1987	*		Kozár <i>et al.</i> 2013
Kermesidae	<i>Kermes echinatus</i> Balachowsky, 1953	*	*	Stathas <i>et al.</i> 2013b
	<i>Kermes greeni</i> Bodenheimer, 1931		*	Pellizzari <i>et al.</i> 2011
	<i>Kermes ilicis</i> (Linnaeus, 1758)	*		Argyriou 1983; Kozár <i>et al.</i> 1991
	<i>Kermes quercus</i> (Linnaeus, 1758)	*		Santas 1983; Kozár <i>et al.</i> 1991
	<i>Kermes vermilio</i> Planchon, 1864	*	*	Lindinger 1912; Hoy 1963; Argyriou 1983
Lecanodiaspididae	<i>Lecanodiaspis sardoa</i> Targioni Tozzetti, 1869	*		Argyriou <i>et al.</i> 1976
Marchalinidae	<i>Marchalina hellenica</i> (Gennadius, 1883)	*	*	Gennadius 1883; Ferris 1925; Argyriou 1983
Margarodidae	<i>Dimargarodes mediterraneus</i> (Silvestri, 1906)	*		Jakubski 1965
Matsucoccidae	<i>Matsucoccus josephi</i> Bodenheimer & Harpaz	*	*	Mendel & Schiller 1993; Gounari <i>et al.</i> 2010
Monophlebidae	<i>Gueriniella serratulae</i> (Fabricius, 1755)	*	*	Milonas <i>et al.</i> 2008; Podsiadlo 1983
	<i>Icerya purchasi</i> Maskell, 1879	*	*	Ayoutantis 1927; Ayoutantis 1940
	<i>Palaeococcus fuscipennis</i> (Burmeister, 1835)	*		Milonas <i>et al.</i> 2008a
	<i>Orthezia yashushii</i> Kuwana, 1923	*		Milonas <i>et al.</i> 2008a
	<i>Ortheziola britannica</i> Kozár & Miller, 2000	*		Kaydan <i>et al.</i> 2014
	<i>Ortheziola marottai</i> Kaydan & Szita, 2014	*		Kaydan <i>et al.</i> 2014
	<i>Ortheziola viti</i> Szita & Konczné Benedicty, 2014	*		Kaydan <i>et al.</i> 2014
Pseudococcidae	<i>Antoninella parkeri</i> (Balachowsky, 1936)	*		Milonas <i>et al.</i> 2008
	<i>Atrococcus arakelianae</i> (Ter-Grigorian, 1964)		*	Kozár & Nagy 1998
	<i>Balanococcus orientalis</i> Danzig & Ivanova, 1976	*		Kozár <i>et al.</i> 1991
	<i>Chaetococcus phragmitis</i> (Marchal, 1909)	*	*	Kozár 1985; Kozár <i>et al.</i> 1991
	<i>Chorizococcus rostellum</i> (Lobdell, 1930)		*	Pellizzari <i>et al.</i> 2011
	<i>Dysmicoccus brevipes</i> (Cockerell, 1893)	*		Roditakis & Milonas 2013
	<i>Erimococcus kimmericus</i> (Kiritshenko, 1940)		*	Kozár <i>et al.</i> 1991
	<i>Heliococcus bohemicus</i> Šulc, 1912	*	*	Milonas & Kozár 2008; Jansen <i>et al.</i> 2011
	<i>Heterococcus nudus</i> (Green, 1926)	*	*	Milonas & Kozár 2008; Pellizzari <i>et al.</i> 2011
	<i>Hypogeococcus pungens</i> Granara de Willink, 1981	*		Ben-Dov <i>et al.</i> , 2002
	<i>Mirococcopsis elongata</i> Borchsenius, 1948	*		Kozár <i>et al.</i> 1991
	<i>Mirococcus inermis</i> (Hall, 1925)	*		Kozár 1985
	<i>Peliococcopsis priesneri</i> (Laing, 1936)	*	*	Kozár 1985
	<i>Peliococcus turanicus</i> (Kiritshenko, 1932)	*		Kozár 1985
<i>Phenacoccus abditus</i> Borchsenius, 1949		*	Kozár <i>et al.</i> 1991	
<i>Phenacoccus hordei</i> (Lindeman, 1886)	*		Milonas & Kozár 2008	

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TABLE 1. (Continued)

Family	Species	Mainland Greece	Crete	Validation
	<i>Phenacoccus interruptus</i> Green, 1923	*		Kozár 1985
	<i>Phenacoccus madeirensis</i> Green, 1923	*	*	Jansen <i>et al.</i> 2011; Papadopoulou & Chryssohoides 2012
	<i>Phenacoccus peruvianus</i> Granara de Willink, 2007	*		Gkounti & Milonas 2013
	<i>Phenacoccus yerushalmi</i> Ben-Dov, 1985	*		Ben-Dov <i>et al.</i> 2006
	<i>Pseudococcus calceolariae</i> (Maskell, 1879)	*		Kozár <i>et al.</i> 1991
	<i>Pseudococcus longispinus</i> (Targioni Tozzetti, 1867)	*	*	Argyriou 1983
	<i>Pseudococcus viburni</i> (Signoret, 1875)	*		Kozár <i>et al.</i> 1991
	<i>Rhodania occulta</i> Schmutterer, 1952	*		Milonas <i>et al.</i> 2013
	<i>Ritsemia pupifera</i> Lichtenstein, 1879	*		Savopoulou <i>et al.</i> 1997
	<i>Seyneria gabrielis</i> (Kozár, 1991)	*		Kozár 1991
	<i>Spilococcus halli</i> (McKenzie & Williams, 1965)	*	*	Kozár 1985; Pellizzari <i>et al.</i> 2011
	<i>Trionymus aberrans</i> Goux, 1938	*	*	Kozár <i>et al.</i> , 1991
	<i>Trionymus cynodontis</i> (Kiritschenko, 1932)	*		Kozár, 1985
	<i>Trionymus multivorus</i> (Kiritschenko, 1936)		*	Pellizzari <i>et al.</i> , 2011
	<i>Vryburgia amaryllidis</i> (Bouché, 1837)	*		Argyriou, 1983
Putoidae	<i>Puto superbus</i> (Leonardi, 1907)	*		Bodenheimer 1928; Argyriou 1983
Rhizoecidae	<i>Eumyrmococcus corinthiacus</i> Williams, 1993	*		Williams 1993
	<i>Rhizoecus albidus</i> Goux, 1936	*	*	Kozár 1985; Pellizzari <i>et al.</i> 2011
	<i>Rhizoecus cacticans</i> (Hambleton, 1946)	*		Kozár & Koncne Benedicty 2007
	<i>Ripersiella palestineae</i> Hambleton, 1946		*	Hambleton 1979

Zoogeographical analysis of the scale insect fauna of mainland Greece and Crete

Mainland Greece is characterized by the presence of different climatic zones: Mediterranean and temperate climates in Southern, Central, Eastern Greece and Alpine climate mostly in the mountainous Western Greece. Thus Greek territory includes several different natural environments and these are reflected in the flora and fauna (HNMS, 2015).

The island of Crete straddles two climatic zones: Mediterranean on the north side and North African on the south side. Northwest Crete is characterized by constant high humidity compared to the dry climate on the rest of the island; Crete has a large number of endemic plants and animals, although the number of the endemic animals is unknown but it might be as high as 1000 (Legakis & Kypriotakis 1994). Unfortunately, only 87 scale insect species have been recorded so far in the island and this low number does not allow a reliable zoogeographical analysis. Nevertheless, the data for Crete are here tentatively reported.

The major groups of chorotypes present in the scale insect fauna of mainland Greece and Crete are reported in Tables 2–7, with the scale insect species grouped in each table according to their particular chorotype. Comments are given below.

Elements widespread in the Holarctic Region (Table 2)

Mainland Greece

This large group includes 82 species (about 44% of the total from mainland Greece) referred to 11 different chorotypes.

Only 4 species (2%) are considered Holarctic elements, whereas Palaearctic and western-Palaearctic elements are 19 (10% of the total); 8 species (4%) have a Central-Asiatic-Mediterranean distribution (i.e. *Prodiaspis tamaricicola* and *Chionaspis etrusca*, linked to Tamaricaceae, and *Salicicola kermanensis* on Salicaceae).

Several species have been referred to the Turanian-Mediterranean (13 species), Turanian-European-Mediterranean (13 species) and Turanian-European (11 species) chorotypes. Together these species constitute about the 20% of the species recorded from mainland Greece. Their distribution pattern covers, besides the Mediterranean and European regions, also the Middle East, Anatolia, Caucasus, Iran and West Turkestan (i.e. *Anapulvinaria pistaciae*, *Suturaspis pistaciae*, *Lepidosaphes granati*).

Crete

Elements widespread in the Holarctic Region include 39 species, 11 of which (12,5%) belong to the Palaearctic and Western-Palaearctic chorotypes and are the most numerous.

Interesting records are *Phenacoccus abditus* and *Trionymus multivorus* (Pseudococcidae) both of the Central Asiatic-European chorotype, and *Getulaspis bupleuri* (Diaspididae) (Turanian-Mediterranean chorotype), known so far only in Sardinia (Pellizzari & Porcelli 2014), some North African countries and Saudi Arabia (Matile-Ferrero 1984).

Elements widespread in Europe (Table 3)

Mainland Greece

European and Southern-European elements are represented with 21 species (11%). Most of these are linked to *Quercus*, Coniferae or Poaceae plant species. A recent new interesting addition is *Rhodania occulta* (Pseudococcidae) (Milonas *et al.* 2013) previously known only in Germany, Netherlands and Poland.

Crete

Only 3 species (3,5%) belong to the European chorotype. They are: *Parthenolecanium rufulum* and *Physokermes piceae* (Coccidae), very common all over Europe, respectively on *Quercus* and *Picea* species, and *Poaspis intermedia* (Coccidae) on Poaceae.

Elements widespread in Mediterranean countries (Table 4)

Mainland Greece

The Mediterranean species number 22 (12%); of these, 17 species are distributed throughout the Mediterranean basin and develop on Mediterranean flora, i.e., *Pollinia pollini* and *Filippia follicularis* on olive trees, *Lecanodiaspis sardoa* on *Cistus* sp., *Kermes vermilio* and *Gonaspidotus minimus* on *Quercus ilex*.

Five species belong to the Eastern-Mediterranean chorotype. Among these *Ortheziola viti*, recently described from Greece and Turkey, and *Marchalina hellenica*, a scale insect of great importance to apiculture; the original distribution area of this species covered Greece and Turkey only, but it has been voluntarily disseminated to enhance honey production. In addition, *Matsucoccus josephi* is present also in Cyprus, Turkey, Israel, Lebanon and Jordan (Mendel 1998) and *Kermes echinatus*, previously only known before from Israel, was recorded from mainland Greece in 2013 (Stathas *et al.* 2013b).

Crete

The species referred to this chorotype number 16 (18%), of which 10 pertain to the Mediterranean chorotype and 6 species belong to the Eastern-Mediterranean chorotype. Three of them have not been reported from mainland Greece so far, namely; *Dynaspidotus greeni* (Diaspididae), also present in Cyprus; *Kermes greeni* (Kermesidae), recently recorded in the island together with *K. echinatus* (Pellizzari *et al.* 2011, Porcelli & Pellizzari 2014) and only known before from Israel and *Ripersiella palestinae* (Rhizoecidae), also known in Israel and Syria (Ben-Dov 2012).

Elements widespread in the Palaetropics and extending into Mediterranean countries (Table 5)

Mainland Greece

This group includes *Ceroplastes rusci*, very common on fig, and possibly *Saissetia privigna* (Coccidae). It is questionable whether *S. privigna* should be considered a true Afrotropical element at the most northern extension of its distribution or a Cultural Immigrant from Africa. In the Mediterranean region it has been recorded also in Egypt and Israel (Ben-Dov *et al.* 2015).

Crete

Only the widespread *Ceroplastes rusci* is reported from the island.

Cosmopolitan or sub-cosmopolitan elements (Cultural Immigrants) (Table 6)

Mainland Greece

Alien species, introduced and acclimatized a long time ago or recent invaders, constitute a large group of 56 species, making up 30% of the Greek fauna. They are mostly pests on agricultural or ornamental plants and their incidental introduction is due to human activity. Several species in this group have been considered as cosmopolitan because of their present distribution even when their native area is well known (i.e. *Ultheria araucariae*, *Icerya purchasi* and *Diaspidiotus perniciosus*). Some species are restricted to greenhouses or are merely interceptions, with the slight possibility of surviving outdoors. Recent invaders are the Nearctic species *Phenacoccus madeirensis* and *P. peruvianus*, which are still spreading through the country (Stathas *et al.* 2015).

Crete

Alien species are 26, 30% of the species recorded from the island, the same percentage as for mainland Greece.

Endemic species (table 7)

Mainland Greece

So far 4 species (2%) appear to be restricted to mainland Greece. Of these, *Anophococcus kotejai* and *Kawekia hellenica* (Acanthococcidae) are linked to Poaceae and it is possible that they have a wider distribution. *Physokermes hellenicus* (Coccidae) is linked to the Greek fir *Abies cephalonica*, which is endemic to Greece. *Eumyrmococcus corinthiacus* (Rhizoecidae) was collected near Corinth, carried in the mandibles of a swarming queen ant *Plagiolepis* sp. (Williams 1993); it is the only species in the genus *Eumyrmococcus* found in the Western Palaearctic region.

Crete

It is possible that *Aonidiella yehudithae* (Diaspididae) is an endemic species. It was described from specimens collected off *Hedera helix* at Avgeniki in 2006 (Ben-Dov 2006). A few years later this species was collected again on the same host plant in Imbros Gorge (Jansen *et al.* 2010).

Comments

The number of species recorded from mainland Greece and Crete appears few in comparison with other Mediterranean countries whose scale insect fauna has been studied more intensively.

With regard to mainland Greece, the total of 187 species is lower than expected when compared with the number of Coccoidea species recorded in France (381) (Foldi 2001), in Italy (390) (Pellizzari & Russo 2005) and in Turkey (359) (Kaydan *et al.* 2013). Moreover, comparison with the checklists of other European and Mediterranean countries highlights many distributional gaps, with several common species having not been recorded from Greece yet, despite their apparent distributional pattern including the Greek territory. For instance,

the following species are widely distributed but have not yet been recorded from Greece: *Acanthococcus roboris* (Goux) and *Diaspidiotus distinctus* (Leonardi), both common on *Quercus*, *Trabutina mannipara* (Hemprich & Ehrenberg), linked to Tamaricaceae, *Planchonia arabis* Signoret, *Acanthococcus aceris* Signoret, etc. We consider that these gaps will be filled by more intensive collecting.

At present, Mediterranean elements make up only 12 % of the scale insect fauna of mainland Greece (in Italy, they are 15%), whereas in Crete they reach 18%, a percentage near to that for Sicily (19.5%) (Longo *et al.* 1999, Mazzeo *et al.* 2011). Several common Mediterranean species, such as *Saharaspis ceardi* (Balachowsky) on *Pistacia* and plants of the Mediterranean maquis, and the polyphagous *Targionia nigra* Signoret, have not been detected yet in Greece. Further faunistic researches will surely result in discovering an increasing number of species in this category.

Comparison with the zoogeographical analysis of scale fauna of Italy (Longo *et al.* 1999) and Sicily (Mazzeo *et al.* 2011) shows that the Greek scale insect fauna has a larger number of species whose distribution includes the Turanian region. This was predictable, due to Greece's more Eastern-Mediterranean geographical position.

Both mainland Greece and Crete have 30% alien species in their scale faunas. It is clear that scale pests on cultivated and ornamental plants are likely to have been studied much more than scales of autochthonous wild plants because of their economic importance. This percentage is similar to that for Italy in 1999 (Longo *et al.* 1999), whereas more recent analyses on the scale insect fauna for other Mediterranean countries indicate that alien species have reached 40% on the island of Sicily (Mazzeo *et al.* 2011) and 42% in Israel (Ben-Dov 2012). However, in spite of the many alien species recorded in Greece, they are almost certainly more common. In fact several alien species, already recorded in many European and Mediterranean countries, have yet to be detected in Greece. For instance, *Pulvinaria innumerabilis* (Rathvon) on grape, *Phoenicococcus marlatti* Cockerell on *Areaceae*, *Ovaticoccus agavium* (Douglas) on *Agave americana*, a common invasive plant in Greek landscapes, or bamboo scales, which are probably overlooked because they are present at low population levels.

Even though our knowledge on the scale insect fauna of mainland Greece has been significantly increased in recent years, that for Crete (87 species) is largely incomplete, in spite of recent additions (Jansen *et al.* 2010; Pellizzari *et al.* 2011). In comparison, the scale insect fauna of Sicily has reached 169 species (Mazzeo *et al.* 2011) whereas the number of recorded species on both Corsica (99 species) and Sardinia (111 species) is still rather low and similar to that for Crete (Foldi 2003, Pellizzari & Porcelli 2014). The scale fauna of these large Mediterranean islands deserves more intensive collections, considering that they can host endemic or rare species (Mazzeo *et al.* 2011).

It is clear that the scale insect fauna of Greece and particularly Crete is largely unexplored. Nevertheless, these data improve our knowledge on the biogeography of scale insects. Moreover, the distributional data may be useful as indicators of the biodiversity in different territories and will help to provide an overview to climate change whose effects cause changes to scale insect species distribution.

TABLE 2. Elements widely distributed in the Holarctic region.

Chorotype	Family	Species	Mainland Greece	Crete
Holarctic	Acanthococcidae	<i>Heterococcus nudus</i>		*
		<i>Rhizococcus greeni</i>	*	
	Coccidae	<i>Eulecanium tiliae</i>	*	
	Diaspididae	<i>Dynaspidiotus abietis</i>	*	
	Pseudococcidae	<i>Heterococcus nudus</i>	*	
Palaeartic	Acanthococcidae	<i>Anophococcus agropyri</i>	*	*
	Coccidae	<i>Eulecanium ciliatum</i>	*	
		<i>Parthenolecanium persicae</i>	*	
		<i>Pulvinaria vitis</i>	*	*
	Diaspididae	<i>Aulacaspis rosae</i>	*	*
		<i>Carulaspis minima</i>	*	*

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TABLE 2. (Continued)

Chorotype	Family	Species	Mainland Greece	Crete
		<i>Chionaspis salicis</i>	*	
		<i>Diaspidiotus gigas</i>	*	
		<i>Diaspidiotus ostreaeformis</i>	*	
		<i>Lepidosaphes conchiformis</i>	*	*
		<i>Lepidosaphes ulmi</i>	*	*
	Ortheziidae	<i>Orthezia urticae</i>	*	*
	Pseudococcidae	<i>Planococcus vovae</i>	*	*
w-Palaeartic	Acanthococcidae	<i>Rhizococcus reynei</i>	*	
	Coccidae	<i>Lichtensia viburni</i>	*	*
	Diaspididae	<i>Diaspidiotus zonatus</i>	*	
		<i>Dynaspidiotus britannicus</i>	*	*
		<i>Leucaspis loewi</i>	*	*
	Ortheziidae	<i>Ortheziola britannica</i>	*	
Sibiric-European	Acanthococcidae	<i>Rhizococcus munroi</i>	*	*
	Cryptococcidae	<i>Pseudochermes fraxini</i>	*	
	Coccidae	<i>Lecanopsis formicarum</i>		*
Asiatic-European	Acanthococcidae	<i>Rhizococcus baldonensis</i>	*	
		<i>Rhizococcus desertus</i>		*
	Diaspididae	<i>Parlatoria parlatoriae</i>		*
	Kermesidae	<i>Kermes quercus</i>	*	
	Pseudococcidae	<i>Balanococcus orientalis</i>	*	
		<i>Heliooccus bohemicus</i>	*	*
		<i>Phenacoccus interruptus</i>	*	
		<i>Trionymus aberrans</i>	*	*
	Rhizoecidae	<i>Rhizoecus albidus</i>	*	*
Central Asiatic-European	Coccidae	<i>Lecanopsis turcica</i>	*	
	Pseudococcidae	<i>Phenacoccus abditus</i>		*
		<i>Trionymus multivorus</i>		*
Central Asiatic-Mediterranean	Cerococcidae	<i>Cerococcus longipilosus</i>	*	
	Diaspididae	<i>Chionaspis etrusca</i>	*	
		<i>Lepidosaphes malicola</i>	*	
		<i>Lepidosaphes pistaciae</i>	*	
		<i>Mercetaspis halli</i>	*	*
		<i>Prodiaspis tamaricicola</i>	*	*
		<i>Salicicola kermanensis</i>	*	
	Pseudococcidae	<i>Erimococcus kimmericus</i>		*
		<i>Mirococcus inermis</i>	*	
Turanian-European-Mediterranean	Acanthococcidae	<i>Anophococcus formicicola</i>	*	*
	Asterolecaniidae	<i>Asterodiaspis bella</i>	*	
	Diaspididae	<i>Chionaspis lepinyei</i>	*	

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TABLE 2. (Continued)

Chorotype	Family	Species	Mainland Greece	Crete
		<i>Diaspidiotus pyri</i>	*	
		<i>Epidiaspis leperii</i>	*	
		<i>Leucaspis pusilla</i>	*	*
		<i>Leucaspis riccae</i>	*	*
		<i>Targionia vitis</i>	*	
	Margarodidae	<i>Dimargarodes mediterraneus</i>	*	
	Pseudococcidae	<i>Chaetococcus phragmitis</i>	*	*
		<i>Phenacoccus yerushalmi</i>	*	
		<i>Spilococcus halli</i>	*	*
	Putoidae	<i>Puto superbus</i>	*	
Turanian-European	Coccidae	<i>Scythia festuceti</i>	*	
		<i>Sphaerolecanium prunastri</i>	*	*
	Diaspididae	<i>Diaspidiotus wuenni</i>	*	
		<i>Epidiaspis gennadii</i>	*	
		<i>Lepidosaphes juniperi</i>	*	
		<i>Mohelnaspis massiliensis</i>	*	
	Eriococcidae	<i>Eriococcus buxi</i>	*	
	Ortheziidae	<i>Ortheziola marottai</i>	*	
	Pseudococcidae	<i>Atrococcus arakelianae</i>		*
		<i>Mirococcopsis elongata</i>	*	
		<i>Peliococcus turanicus</i>	*	
		<i>Ritsemia pupifera</i>	*	
Turanian-Mediterranean	Coccidae	<i>Anapulvinaria pistaciae</i>	*	
	Diaspididae	<i>Acanthomytilus intermittens</i>		*
		<i>Diaspidiotus ceconii</i>	*	
		<i>Diaspis syriaca</i>	*	
		<i>Dynaspidiotus abieticola</i>	*	
		<i>Dynaspidiotus ephedrarum</i>	*	
		<i>Getulaspis bupleuri</i>		*
		<i>Koroneaspis aegilopos</i>	*	*
		<i>Lepidosaphes flava</i>	*	*
		<i>Lepidosaphes granati</i>	*	
		<i>Lineaspis striata</i>	*	*
		<i>Melanaspis inopinata</i>	*	
		<i>Parlatoria oleae</i>	*	*
		<i>Suturaspis pistaciae</i>	*	
	Pseudococcidae	<i>Peliococcopsis priesneri</i>	*	*
European-Mediterranean	Diaspididae	<i>Diaspidiotus labiatarum</i>	*	
		<i>Diaspidiotus lenticularis</i>	*	*
	Monophlebidae	<i>Palaeococcus fuscipennis</i>	*	
	Ortheziidae	<i>Orthezia arenariae</i>	*	

TABLE 3. Elements widely distributed in Europe.

Chorotype	Family	Species	Mainland Greece	Crete
European	Acanthococcidae	<i>Anophococcus herbaceus</i>	*	
	Asterolecaniidae	<i>Asterodiaspis quercicola</i>	*	
	Coccidae	<i>Eulecanium sericeum</i>	*	
		<i>Luzulaspis dactylis</i>	*	
		<i>Nemolecanium graniforme</i>	*	
		<i>Parthenolecanium rufulum</i>	*	*
		<i>Physokermes hemicryphus</i>	*	
		<i>Physokermes inopinatus</i>	*	
		<i>Physokermes piceae</i>	*	*
		<i>Poaspis intermedia</i>		*
		<i>Poaspis jahandiezi</i>	*	
		Diaspididae	<i>Carulaspis visci</i>	*
	<i>Leucaspis pini</i>		*	
	Pseudococcidae	<i>Phenacoccus hordei</i>	*	
		<i>Rhodania occulta</i>	*	
s-European	Acanthococcidae	<i>Rhizococcus istresianus</i>	*	
	Asterolecaniidae	<i>Asterodiaspis repugnans</i>	*	
	Diaspididae	<i>Acanthomytilus jablonowskii</i>	*	
		<i>Diaspidiotus thymbrae</i>	*	
	Ortheziidae	<i>Newsteadia susannae</i>	*	
	Pseudococcidae	<i>Antoninella parkeri</i>	*	
<i>Seyneria gabrielis</i>		*		

TABLE 4. Elements widely distributed in the Mediterranean Basin.

Chorotype	Family	Species	Mainland Greece	Crete	
Mediterranean	Acanthococcidae	<i>Rhizococcus thymelaeae</i>	*		
	Acleridae	<i>Aclerda berlesii</i>	*		
	Asterolecaniidae	<i>Asterodiaspis ilicicola</i>	*		
		<i>Pollinia pollini</i>	*	*	
		<i>Filippia follicularis</i>	*	*	
	Diaspididae	<i>Adiscodiaspis ericicola</i>			*
		<i>Aonidia lauri</i>	*		*
		<i>Aonidia maroccana</i>	*		
		<i>Aonidia mediterranea</i>	*		*
		<i>Aspidiotus hedericola</i>	*		
		<i>Discodiaspis salicorniae</i>	*		
		<i>Duplachionaspis berlesii</i>	*		*
		<i>Gonaspidotus minimus</i>	*		*
		<i>Rhizaspidiotus donacis</i>			*
		Eriococcidae	<i>Eriococcus williamsi</i>	*	

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TABLE 4. (Continued)

Chorotype	Family	Species	Mainland Greece	Crete
	Kermesidae	<i>Kermes ilicis</i>	*	
		<i>Kermes vermilio</i>	*	*
	Lecanodiaspididae	<i>Lecanodiaspis sardoa</i>	*	
	Monophlebidae	<i>Gueriniella serratulae</i>	*	*
e-Mediterranean	Acanthococcidae	<i>Anophococcus evelinae</i>	*	
	Diaspididae	<i>Dynaspidiotus greeni</i>		*
	Kermesidae	<i>Kermes echinatus</i>	*	*
		<i>Kermes greeni</i>		*
	Marchalinidae	<i>Marchalina hellenica</i>	*	*
	Matsucoccidae	<i>Matsucoccus josephi</i>	*	*
	Ortheziidae	<i>Ortheziola viti</i>	*	
	Rhizoecidae	<i>Rhizoecus palestinae</i>		*

TABLE 5. Afrotropical or oriental elements also present in the Mediterranean area.

Chorotype	Family	Species	Mainland Greece	Crete
Afrotropical-Mediterranean	Coccidae	<i>Ceroplastes rusci</i>	*	*
		<i>Saissetia privigna</i>	*	

TABLE 6. Cosmopolitan or subcosmopolitan species (Cultural Immigrants).

Chorotype	Family	Species	Mainland Greece	Crete
Cosmopolitan	Acanthococcidae	<i>Gossyparia spuria</i>	*	
		<i>Uhlaria araucariae</i>	*	
	Asterolecaniidae	<i>Asterodiaspis variolosa</i>	*	
	Coccidae	<i>Ceroplastes sinensis</i>	*	*
		<i>Coccus hesperidum</i>	*	*
		<i>Parthenolecanium corni</i>	*	
		<i>Pulvinaria floccifera</i>	*	
		<i>Saissetia oleae</i>	*	*
	Diaspididae	<i>Aonidiella aurantii</i>	*	*
		<i>Aonidiella citrina</i>	*	
		<i>Aspidiotus nerii</i>	*	*
		<i>Carulaspis juniperi</i>	*	
		<i>Diaspidiotus perniciosus</i>	*	
		<i>Duplacionaspis natalensis</i>	*	*
		<i>Hemiberlesia rapax</i>	*	
		<i>Lepidosaphes beckii</i>	*	*
		<i>Lepidosaphes gloverii</i>	*	
		<i>Lopholeucaspis cockerelli</i>	*	
	<i>Lopholeucaspis japonica</i>	*		
	<i>Odonaspis ruthae</i>	*	*	

.....continued on the next page

TABLE 6. (Continued)

Chorotype	Family	Species	Mainland Greece	Crete
		<i>Parlatoria pergandii</i>	*	
		<i>Parlatoria theae</i>	*	
		<i>Parlatoria ziziphi</i>	*	*
		<i>Pseudaulacaspis pentagona</i>	*	*
		<i>Unaspis euonymi</i>	*	*
	Monophlebidae	<i>Icerya purchasi</i>	*	*
	Pseudococcidae	<i>Chorizococcus rostellum</i>		*
		<i>Planococcus citri</i>	*	*
		<i>Planococcus ficus</i>	*	*
		<i>Pseudococcus calceolariae</i>	*	
		<i>Pseudococcus longispinus</i>	*	*
		<i>Pseudococcus viburni</i>	*	
		<i>Trionymus cynodontis</i>	*	
Pantropical	Acanthococcidae	<i>Rhizococcus coccineus</i>	*	
	Coccidae	<i>Ceroplastes cirripediformis</i>	*	
		<i>Ceroplastes floridensis</i>	*	*
		<i>Protopulvinaria pyriformis</i>	*	*
		<i>Saissetia coffeae</i>	*	*
	Diaspididae	<i>Abgrallaspis cyanophylli</i>	*	*
		<i>Chrysomphalus aonidum</i>	*	
		<i>Chrysomphalus dictyospermi</i>	*	*
		<i>Fiorinia fioriniae</i>	*	
		<i>Hemiberlesia lataniae</i>	*	*
		<i>Lepidosaphes pinnaeformis</i>	*	
		<i>Oceanaspidiotus spinosus</i>		*
	Pseudococcidae	<i>Dysmicoccus brevipes</i>	*	
		<i>Hypogeococcus pungens</i>	*	
		<i>Phenacoccus madeirensis</i>	*	*
	Rhizoecidae	<i>Rhizoecus cacticans</i>	*	
Afrotropical	Coccidae	<i>Pulvinariella mesembryanthemi</i>	*	*
Asiatic	Coccidae	<i>Coccus pseudomagnoliarum</i>	*	
Australasian	Diaspididae	<i>Poliaspis media</i>	*	
Neartic	Diaspididae	<i>Diaspidiotus osborni</i>		*
	Diaspididae	<i>Diaspis echinocacti</i>	*	
Neotropical	Pseudococcidae	<i>Phenacoccus peruvianus</i>	*	
	Pseudococcidae	<i>Vryburgia amaryllidis</i>	*	
e-Palaearctic	Ortheziidae	<i>Orthezia yashushii</i>	*	
Oriental	Coccidae	<i>Pulvinaria horii</i>	*	
	Diaspididae	<i>Diaspidiotus degeneratus</i>	*	

TABLE 7. Endemic elements.

Chorotype	Family	Species	Mainland Greece	Crete
Endemic	Acanthococcidae	<i>Anophococcus kotejai</i>	*	
		<i>Kaweckia hellenica</i>	*	
	Coccidae	<i>Physokermes hellenicus</i>	*	
	Diaspididae	<i>Aonidiella yehudithae</i>		*
	Rhizoecidae	<i>Eumyrmococcus corinthiacus</i>	*	

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