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Scales (Hemiptera, Superfamily Coccoidea) Chapter 9.3

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Abstract

Scale insects are frequent invaders. With 129 established species, they numerically represent one of the major group of insects alien *to* Europe. Scales are usually small insects with wingless females. Due to this small size and concealment, many species, mainly belonging to the families Diaspididae, Pseudococcidae and Pseudococcidae, have been accidentally introduced to Europe, mostly originating from tropical regions and essentially from Asia. The trade of fruit trees and ornamentals appears to be the usual pathway of introduction. At present, alien scales represent an important component of the European entomofauna, accounting for about 30% of the total scale fauna.

Keywords

Europe, Alien, scale insects

9.3.1 Introduction

Coccoidea or scale insects is a large superfamily in the order Hemiptera with a worldwide distribution. They are unusually small insects, highly specialized for plant parasitism, that have evolved different kinds of metamorphosis depending on sex and family. Scale insects are characterized by sexual dimorphism: females are wingless, usually small (from 0.5 – 10mm), with an oval or round but flat to fairly convex body

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form, sometimes bud shaped, and often protected by waxy secretions or covers. The adult females may exhibit reduction or loss of appendages, depending on family and instar, and are often sedentary or sessile. Adult males are usually winged and inconspicuous, do not feed and live a few days. Scale insect identification is mainly based upon the morphology of adult females that persist on the host plant longer than the other stages.

Females usually take three or four developmental stages to reach maturity, males usually five. Parthenogenesis is quite common. Eggs are usually laid under the female body, under the scale cover, or in waxy egg-sacs. Dispersal is carried out by first instars.

Scale insects feed on various parts of the host plant (leaves, fruits, stems, branches and roots) and are frequently introduced and acclimatized in different parts of the world. This is due to their small size (first instars are about 0.2–0.3mm; adult females usually are from 0.5 to10mm long) and their concealment using waxy secretions; beside many species live in hidden habitats (under leaf sheaths, in bark crevices or on roots) so that they can easily escape visual quarantine inspections. Once in a new territory, parthenogenesis and high fecundity favour quick colonization starting from a few females: for example, a single female *Neopulvinaria innumerabilis* may lay up to 8000 eggs (Canard 1968).

9.3.2 Taxonomy of the scale species alien *to* Europe

According to Ben-Dov et al. (2006) the superfamily Coccoidea comprises 22 families, with more than 7300 described species. In Europe, native representatives of 12 families have so far been recognized. On the basis of the best known western and central European coccoid faunas (France, Italy, Hungary) (Ben-Dov et al. 2006, Foldi 2001, Pellizzari and Russo 2004), the total number of scale insects present in Europe is likely to reach about 400–450 species. Aliens recorded in Europe up until 2007 account for 129 species which include the following eight families: Diaspididae (60 species), Pseudococcidae (37), Coccidae (23), Eriococcidae (3), Margarodidae (2), Asterolecanidae, Ortheziidae, and the alien family Phoenicococcidae, each with one species (Table 9.3.1). Unlike for other taxa, aliens represent an important component of the scale fauna currently present in Europe, i.e. near 30% (Fig. 9.3.1).

The remaining five native families (Aclerdidae, Cerococcidae, Kermesidae, Lecanodiaspididae, Micrococcidae) each have one or two species in Europe: none of them is a pest, with the exception of the family Kermesidae (8 species in Europe), in which *Kermes vermilio* and *Nidularia pulvinata* exhibit outbreaks in urban environments only.

One species, *Dactylopius coccus* Costa, representing the alien family Dactylopiidae, has been included among aliens *to* Europe, even though it is present only in Canary islands, Madeira and Azores, where it was intentionally introduced. These islands belong politically to Europe (Spain, Portugal) but biogeographically they belong to Macaronesia, a biogeographic Atlantic region quite distinct from the European continent and with a unique flora and fauna.

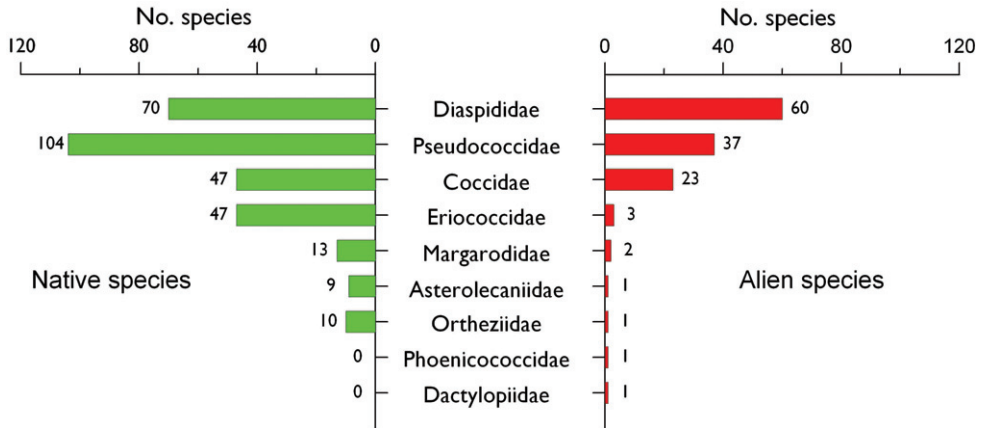

Figure 9.3.1 Taxonomic overview of the scale species alien *to* Europe compared to the native fauna. Species alien *to* Europe include cryptogenics.

Diaspididae

Armoured scale insects are the commonest alien scales incidentally introduced all over the world: this is probably due to their small dimension and camouflage. The 60 alien species account for nearly half (44.6%) of an estimated 130 species in Europe. Many notorious pests of fruit trees such as *Pseudaulacaspis pentagona* (the white peach scale- see factsheet 14.45)) and *Diaspidiotus perniciosus* (San José scale - see factsheet 14.44)) belong to this family: these species are still pests of fruit trees in spite of the introduction of specific parasitoids from their native area. The Asiatic armoured scales of *Citrus* are largely found in European *Citrus* groves and presently number 10 species. Their "invasion" started around 1850 with *Parlatoria ziziphi* and *Lepidosaphes becki* and is still going on with the arrival and establishment of *Unaspis yanonensis* (1969), *Aonidiella citrina* (1994), *Chrysomphalus aonidum* (2000). Several armoured scales commonly occur throughout European greenhouses (e.g. *Diaspis echinocacti*, *Chrysomphalus dictyospermi*, *Diaspis bromeliae*, *Abgrallaspis cyanophylli*), even if they cannot be considered as established. In some cases, species recorded only in greenhouses in northern and central Europe are established outdoors in southern countries (i.e. *Furchadaspis zamiae, Chrysomphalus aonidum*). Some armoured scales thought to be of Afrotropical origin or cryptogenic (e.g. *Aspidiotus nerii*, *Hemiberlesia lataniae, H. rapax*) are very common in natural habitats of the Mediterranean countries (including small islands).

Pseudococcidae

Mealybugs are covered with mealy or cottony wax, have a distinct segmentation and are mobile. The 37 alien mealybugs account for roughly one fourth (25.7%) of the ca. 140 European species and most of them are polyphagous. *Planococcus citri, Pseu-*

dococcus longispinus, P. viburni and *P. calceolariae* arrived and established during the 19th century and are presently the most common species on ornamental plants, both outdoors and indoors. *P. citri*, first recorded in 1813, is still a pest of *Citrus* and ornamental plants. Several mealybugs have been recorded in only one or two countries to date (e.g. *Palmicultor palmarum*, *Phenacoccus madeirensis*, *Rhizoecus americanus, Trochiscococcus speciosus*), both outdoors and in greenhouses, on ornamental plants.

Coccidae

About 70 species of soft scales are recorded in Europe. Of these, there are 23 aliens *to* Europe representing 32.8% of the fauna, and are mainly pests of fruit trees and ornamentals. Among them, the polyphagous *Coccus hesperidum* and *Saissetia oleae*, the well-known Mediterranean Black Scale, are probably the most ancient arrivals which established in the countries surrounding the Mediterranean Basin. Most recent arrivals are *Pulvinaria hydrangeae*, *P. regalis* (see factsheet 14.41), *Ceroplastes japonicus* and, in warmer places, *Protopulvinaria pyriformis*, invasive on trees and ornamental plants in urban environments. Some species, such as *Coccus pseudomagnoliarum*, after first spreading in Mediterranean *Citrus* groves, later became more localised and less common. On the other hand, the American *Pulvinaria innumerabilis* is still considered a pest of vine, more than 40 years after its arrival in European vineyards. Several species (e.g. *Saissetia coffeae*, *S. oleae, C. hesperidum*, *Eucalymnatus tessellatus, Parasaissetia nigra*) are rather common in greenhouses of central and northern Europe, while in southern Europe are outdoors pests.

Eriococcidae

European felt scales number about 50 species. Among them, only three alien felt scales have been so far recorded. The Australian *Eriococcus araucariae* is widespread on *Araucaria* trees growing in Mediterranean countries, the American *E. coccineus* is recorded on succulent plants and *Ovaticoccus agavium* is quite common on *Agave* sp. growing outdoors.

Margarodidae

European margarodids recorded up until now number 15 species. Two alien margarodids, *Icerya purchasi* (the cottony cushion scale) and *I. formicarum,* invaded Europe at very different times. The latter species is known from a single record in 2001 in Corsica and its establishment is unknown. On the other hand, the Australian *I. purchasi* has both established and caused an agricultural and environmental impact. It arrived and established in many Mediterranean countries between the end of 1800 and the first

decades of 1900 and was very destructive to *Citrus* groves. The high infestations led to the introduction of the Australian coccinellid *Rodolia cardinalis*, for biological control. Presently, the cottony cushion scale is mainly a pest of ornamental plants such as *Pittosporum, Acacia* and *Mimosa*. It is also a very common species in semi-natural habitats (i.e. the Mediterranean maquis), far away from cultivated areas, where it develops on autochthonous wild plants such as *Cistus*, *Genista*, *Smilax* and *Rosmarinus*. Two other margarodids, *Marchalina hellenica* and *Matsucoccus feytaudi*, are alien *in* Europe, entirely due to deliberate introduction.

Asterolecanidae

About 10 species of asterolecanids are present in Europe. Of these, the only alien pit scale is the Asiatic *Bambusaspis bambusae*, a species associated with bamboos.

Ortheziidae

Ortheziids consist of 10 species in Europe. Among these, *Insignorthezia insignis*, a polyphagous Neotropical species, has been reported in European greenhouses since the end of 19th century. Apparently *I. insignis* is established outdoors only in Portugal and France.

Phoenicococcidae

Phoenicococcus marlatti, the Red Date Palm Scale, thought to originate in the Middle East or North Africa, is the only species currently placed in the family Phoenicococcidae. It is considered a minor pest of commercial dates, whereas in Spain, France and Italy, it infests ornamental palms (mainly *Phoenix canariensis*).

9.3.3 Temporal trends of introduction in Europe of alien scale species

Fig. 9.3.2. presents the temporal variation in the mean number of new alien species recorded per year since 1492. Serious studies of the Coccoidea began in mid 19th century. From that time, to the mid-1970s, the introduction of alien species was relatively constant, averaging 0.66 species per year. Since then, there is an apparent increase in alien introductions, up to an average of 1.15 species per year.

In interpreting this chart, account should be taken of "old" alien species, found and described in Europe, (i.e. *Aspidiotus nerii, Planococcus citri, Coccus hesperidum, Saissetia oleae*) for which the introduction date is based only on the date of their first description. In the case of the most harmful alien scales, the date of first introduc-

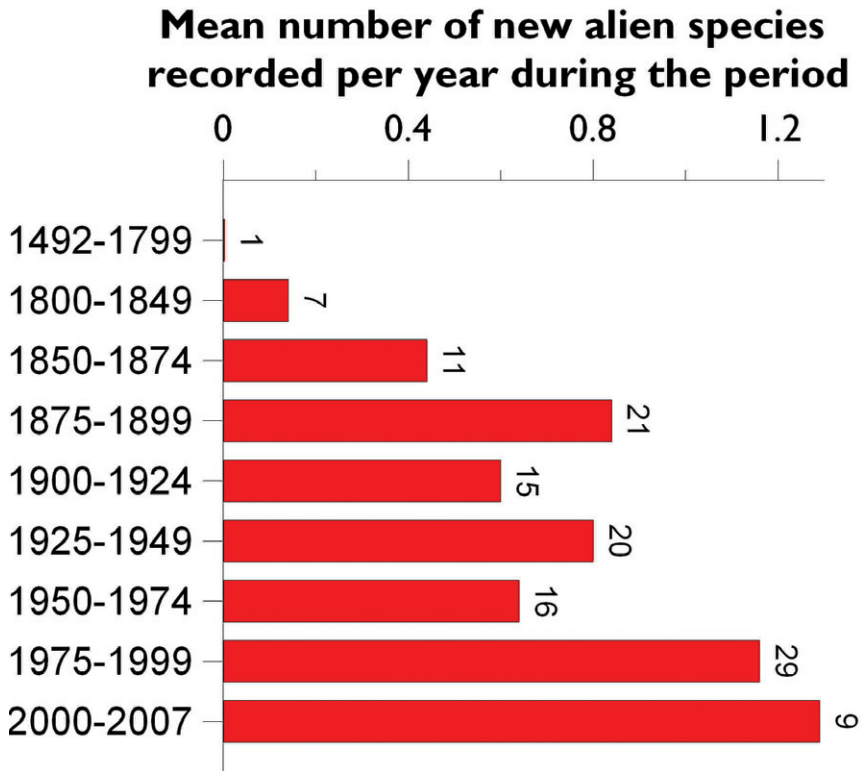

Figure 9.3.2 Temporal trends in the mean number of new records per year of scale species alien *to* Europe from 1492 to 2007. The number above the bar indicates the absolute number of species in this time period.

tion to Europe and the chronology of their invasion is known more precisely (i.e. for *Pseudaulacaspis pentagona*, *Icerya purchasi, Diaspidiotus perniciosus*). Moreover, records of alien scales depend on the presence of specialists in a given country. For instance, during the 1970–80s, advances in systematic knowledge and the increasing number of active coccidologists led to the "discovery" of several species which have probably been introduced a long time before. The great rise in the global exchanges of plants and quarantine inspections can explain the increases in subsequent years up until the present.

Among the scale insects introduced to Europe from the end of 19th century to 1960s there are several pests of fruit trees and *Citrus* (i.e. *Diaspidiotus perniciosus, Lepidosaphes gloverii, Pseudaulacaspis pentagona, Ceroplastes sinensis, Icerya purchasi*), whereas in the last 40 years the most numerous introduced scales are pest of ornamental plants, both outdoors and indoors (i.e. *Pulvinaria regalis, P. hydrangeae, Ceroplastes japonicus, Protopulvinaria pyriformis, Parassaisetia nigra, Trochiscococcus speciosus*), the main scale of agricultural importance being *Neopulvinaria innumerabilis*, a pest of vine.

9.3.4 Biogeographic patterns of the scale species alien to Europe

9.3.4.1 Origin of the alien species

The geographical origin of introduced scale insects shows a large dominance of species from tropical areas, essentially Asia, followed by southern American species (Fig. 9.3.3). The precise origin remains unknown for about one fourth of alien scales. Among the most widespread aliens to Europe are *Diaspidiotus perniciosus* of temperate Asian, *Planococcus citri* from tropical Asia, *Ceroplastes sinensis* from Central-America, *Parthenolecanium fletcheri* from Northern-America, *Saissetia oleae* from the Afrotropics, *Icerya purchasi* from Australasia, and *Lepidosaphes beckii* as cryptogenic species.

9.3.4.2 Distribution of the alien species in Europe

It should be borne in mind that, as for the other arthropod groups, the number of records of alien scales in European countries, reflects, in part, differences of study intensity and the number of local taxonomists. Moreover, the geographic position of some countries such as France, Italy and Spain, whose climatic conditions vary from high montane, continental to Mediterranean, allows establishment of species from very different geographical areas. Two countries present a particularly high number of alien species: France with 90 species and Italy with 92 species (Fig. 9.3.4). Lagging far behind are Spain, Great Britain and Portugal with 50, 43 and 41 species, respectively. The islands of the Atlantic, not represented in the figure, have respectively 51 aliens in the Canaries, 44 in Madeira and 22 in the Azores. There are 12 alien species recorded in at least 20 countries, namely *Coccus hesperidum* (28 countries), *Pulvinaria floccifera* (21), *Saissetia coffeae* (24), *S. oleae* (26), *Aspidiotus nerii* (26), *Diaspidiotus perniciosus* (26), *Pinnaspis aspidistrae* (20), *Pseudaulacaspis pentagona* (21), *Planococcus citri* (22), *Pseudococcus longispinus* (22) and *P. viburni* (26). These are all polyphagous species, with the exception of *Unaspis euonymi,* monophagous on *Euonymus* spp., recorded in 22 countries. A total of 20 species (15%) are present only in one country.

9.3.4.3 Scale species alien in Europe

With regard to scale insects alien *in* Europe, that is originating from another European area where native and introduced through human activity, only very few certain cases are known. *Marchalina hellenica* is native to Turkey and Greece and presently invasive in the small island of Ischia (Italy). It was introduced there in 1960 to study endosymbiosis, but unfortunately escaped from laboratory breeding and presently is a pest of pines (Tranfaglia and Tremblay 1984). *Matsucoccus*

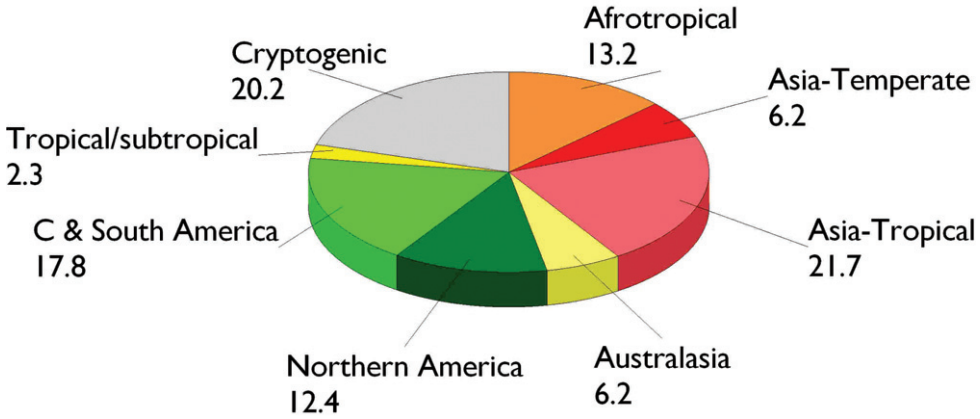

Figure 9.3.3 Geographic origin of the scale species alien *to* Europe.

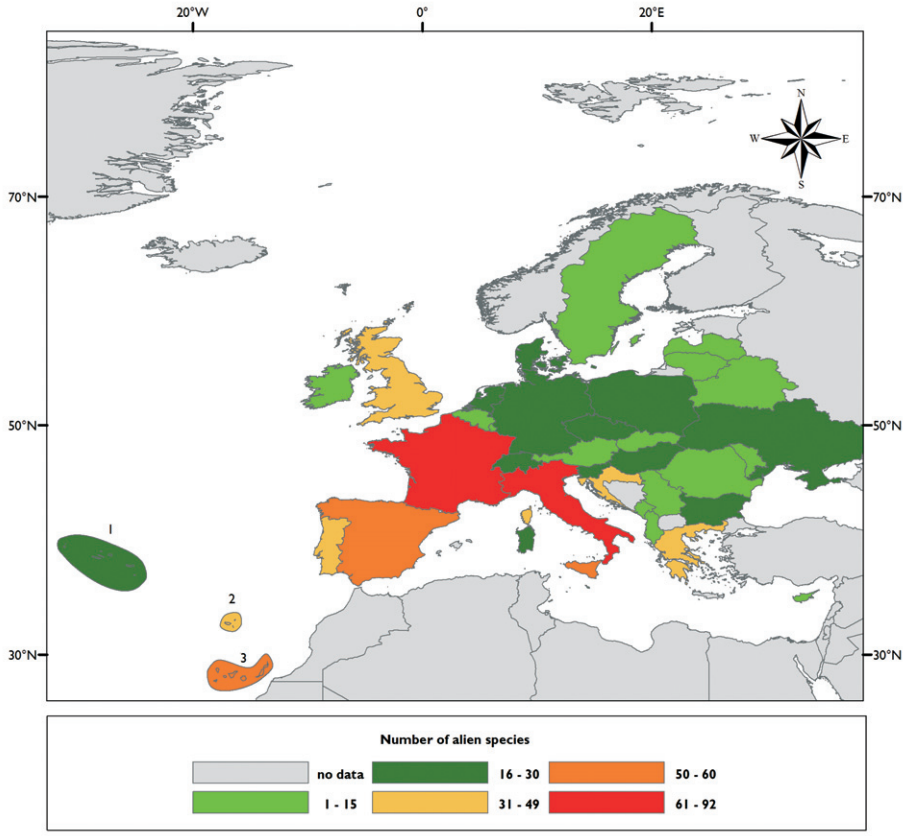

Figure 9.3.4 Numbers of established alien scale species in the European countries and main islands according to Table 9.3.1. Archipelago: **1** Azores **2** Madeira **3** Canary islands.

Figure 9.3.5 *Ceroplastes ceriferus* (Coccidae). Credit: Giuseppina Pellizzari

Figure 9.3.6 *Coccus hesperidum* (Coccidae). Credit: Giuseppina Pellizzari

feytaudi lives on *Pinus pinaster* and is native to the Atlantic regions of France, Spain and Portugal. It was introduced with its host plant in South-eastern France and from there spread towards Italy (Arzone and Vidano 1981). Both *Aonidiella lauretorum* and *A. tinerfensis* are endemic to the Atlantic islands of Canary (Spain) and Madeira (Portugal). They were introduced incidentally with their host plants

Figure 9.3.7 *Parasaissetia nigra* (Coccidae). Credit: Giuseppina.

Figure 9.3.8 *Protopulvinaria pyriformis* (Coccidae). Credit: Giuseppina Pellizzari.

in the Botanic gardens of Sintra and Lisbon (Portugal), where they still persist (Balachowsky 1948).

9.3.6 Pathways of introduction in Europe of alien scale species

Scale insects are highly specialized, sedentary, plant-parasitic insects and the only pathway of introduction is the horticultural and ornamental trade: importation and trade

Figure 9.3.9 *Pulvinaria hydrangeae* (Coccidae). Credit: Nico Schneider

Figure 9.3.10 *Pulvinaria floccifera* (Coccidae). Credit: Nico Schneider

of fruit and *Citrus* trees, ornamental trees and bushes, bulbs and corms, has led to incidental introduction and subsequent spread of scale insects. More recently, the "fashion" of succulent plant cultivation and the subsequent increase in plant importation and plant exchanges among collectors is responsible for the introduction and spread of several species such as *Delottococcus euphorbiae*, *Hypogeococcus pungens, Trochiscococcus speciosus, Vryburgia rimariae, Spilococcus mamillariae* and *Eriococcus coccineus.* Importation of bonsais from Asia could allow the introduction and spread of *Rhizoecus hibisci*, a mealybug living on roots and recently intercepted several times by European quarantine services.

Figure 9.3.11 *Chrysomphalus aonidum* (Diaspididae). Credit: Giuseppina Pellizzari.

Figure 9.3.12 *Unaspis yanonensis* (Diaspididae). Credit: Giuseppina Pellizzari.

9.3.7 Ecosystems and habitats invaded in Europe by alien scale species

Alien, established scale insects colonize strongly anthropogenic habitats such as cultivated agricultural lands, horticultural and domestic habitats, urban environments, gardens and parks, botanic gardens, nurseries and greenhouses, but they have also spread to natural habitats. Mediterranean *Citrus* groves host a large community of alien scales: 18 different species have been so far recorded. These are: *Icerya purchasi Planococcus citri, Pseudococcus calceolariae, P. longispinus, Ceroplastes sinensis, Coccus hesperidum, C. pseudomagnoliarum, Saissetia oleae, Aonidiella aurantii, A. citrina, As-*

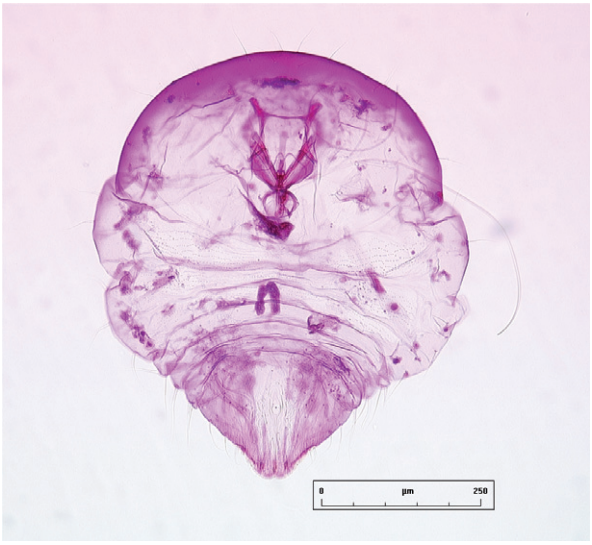

Figure 9.3.13 *Comstockiella sabalis* (Diaspididae). Credit: Jean Francois Germain

Figure 9.3.14 *Ovaticoccus agavium* (Eriococcidae). Credit: Giuseppina Pellizzari

pidiotus nerii, *Chrysomphalus dictyospermi, C. aonidum, Lepidosaphes beckii, L. gloverii, Parlatoria pergandii, P. ziziphi* and *Unaspis yanonensis.* Some polyphagous scales are urban pests, largely distributed in urban parks and gardens, on trees and ornamentals (i.e. *Pulvinaria regalis*, *P. hydrangeae*, *Ceroplastes japonicus*), whereas they are absent or very rare in the countryside. A few monophagous species are only known in Botanical gardens, where they persist outdoors, at a low population levels, on exotic plants

Figure 9.3.15 *Pseudococcus comstocki* (Pseudococcidae). Credit: Giuseppina Pellizzari

Figure 9.3.16 *Pseudococcus longispinus* (Pseudococcidae). Credit: Giuseppina Pellizzari

introduced over there a long before (i.e. *Aonidiella tinerfensis, Pseudaonidia paeoniae* or *Bambusaspis bambusae*).

Several other monophagous species remain strictly associated to their original, exotic ornamental plants, and have a correspondingly wide distribution in Europe (i.e. *Parthenolecanium fletcheri, Pulvinaria mesembryanthemi, Eriococcus araucariae*). On the other hand, some polyphagous species (i.e. *Diaspidiotus perniciosus*, *Pseudaulacaspis pentagona, Pulvinaria floccifera*) have spread from cultivated areas to natural woodland and forest habitats (Balachowsky 1932b, Balachowsky 1936). Others (*Antonina graminis*,

Figure 9.3.17 *Pseudococcus calceolariae* (Pseudococcidae). Credit: Jean Francois Germain

Chorizococcus rostellum and *Trionymus angustifrons*) can be found in grasslands. In natural habitats of Mediterranean countries (including small islands), species such as the armoured scales *Aspidiotus nerii* (see factsheet 14.43), *Hemiberlesia lataniae, H. rapax*, the mealybug *Planococcus citri,* the wax scale *Ceroplastes sinensis* and the Australian *I. purchasi* are quite common on wild autochthonous plants, growing far away from cultivated plants. Their transfer from cultivated plants to authochtonous ones in natural environments confirms that they have fully acclimatized.

9.3.8 Impact of alien scale species

Scale insects are plant pests, especially of fruit trees, woody ornamentals, forest trees and greenhouse plants. They cause damage to plants by sap sucking. Moreover, except for Diaspididae and Asterolecaniidae, they excrete honeydew that covers leaves and fruits and allows the development of sooty mould. This black sooty mould can reduce photosynthesis by 70%, leading to early senescence, with smaller and premature fruits, and loss of aesthetic value (Mibey 1997). Moreover, Coccidae and Pseudococcidae are vectors of closteroviruses. For example, *Planococcus citri* and *Pulvinaria innumerabilis* may transmit the Grapevine Leafroller-associated Virus (GLRaV-1, GLRaV-3) and the Corky Bark disease (GVA, GVB) (Sforza et al. 2003, Zorloni et al. 2006). Diaspididae

cause discolouration on leaves, red or black spots on fruits, and twig dieback. Pesticides are commonly applied to control scale insects in fruit orchards and *Citrus* groves. Infestations of alien scales in orchards have led to the introduction to Europe, from their native area, of many natural enemies for biological control purposes.

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Table 9.3.1. List and main characteristics of the scale species alien to Europe. Status: A: Alien to Europe; C: cryptogenic species. Country codes abbreviations refer to ISO 3166 (see appendix I). Habitat abbreviations refer to EUNIS (see appendix II). Only selected references are given. Last update 29/05/200

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Asterolecaniidae								
Bambusaspis bambusae (Boisduval, 1869)	A	Phyto-phagous	Asia-Tropical	1941, IT-SIC	DK, ES, FR, GB, IT, IT-SIC, PT, PT-MAD	I2, J100	*Bambusa*	Russell (1941)
Coccidae								
Ceroplastes ceriferus (Fabricius, 1798)	A	Phyto-phagous	Central-America	1921, IT	IT, ES-CAN, GB	I2	Polyphagous	Green (1921b), Mori et al. (2001)
Ceroplastes floridensis Comstock, 1881	A	Phyto-phagous	South-America	1930, FR	CY, FR, GR, IL, MT, PT-AZO, PT-MAD	I2	Polyphagous	Balachowsky (1930)
Ceroplastes japonicus Green, 1921	A	Phyto-phagous	Asia-Tropical	1930, FR	FR, IT, HR, SI	I2	Polyphagous	Pellizzari and Camporese (1994)
Ceroplastes sinensis Del Guercio 1900	A	Phyto-phagous	Central-America	1890, IT	AL, ES, ES-CAN, FR, FR-COR, GR,HR, IT, IT-SIC, MT, ME, PT, PT-AZO, PT-MAD, RO	I2	Polyphagous	Del Guercio (1900)
Coccus hesperidum Linnaeus, 1758	A	Phyto-phagous	Tropical/ subtropical	1829, IT	BE, BG, CH, CY, DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SIC, IT-SAR, LV, NL, ME, MT, PT, PT-AZO, PT-MAD, SK, SI, RS, RO, UA	I2	Polyphagous	Costa (1829)
Coccus longulus (Douglas, 1887)	A	Phyto-phagous	Tropical/ subtropical	2001, FR	FR, ES-CAN	I2	Polyphagous	Foldi (2001)
Coccus pseudohesperidum (Cockerell, 1895)	A	Phyto-phagous	Southern-America	1920, GB	GB, LV, UA	I2	Polyphagous	Green (1921a)

Family *Species*	**Status**	**Regime**	**Native range**	**1st record in Europe**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Coccus pseudomagnoliarum (Kuwana, 1914)	A	Phyto-phagous	Asia-Tropical	1974, GR, IT	FR, GR, HR, IT, IT-SIC,ME, SI	I2	*Citrus*	Barbagallo (1974)
Eucalymnatus tessellatus (Signoret, 1873)	A	Phyto-phagous	Southern-America	1932, FR	BG, DK, DE, ES, ES-CAN, FR, IL, PT-MAD, PL, UA	I2, J100	*Livistona* ., Palms	Balachowsky (1954)
Eulecanium excresens Ferris, 1920	A	Phyto-phagous	Northern-America	1998, GB	GB	I2	*Juglans*, *Wisteria*	Malumphy (2005)
Cryptinglisia lounsburyi (Cockerell, 1900)	A	Phyto-phagous	Afrotropical	1982, IT	IT	I2	*Pelargonium*	Marotta (1987)
Neopulvinaria innumerabilis (Rathvon, 1880)	A	Phyto-phagous	Northern-America	1961, FR	FR, HR, IT, SI	I2	*Vitis*, polyphagous	Hodgson (1994)
Parasaissetia nigra (Nietner, 1861)	A	Phyto-phagous	Afrotropical	1900, IT	AL, ES, ES-CAN,FR, FR-COR, IT, IT-SIC, MT, PT, PT-AZO, PT-MAD, PL, RO	I2	Polyphagous	Marotta (1987)
Parthenolecanium fletcheri (Cockerell, 1893)	A	Phyto-phagous	Northern-America	1935, PL	AT, BG, CH, CZ, DE, FR, HU, HR, LV, NL, PL, RO, S	I2	*Cupressus*, *Thuya*	Kawecki (1935)
Protopulvinaria pyriformis (Cockerell, 1894)	A	Phyto-phagous	Asia-Tropical	1991, IT	AL, ES, ES-CAN, FR, GR, IT, IT-SIC, PT, PT-AZO, PT-MAD	I2	Polyphagous	Marotta and Tranfaglia (1990)
Pulvinaria floccifera (Westwood, 1870)	A	Phyto-phagous	Asia-Temperate	1889, FR	CH, CY, CZ, DE, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, NL,PT, PT-MAD, SE, SI, RO, RU	I2	*Ilex aquifolium*, *Taxus baccata*	Marchal (1907)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Pulvinaria horii Kuwana, 1902	A	Phyto-phagous	Asia-Temperate/ Japan	2001, FR, GR	FR, GR, HR, IT, IT-SIC,ME, SI	F, G	*Aesculus, Acer, Ficus*	Foldi (2001)
Pulvinaria hydrangeae (Steinweden, 1946)	A	Phyto-phagous	Northern-America	2001, FR	CH, DE, FR, GB, HR, IT, LU, NL, SI	I2	Polyphagous	Foldi (2001)
Pulvinaria psidii Maskell, 1893	A	Phyto-phagous	Tropical/ subtropical	1928, GB	GB, ES-CAN	I2	Polyphagous	Green (1928)
Pulvinaria regalis Canard, 1968	A	Phyto-phagous	Asia-temperate	1968, FR	AT, BE, CH, DE, FR, GB, IRL, LU, NL	I2	Polyphagous	Canard (1968)
Pulvinariella mesembryanthemi (Vallot, 1830)	A	Phyto-phagous	Afrotropical/ South Africa	1829, FR	ES, ES-CAN,FR, GB, GR, IT, IT-SAR, IT-SIC, MT, PT-MAD, SI	I2	Aizoaceae	Balachowsky (1932a)
Saissetia coffeae (Walker, 1852)	A	Phyto-phagous	Afrotropical	1867, IT	BG, CH, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HR, HU, IT, IT-SAR, IT-SIC, LV, MT, NL, PT, PT-AZO, PT-MAD, PL, RO, S, UA	I2, J100	Polyphagous	Leonardi (1920)
Saissetia oleae (Olivier, 1791)	A	Phyto-phagous	Afrotropical	1791, FR, IT	AL, AT, BG, CH, CY,DK, ES, ES-CAN, FR, FR-COR, GB, GR, HR, IT, IT-SAR, IT-SIC, ME, PT, PT-AZO, PT-MAD, NL, RO, SK, SI, RS, UA	I, I2	*Olea europea, Nerium oleander*, polyphagous	Olivier (1791)
Dactylopiidae								
Dactylopius coccus Costa, 1829	A	Phyto-phagous	Central-America	1827, ES-CAN	ES-CAN, PT-AZO, PT-MAD	I	Cactaceae	Russo and Mazzeo (1996)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Diaspididae								
Abgrallaspis cyanophylli (Signoret, 1869)	C	Phyto-phagous	Cryptogenic	1868, FR	BG, CZ, DK, ES-CAN, FR, FR-COR, IT, IT-SAR, IT-SIC, PL	I2	Polyphagous	Signoret (1869a)
Aonidiella aurantii (Maskell, 1879)	A	Phyto-phagous	Asia-Tropical/ China	1881, IT	CY, ES, ES-CAN, FR, FR-COR, GR, IT, IT-SAR, IT-SIC, PT-MAD	I, I2	*Citrus*, Polyphagous	Leonardi (1918)
Aonidiella citrina (Coquillett, 1891)	A	Phyto-phagous	Asia-tropical	1994, IT	CY, FR, FR-COR, IT	I, I2	*Citrus*, Polyphagous	Longo et al. (1994)
Aonidiella taxus Leonardi 1906	A	Phyto-phagous	Asia-tropical	1906, IT	ES, FR, IT, IT-SIC	I2	*Taxus*	Leonardi (1906)
Aonidiella tinerfensis (Lindinger, 1911)	A	Phyto-phagous	Africa/ Canary Islands	1936, PT	PT	I2	*Dracaena*	Fernandes (1992)
Aspidiotus destructor Signoret 1869	C	Phyto-phagous	cryptogenic	1898, IT	FR, IT	J100	Palms, Polyphagous	Leonardi (1898)
Aspidiotus nerii (Bouché, 1833)	A	Phyto-phagous	Afrotropical	1829, IT	AL, CH, CY, CZ, DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, MT, PT, PT-AZO, PT-MAD, PL, RO, RS, SE, SI	I, I2	*Nerium oleander*, Polyphagous	Leonardi (1920)
Aulacaspis tubercularis Newstead, 1906	C	Phyto-phagous	Cryptogenic	1990, IT	IT, IT-SIC, PT	I2	*Mangifera*	Porcelli (1990)
Chrysomphalus aonidum (Linnaeus, 1758)	A	Phyto-phagous	Southern-America	1895, IT	BE, DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HR, IT, PT-MAD, PL, RS	I2	*Citrus*, Polyphagous	Leonardi (1920)

Family *Species*	**Status**	**Regime**	**Native range**	**1st record in Europe**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Chrysomphalus dictyopsermi (Morgan, 1889)	A	Phyto-phagous	Asia-Tropical	1896, IT	CZ,DK, ES, ES-CAN, FR, FR-COR, GB, GR, HR, IT, PT, PL,PT-AZO, PT-MAD, PL, RO, RS	I2, J100	*Citrus*, Polyphagous	Berlese and Leonardi (1896)
Chrysomphalus pinnulifer (Maskell, 1891)	C	Phyto-phagous	Cryptogenic	1957, ES	ES, ES-CAN, PT-MAD	I2	Polyphagous	Gómez-Menor Ortega (1957)
Comstockiella sabalis (Comstock, 1883)	A	Phyto-phagous	Northern-America	2005, FR	FR	I2	Palms	Germain and Matile-Ferrero (2006)
Diaspidiotus osborni (Newell & Cockerell, 1898)	A	Phyto-phagous	Northern-America	1979, BG	BG, CH, IT, IT-SIC	I2	*Platanus*	Kozár et al. (1979)
Diaspidiotus perniciosus (Comstock, 1881)	A	Phyto-phagous	Asia-temperate/ China	1928, HU	AT, BG, CH, CZ, DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, MD, NL, PT, PT-MAD, PL, RO, SE, SI, UA	G, I	Fruit trees, Polyphagous	Melis (1943)
Diaspidiotus uvae (Comstock 1881)	A	Phyto-phagous	Northern-America	1944, ES	ES, ES-CAN	I	Polyphagous	Ruiz Castro (1944)
Diaspis boisduvalii Signoret 1869	A	Phyto-phagous	Southern-America	1868, FR	BG, DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, IT, IT-SIC, PT, PT-MAD, SE	I2, J100	Polyphagous	Signoret (1869b)
Diaspis bromeliae (Kerner, 1778)	A	Phyto-phagous	Southern-America	1868, FR	A, B, BG, CH, CZ, DE, DK, ES, ES-CAN FR, GB, HU, IT, IT-SIC, MT, NL, PT-AZO, PT-MAD, PL, SE	I2, J100	Bromeliaceae	Signoret (1869b)

Family *Species*	**Status**	**Regime**	**Native range**	**1st record in Europe**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Diaspis echinocacti (Bouché, 1833)	A	Phyto-phagous	Central-America	1827, IT	DE, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, LU, LT, PT, PT-MAD	I2, J100	Cactaceae	Leonardi (1920)
Entaspidiotus lounsburyi (Marlatt, 1908)	A	Phyto-phagous	Afrotropical/ South Africa	1999, IT, IT-SIC	IT, IT-SIC	I2	Aizoaceae	Russo et al. (1999)
Eulepidosaphes pyriformis (Maskell, 1897)	A	Phyto-phagous	Afrotropical/ South Africa	1985, GB	GB	I2	Polyphagous	Williams (1985)
Fiorinia fioriniae (Targioni Tozzetti, 1867)	A	Phyto-phagous	Asia-Tropical	1867, IT	ES-CAN, FR, GR, IT, IT-SIC, MT, PT-MAD	I2	Polyphagous	Targioni Tozzetti (1886), (1885)
Fiorinia pinicola Maskell, 1897	A	Phyto-phagous	Asia-Tropical	1952, PT	IT, PT	I2	Polyphagous	Baeta Neves (1954)
Furchadaspis zamiae (Morgan, 1890)	A	Phyto-phagous	Afrotropical	1895, IT	CH, CZ, DE, DK, ES, ES-CAN, FR, GB, IT, IT-SAR, IT-SIC, PT, PT-AZO, PT-MAD, PL, SE, UA	I2, J100	Cycadaceae, Zamiaceae	Berlese and Leonardi (1896)
Gymnaspis aechmeae Newstead, 1898	C	Phyto-phagous	Cryptogenic	1898, GB	BE, BG, CH, CZ, DE, ES, FR, IT, IRL, Pl, RO, S	I2, J100	Bromeliaceae	Newstead (1898)
Hemiberlesia lataniae (Signoret, 1869)	C	Phyto-phagous	Cryptogenic	1869, FR	AT, BE, BG, CY, CZ, DE, ES, ES-CAN, FR, FR-COR, GB, GR, IT, IT-SIC, PT, PT-MAD, PL, RO	I2, J100	Polyphagous	Signoret (1869a)
Hemiberlesia palmae (Cockerell, 1892)	A	Phyto-phagous	Southern-America	1920, GB	CY, GB, PT, PT-MAD	I2, J100	Palms	Green (1920)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Hemiberlesia rapax (Comstock, 1881)	C	Phyto-phagous	Cryptogenic	1881, IT	CZ, ES, ES-CAN, FR, GR, IT, IT-SAR, IT-SIC, MA, PT, PT-AZO, PT-MAD, PL	I2, J100	Polyphagous	Leonardi (1920)
Howardia biclavis (Comstock, 1883)	C	Phyto-phagous	Cryptogenic	1896, IT	FR, IT	I2, J100	Polyphagous	Berlese and Leonardi (1896)
Ischnaspis longirostris (Signoret, 1882)	C	Phyto-phagous	Cryptogenic	1954, FR	CZ, DK, ES-CAN, F	I2, J100	Polyphagous	Balachowsky (1954)
Kuwanaspis pseudoleucaspis Kuwana, 1923	A	Phyto-phagous	Asia-temperate/ China Japan	1900, IT	AL,FR, HR, IT, PL, SI, UA	I2	Bamboos	Lupo (1938)
Lepidosaphes beckii (Newman, 1869)	C	Phyto-phagous	Cryptogenic	1850, DE	BG, CY, ES, ES-CAN, FR, FR-COR, GB, GR, HR, IT, IT-SAR, IT-SIC, MA, PT, PT-AZO, PT-MAD	I2	Polyphagous	Bouché (1851)
Lepidosaphes gloverii (Packard, 1869)	C	Phyto-phagous	Cryptogenic	1884, IT	ES, FR, FR-COR, HR, IT, IT-SAR, IT-SIC, GR, P	I2	*Citrus*, Polyphagous	Targioni Tozzetti (1884)
Leucaspis podocarpi (Green, 1929)	A	Phyto-phagous	Australasia/ New-Zealand	1985, GB	GB	I2	Podocarpus	Williams (1985)
Lindingaspis rossi (Maskell, 1891)	A	Phyto-phagous	Australasia/ Australia	1942, PT	ES, FR, IT, IT-SIC, PT, PT-MAD	F, G, I2	Polyphagous	Seabra de (1942)
Lopholeucaspis cockerelli (Grandpré & Charmoy, 1899)	C	Phyto-phagous	Cryptogenic	1908, DE	DE, GB, GR	J100	Orchidaceae	Lindinger (1908)
Oceanaspidiotus spinosus (Comstock, 1883)	C	Phyto-phagous	Cryptogenic	1890, IT-SIC	ES, ES-CAN, GB, IT, IT-SIC, PT, PT-AZO, PT-MAD	I2, J100	Polyphagous	Leonardi (1897)
Odonaspis greenii (Cockerell, 1902)	A	Phyto-phagous	Asia-Tropical	1963, CZ	CZ, ES, IT	I2, J100	Bamboos	Zahradnik (1990)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Odonaspis secreta (Cockerell, 1896)	A	Phyto-phagous	Asia-Tropical	1929, FR	FR	I2	Bamboos	Balachowsky (1930)
Opuntaspis philococcus (Cockerell, 1893)	A	Phyto-phagous	Southern-America	1929, FR	FR	I2	Opuntia	Balachowsky (1932a)
Parlatoria blanchardi Targioni Tozzetti, 1883	A	Phyto-phagous	Arabian peninsula	1947, IT	ES, FR, IT, PT	I2	Palms	Lupo (1948)
Parlatoria camelliae Comstock, 1883	A	Phyto-phagous	Asia-Tropical	1903, IT	ES, FR, IT, IT-SIC, PT, PT-MAD	I2	*Camellia*, Polyphagous	Leonardi (1903)
Parlatoria crotonis Douglas, 1867	C	Phyto-phagous	Cryptogenic	1887, GB	FR, GB, IT, HU	I2	*Croton*	Douglas (1887)
Parlatoria pergandii Comstock 1881	C	Phyto-phagous	Cryptogenic	Last 1899, IT	CY, DE, ES, ES-CAN, FR, FR-COR, GR, HR, IT, IT-SAR, IT-SIC, MT, PT, PT-MAD	I2, J100	*Citrus*, Polyphagous	Berlese and Leonardi (1899)
Parlatoria proteus (Curtis, 1843)	C	Phyto-phagous	Cryptogenic	1939, FR	BG, CZ, DE, DK, FR, PL, UA	I2, J100	Palms, orchids, Polyphagous	Morrison (1939)
Parlatoria theae Cockerell, 1896	C	Phyto-phagous	Cryptogenic	1953, FR	ES, FR, PT-MAD, PL, UA	I2	Polyphagous	Balachowsky (1953)
Parlatoria ziziphi (Lucas, 1853)	A	Phyto-phagous	Asia-Tropical	1853, FR	BG, CY, ES, ES-CAN, FR, FR-COR, GR, HR, IT, IT-SAR, IT-SIC, PT, UA	I2	*Citrus*, Rutaceae	Lucas (1853)
Pinnaspis aspidistrae (Signoret, 1869)	A	Phyto-phagous	Asia-Tropical	1868, FR	B, BG, CZ, DE, ES, ES-CAN, FR, FR-COR, GB, HU, IT,IT-SIC, IE, MT, NL, PT, PT-MAD, PL, S, UA	J100	Polyphagous	Signoret (1869b)
Pinnaspis buxi (Bouché, 1851)	C	Phyto-phagous	Cryptogenic	1851, DE	DE, DK, FR, IT	J100	Polyphagous	Balachowsky (1938)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Pinnaspis strachani (Cooley, 1899)	C	Phytophagous	Cryptogenic	1988, IT	DE, ES-CAN, FR, GB, IT, PL	J100	Polyphagous	Tranfaglia and Viggiani (1988)
Poliaspis cycadis Comstock, 1833		Phytophagous	Asia-tropical	2007, GR	GR	J100	Cycadaceae, Ericaceae	Anagnou–Veroniki et al. (2008)
Pseudaonidia paeoniae (Cockerell, 1899)	A	Phytophagous	Asia-Tropical	1949, IT	IT	J100	*Camellia*	Pegazzano (1949)
Pseudaulacaspis cockerelli (Cooley, 1897)	A	Phytophagous	Asia-Tropical	1992, IT	FR, FR-COR, IT, IT-SIC, SI	J100	Polyphagous	Russo and Mazzeo (1992)
Pseudaulacaspis pentagona (Targioni Tozzetti, 1886)	A	Phytophagous	Asia-Tropical?	1886, IT	AT, BG, CH, DE, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, MA, NL, PT, PT-MAD, SI, UA	G, J, I	Fruit trees, Polyphagous	Targioni Tozzetti (1867)
Pseudoparlatoria parlatorioides (Comstock, 1883)	C	Phytophagous	Cryptogenic	1918, IT	CZ, DE, ES, FR, IT, PT-MAD	I2, J100	Polyphagous	Leonardi (1918)
Pseudoparlatoria ostreata Cockerell, 1892	C	Phytophagous	Cryptogenic	1954, FR	FR	I2	Polyphagous	Balachowsky (1954)
Rutherfordia major (Cockerell, 1894)	C	Phytophagous	Cryptogenic	2002, FR	FR	I2, J100	Polyphagous	Germain et al. (2002)
Selenaspidus albus McKenzie, 1953	A	Phytophagous	Afrotropical/ South Africa	1991, IT	IT	I2	Euphorbiaceae	Marotta and Garonna (1991)
Umbaspis regularis (Newstead, 1911)	A	Phytophagous	Afrotropical	1990, IT	IT	I2	Polyphagous	Pellizzari (1993)
Unaspis euonymi (Comstock, 1881)	A	Phytophagous	Asia-Temperate/ Eastern Asia	1884, IT	AT, BG, CH, DE, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, MT, NL, PL, PT, RO, SI, UA	I2	*Euonymus*	Targioni Tozzetti (1884)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Unaspis yanonensis (Kuwana, 1923)	A	Phyto-phagous	Asia-Tropical	1969, FR	ES, FR, FR-COR, IT	I, I2	*Citrus*	Bénassy (1969)
Eriococcidae								
Eriococcus araucariae Maskell, 1879	A	Phyto-phagous	Australasia/ Australia	1895?, IT	ES, ES-CAN, FR, FR-COR, GR, HR, IT, IT-SAR, IT-SIC, PT, PT-AZO, PT-MAD	I2	*Araucaria*	Leonardi (1899)
Eriococcus coccineus Cockerell, 1894	A	Phyto-phagous	Northern-America	1930, FR	FR,FR-COR, GR, HR, IT, IT-SIC	I2, J100	Cactaceae	Balachowsky (1932a)
Ovaticoccus agavium (Douglas, 1888)	A	Phyto-phagous	Northern-America	1888, GB	FR, FR-COR, IT, IT-SIC, UA	I2, J100	Agavaceae	Green (1915)
Margarodidae								
Icerya formicarum Newsteadt, 1897	A	Phyto-phagous	Asia-Tropical	2001, FR	FR	I2	Polyphagous	Foldi (2001)
Icerya purchasi (Maskell, 1879)	A	Phyto-phagous	Australasia/ Australia	1900, IT	AL, CH, CY, ES, ES-CAN, FR, FR-COR, GR, HR, IT, IT-SAR, IT-SIC, MT, PT, PT-AZO, PT-MAD, RO, SI	I, I2	Polyphagous	Leonardi (1920)
Ortheziidae								
Insignorthezia insignis (Browne, 1997)	A	Phyto-phagous	Southerrn-America	1887, GB	AT, CH, CZ, DE, DK, ES-CAN, FR, GB, HU, HR, PT, PT-AZO, PT-MAD	I2, J100	Polyphagous	Douglas (1889)
Phoenicoccocidae								
Phoenicococcus marlatti (Cockerell, 1899)	A	Phyto-phagous	North Africa	1930, FR	ES, FR, FR-COR, IT, IT-SIC, PT-MAD	I2	Palms	Balachowsky (1930)
Pseudococcidae								
Antonina crawi Cockerell, 1900	A	Phyto-phagous	Asia-Tropical	1937, FR	ES, FR, GB, HR, UA	I2	Poaceae	Goux (1937)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Antonina graminis (Maskell, 1897)	A	Phyto-phagous	Asia-Tropical	1992, IT	FR, IT	E, I2	Poaceae	Marotta (1992)
Balanococcus diminutus (Leonardi, 1918)	A	Phyto-phagous	Australasia/ Australia	1918, IT	FR, GB, IT, UA	J100	*Phormium*	Leonardi (1918)
Balanococcus kwoni Pellizzari & Danzig 2007	A	Phyto-phagous	Asia	Last 2007,IT	IT	I2	Bamboos	Pellizzari and Danzig (2007)
Chaetococcus bambusae (Maskell, 1892)	A	Phyto-phagous	Asia-Tropical	1990, IT	IT	I2	Bamboos	Porcelli (1990)
Chorizococcus rostellum (Lobdell, 1930)	A	Phyto-phagous	Northern-America	1979, GR	FR, GR, HU, IT, IT-SAR	E, I	Agavaceae, Gramineae	Tranfaglia (1981)
Delottococcus euphorbiae (Ezzat & McConnell, 1956)	A	Phyto-phagous	Afrotropical/ South Africa	1977, IT	FR, IT, IT-SIC	I2	Polyphagous	Tranfaglia (1981)
Dysmicoccus boninsis (Kuwana, 1909)	C	Phyto-phagous	Cryptogenic	Last 1938 PT-MAD	PT-MAD	I	Polyphagous	Balachowsky (1938)
Dysmicoccus brevipes (Cockerell, 1893)	A	Phyto-phagous	Central-America	1933, NL	ES-CAN, IT, IT-SIC,NL, PT-AZO, PT-MAD	J100	Polyphagous	Jansen (1995)
Dysmicoccus grassii (Leonardi, 1913)	A	Phyto-phagous	Central-America	Last 1913 ES-CAN	ES-CAN, FR	I, J100	Polyphagous	Leonardi (1913)
Dysmicoccus mackienziei Beardsley 1965	A	Phyto-phagous	Southern-America/ Mexico	1989, IT	IT	I2	Bromeliaceae	Marotta (1992)
Dysmicoccus neobrevipes Beardsley 1959	A	Phyto-phagous	Southern-America	1988, NL	IT, IT-SIC, NL	I2	Polyphagous	Jansen (1995)
Ferrisia virgata (Cockerell, 1893)	A	Phyto-phagous	Southern-America	1994, NL	FR, NL	I2, J100	Polyphagous	Jansen (1995)
Geococcus coffeae Green, 1933	A	Phyto-phagous	Asia-Tropical	1967, NL	DK, FR, NL	I2, J100	Polyphagous	Jansen (1995)

Family *Species*	**Status**	**Regime**	**Native range**	**1st record in Europe**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Hypogeococcus pungens Granara de Willink, 1981	A	Phyto-phagous	Southern-America	1986, IT	FR, FR-COR, GR, IT, IT-SIC	I2	Cactaceae	Süss and Trematerra (1986)
Nipaecoccus nipae (Maskell, 1893)	A	Phyto-phagous	Central-America	1917, GB	ES, ES-CAN, GB, IT-SIC, PT-MAD	I2, J100	Polyphagous	Green (1917)
Palmicultor palmarum (Ehrhorn, 1916)	C	Phyto-phagous	Cryptogenic	2004, FR	ES-CAN, F	J100	Palms	Chapin and Germain (2005)
Peliococcus serratus (Ferris, 1925)	A	Phyto-phagous	Northern-America	1976, IT	IT	G, I2	*Corylus*	Tranfaglia (1976)
Phenacoccus gossypii Townsend & Cockerell, 1898	A	Phyto-phagous	Northern-America	1946, ES	ES, ES-CAN	I2	Polyphagous	Gómez-Menor Ortega (1946)
Phenacoccus madeirensis Green, 1923	A	Phyto-phagous	Southern-America	1923, PT-MAD	FR, IT, IT-SIC, PT-MAD	I2	Polyphagous	Green (1923)
Phenacoccus solani Ferris, 1918	A	Phyto-phagous	Northern-America	1999, IT, IT-SIC	AL, IT, IT-SIC	I2	Polyphagous	Mazzeo et al. (1999)
Planococcus citri (Risso, 1813)	A	Phyto-phagous	Asia-Tropical	1813, FR	BG, CH, CY, CZ, ES, ES-CAN, FR, FR-COR, GB,GR, HU, HR, IT, IT-SAR, IT-SIC, NL, PL, PT, PT-AZO, PT-MAD, SI, UA	I2, J100	Polyphagous	Risso (1813)
Planococcus halli Ezzat & McConnel, 1956	C	Phyto-phagous	Cryptogenic	1989, IT	IT	I2	*Nerium oleander*, Polyphagous	Marotta (1992)
Pseudococcus calceolariae (Maskell, 1879)	A	Phyto-phagous	Australasia/ Australia	1914, GB	BG, CZ, ES, ES-CAN, FR, FR-COR, GB, HR, IT, IT-SAR, IT-SIC, PT, PT-AZO, UA	I2, J100	Polyphagous	Green (1915)

Family *Species*	Status	Regime	Native range	1st record in Europe	Invaded countries	Habitat	Hosts	References
Pseudococcus cosmtocki (Kuwana, 1902)	A	Phyto-phagous	Asia-Temperate	last 1989, MD	ES-CAN,FR, IT, MD, PT-MAD	I, I2	Polyphagous	Ben-Dov (1994)
Pseudococcus longispinus (Targioni TozzettIT, 1868)	A	Phyto-phagous	Australasia/ Australia	1867, IT	BG, CZ, DK, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, LV, MT, PT, PT-AZO, PT-MAD, PL, SI, UA	I2, J100	Polyphagous	Targioni Tozzetti (1886), (1885)
Pseudococcus viburni (Signoret, 1875)	A	Phyto-phagous	Northern-America	1875, FR	B, BG, DE, DK, CZ, ES, ES-CAN, FR, FR-COR, GB, GR, HU, HR, IT, IT-SAR, IT-SIC, MT, NL, PT, PT-AZO, PT-MAD, PL, SI, SK, RS, UA	I, I2	Polyphagous	Signoret (1875)
Rhizoecus americanus (Hambleton, 1946)	A	Phyto-phagous	Northern-America	1992, IT, IT-SIC	IT, IT-SIC	I2	Polyphagous	Russo and Mazzeo (1992)
Rhizoecus cacticans (Hambleton, 1946)	A	Phyto-phagous	Southern-America	1961, NL	BY, CZ, DK, ES-CAN, IT, IT-SIC, NL, PL	I2	Polyphagous	Jansen (1995)
Rhizoecus dianthi Green, 1926	A	Phyto-phagous	Australasia/ Australia	1961, NL	CZ, DK, FR, IT, NL, PL	I2	Polyphagous	Jansen (1995)
Rhizoecus latus (Hambleton, 1946)	A	Phyto-phagous	Southern-America	1995, IT	IT	I2	Polyphagous	Marotta (1995)
Spilococcus mamillariae (Bouché, 1844)	A	Phyto-phagous	Northern-America	1979, IT	CZ, DE, DK, FR, GB, HU, IT, IT-SIC	I2, J100	Cactaceae	Tranfaglia (1981)
Trionymus angustifrons Hall, 1926	A	Phyto-phagous	Arabian peninsula	1966, PL	CH, FR, PL	E, I2	Compositae, *Tamarix, Urtica*	Koteja and Zak-Ogaza (1966)
Trochiscococcus speciosus (De Lotto, 1961)	A	Phyto-phagous	Afrotropical	1990, IT	FR,IT	J100	Liliaceae	Williams and Pellizzari (1997)

Family *Species*	**Status**	**Regime**	**Native range**	**1st record in Europe**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Vryburgia amaryllidis (Bouché, 1837)	A	Phyto-phagous	Afrotropical	1933, IT	BG, DE, ES, FR,GR, IT, NL, P	I2	Polyphagous	Menozzi (1933)
Vryburgia brevicruris (McKenzie, 1960)	A	Phyto-phagous	Afrotropical	1975, DK	BE, DK, GB	I2	Polyphagous	Kozarzhevskaya and Reitzel (1975)
Vryburgia rimariae Tranfaglia, 1981	A	Phyto-phagous	Afrotropical/ South Africa	1975, IT	FR, IT, IT-SIC	I2	Crassulaceae	Tranfaglia (1981)

Table 9.3.2. List and main characteristics of the scale species alien *in* Europe. Country codes abbreviations refer to ISO 3166 (see appendix I). Habitat abbreviations refer to EUNIS (see appendix II). Only selected references are given. Last update 29/05/2009

Family *Species*	**Regime**	**Native range**	**Invaded countries**	**Habitat**	**Hosts**	**References**
Diaspididae						
Aonidiella tinerfensis Lindinger (1911)	Phytophagous	Canary Islands	PT	I2	*Dracaena*	Balachowsky (1948), Fernandes (1992), (1990)
Aonidiella lauretorum (Lindinger, 1911)	Phytophagous	Canary Islands, Madeira	PT	I2	Poly-phagous	Balachowsky (1948)
Margarodidae						
Marchalina hellenica (Gennadius, 1883)	Phytophagous	Greece, Turkey	IT	G	*Pinus*	Tranfaglia and Tremblay (1984)
Matsucoccus feytaudi Ducasse 1941	Phytophagous	France, Spain, Portugal	IT, FR-COR	G	*Pinus pinaster*	Arzone and Vidano (1981), Jactel et al. (1996)