

**A NEW INTRODUCED WAX SCALE TO TURKEY:
CEROPLASTES CERIFERUS (FABRICIUS)
(HEMIPTERA: COCCIDAE)**

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ABSTRACT: The Indian wax scale, *Ceroplastes ceriferus* (Fabricius), is highly polyphagous. It occurs in many parts of world. Recently it is introduced to Turkey. A description of the adult female, geographic distribution, host plants and biology are presented with an identification key to the Turkish wax scales.

KEY WORDS: Coccidae, wax scales, invasive insect, *Acer palmatum*

The wax scale genus *Ceroplastes* Gray, 1828 (Hemiptera: Coccidae: Ceroplastinae) has a characteristic thick wax test that covers the adult female body. Species of the genus have been recorded from all zoogeographical regions and the genus contains approximately 145 species worldwide (Garcia et al., 2016). In the Palearctic region, there are 13 *Ceroplastes* species, 7 from southern Mediterranean countries (Fetyko et al., 2012). Four species as *C. floridensis* (Comstock), *C. japonicus* Green, *C. rusci* (Linnaeus) and *C. sinensis* (Del Guercio) have been reported in Turkey (Kaydan et al., 2013). *C. floridensis* and *C. rusci* are considered important pests of fig, citrus, pomegranate, forest and ornamental plants in Turkey (İyriboz, 1940; Bodenheimer, 1953; Anonymous, 2008; Ülgentürk & Çanakçıoğlu, 2004; Ülgentürk et al., 2012; Kaydan et al. 2013). *C. floridensis* and *C. rusci* are part of pest control programs of the Turkish Ministry of Food, Agriculture and Livestock (Anonymous, 2008). Both species have two or three generations in a year and hibernate as second nymph stages in southern Turkey (Soylu, 1976; Uygun et al., 1987). *C. sinensis* was first noticed by Bodenheimer (1953) who recorded on *Citrus* sp. and *Punica granatum* and kiwi in Black Sea Region (Alkan, 1957; Ülgentürk et al., 2009). Recently, Ülgentürk et al. (2013) reported it on *Ilex aquifolium*, *Nerium oleander* and an undetermined Poaceae in Aegean and Marmara Regions. According to Bodenheimer (1953), it has one generation in Black Sea Region. *Ceroplastes japonicus* was first determined on *Hedera helix* and *Laurus nobilis* (Kaydan & Kondo, 2008), after *Acer negundo*, *A. pseudoplatanus*, *Aesculus hippocastaneum*, *Fraxinus* sp., *Laurus nobilis*, *Malus floribunda*, *Morus alba*, *N. oleander*, *Pistacia terebrentia*, *Pyracantha coccinea* and *Ulmus campestre* in İstanbul parks (Ülgentürk et al., 2008). This paper reports the detection and information of Indian wax scale insect for the first time in Turkey.

MATERIAL AND METHODS

Specimens were collected from a garden in Yalova, Marmara Region. Wax scale insects were prepared for light microscopy using the slide-mounted method of Kosztarab & Kozár (1988). Gimpel et al. (1974) and Williams & Watson (1990) followed for morphological terminology. Photographs were taken using Canon EOS 550 D camera and Bs200 ProPsoftware and a Nikon E600 phase contrast

microscope with Delta pix camera. Slides and dry material are deposited at Ankara University, Faculty of Agriculture, Department of Plant Protection, Turkey.

OBSERVATION AND RESULTS

Ceroplastes Gray, 1828

Type species: *Coccus janeirensis* Gray, 1828

Ceroplastes ceriferus (Fabricius, 1798)

Synonyms: *Coccus (Ceroplastes) chilensis* Gray, 1828; *Ceroplastes australiae* Walker, 1852; *Lacca alba* Signoret, 1869.

Material examined: *Acer palmatum* cv *atropurpureum* (Magnoliophda: Aceraceae), 28.xi.2015, 4 ♀♀ in Yalova, Marmara Region, Turkey.

Field characters. Body covered with thick, white to pinkish white, wet wax, convex, circular or irregular in outline, with an anteriorly projecting wax horn on old female (post-reproductive) (Figs. 1a,b). Wax plates visible on older females, without nuclei. Wax bands near both anterior and posterior spiracles, anterior bands directed dorsally (Fig. 1b).

Slide-mounted characters. Adult female broadly oval, caudal process poorly developed in young adult female (Williams & Watson, 1990). In our samples, caudal process fully developed, projects from posterior end as cylindrical process about one third length of body (Fig. 1c). **Dorsum.** Without a mediodorsal clear area and with cephalic and posterolateral clear areas divided. Dorsal setae mostly cylindrical with rounded or truncate apices. Pores predominantly triangular and trilocular (Fig. 1i), with a few numbers of oval trilocular pores, quadrilocular pores and bilocular pores present. With 1 ventral and 4 dorsal setae on each anal plate; with about 52-54 bullet-shaped stigmatic setae along margins in 6 irregular rows (Fig. 1d). No filamentous ducts at our mature females but according to Williams & Watson (1990) filamentous ducts band present on dorsum.

Ventrum. With many cruciform pores, antennae 6-segmented, legs without tibio-tarsal articulatory scleroses with unequal claw digitules (Figs. 1e,f); multilocular pores present on all abdominal segments (Fig. 1g) and normally present near each coxa. Tubular duct present on head and in vulvar region (Fig. 1h). Quinquelocular pores in stigmatic furrows present in wide bands.

Hosts, distribution, damages and natural enemies

C. ceriferus is a highly polyphagous species that was reported on over a hundred species of different plant families from 40 countries (Garcia et al., 2016). It is most likely native to Asia, but is widely distributed all over the world (Gimpel et al., 1974; Lee et al., 2012). In Europe, it has been intercepted several times on imported ornamental plants (*Ficus*, *Podocarpus*) from Taiwan and it was added to the EPPO (European Plant Protection Organization) alert List (EPPO, 2002). It has since been reported on *Acer palmatum*, *Buxus* sp. *Camellia*, *Cornus*, *Desmodium penduliflorum*, *Deutzia*, *Euonymus*, *Hedera*, *Laurus nobilis*, *Magnolia*, *Malus*, *Spirea*, *Pyracantha*, and many others in North Italy (Mori et al., 2001). It is less aggressive than the former (Mazzeo et al., 2014). On the other hand, it is a pest of economic importance of ornamentals in the USA (Gimpel et al., 1974) and it has been in invasive and Exotic Insect List of North America (Anonymous, 2014). After this species was removed from the EPPO alert list in 2005 (EPPO, 2016), new records are reported from Europe (Malumphy &

Badmin, 2012; Fetyko & Kozar, 2012; Seljak et al., 2012). *C. ceriferus* occurs only on stems and branches. It sucks plant juice and can cause wilting and dieback of stems. It secretes large honeydew and causes sooty mold (Gimpel et al., 1974; Pellizzari et al., 2004). It has few natural enemies namely, *Pectinodiplosis erratica* (Felt) (Diptera: Cecidomyiidae), *Anicetus rarisetus* Xu & He and *A. zhejiangensis* Xu & Li (Hymenoptera: Encyrtidae) (Xu & Li, 1991; Xu & He, 1997; Gagne et al., 2009).

Key to adult female of *Ceroplastes* of Turkey

1. Anal process present, not more than one-third length of body.....*ceriferus* (Fabricius)
- Anal process absent.....2
2. Ventral tubular ducts with a short, broad inner filament.....3
- Ventral tubular ducts, if present, not short, with narrow inner filament.....4
3. The anterior and posterior stigmatic setae rows are separated by 7-12 marginal bristle-shaped setae on body margin.....*floridensis* Comstock
- The stigmatic setae of anterior and posterior stigmatic cleft usually an uninterrupted row on body margin.....*japonicus* Green
4. Antenna 7-segmented, dorsal pores predominantly trilocular.....
-*sinensis* Del Guercio
- Antenna 6- segmented, dorsal pores predominantly bilocular....*rusei* (Linnaeus)

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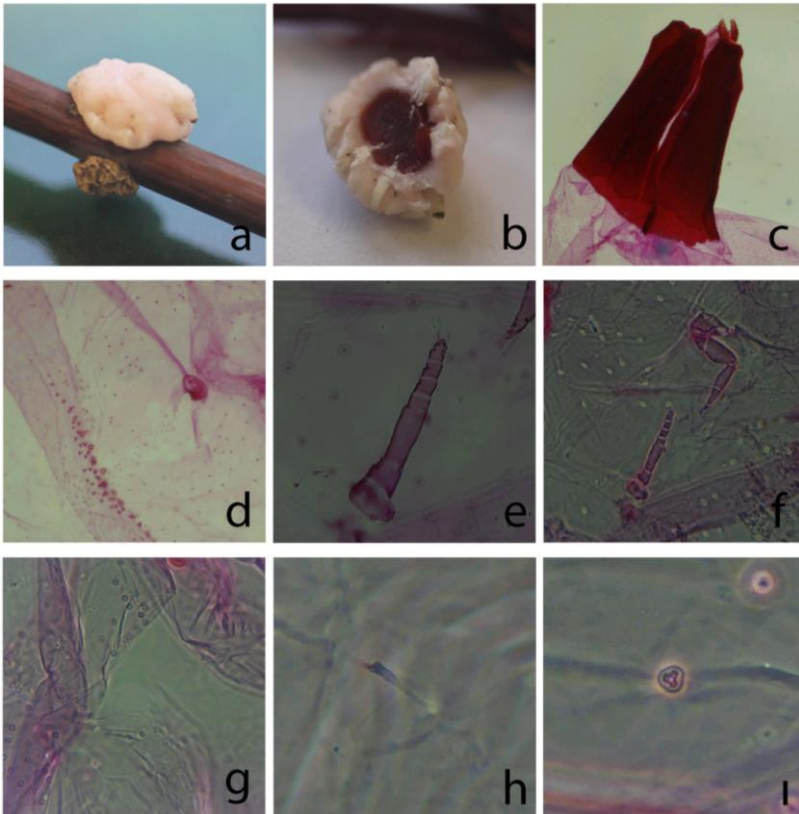


Figure 1. Dorsal (a) and ventral appearances (b), anal process (c), stigmatic areas (d) antenna (e) leg (f) multilocular disc pores (g) tubular duct (h) and trilocular pore (i) of *Ceroplastes ceriferus* (Fabricius).