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***Ceroplastes ceriferus* (Fabricius) (Hemiptera, Coccoidea):
new pest of ornamentals in Europe?**

Abstract - The presence from Italian gardens of the wax scale *Ceroplastes ceriferus* (Fabricius) is reported. The species was found in North Italy on several ornamental species and appears to be already established. It is the first record of this species from outdoors in Europe. *Ceroplastes ceriferus* is probably native to Asia and is presently widespread in many countries of the world where is reported as pest of ornamental plants. It is a polyphagous species, has one generation/year and overwinters as adult female.

Key words: Wax Indian scale, Coccidae, Italy, Ornamental plants.

INTRODUCTION

While monitoring overwintering populations of scales on ornamental plants located in parks and gardens in the district of Verona during January 2001, we noticed the presence of individuals of a *Ceroplastes* sp., macroscopically different from the species of *Ceroplastes* already recorded in Italy. In particular, it was different from *C. japonicus* Green which is widely distributed in urban and suburban areas of northern and central Italy.

The analyses of slide mounted specimens helped to identify a new exotic pest: *Ceroplastes ceriferus* (Fabricius), never recorded outdoors in Europe. Previous records of this species in Europe regard only interceptions: *C. ceriferus* was intercepted two times by the Plant Protection Service of The Netherlands (2000; 2001) on plants of *Podocarpus* and *Ficus* coming from Taiwan. *C. ceriferus* is considered a pest of ornamentals and is reported in a list of "Pest scales of ornamentals of the world" by Gill & Kosztarab (1997), whereas on fruit trees of the temperate areas (apple, pear, peach trees) it is considered a minor pest (Pfeiffer, 1997). Although it is not inserted among the European quarantined species (D.M. 31.01.96), it was listed by Tranfaglia and Viggiani (1988) and Tremblay (1988) among scale species with high risk of introduction to Italy and other European countries. Their forecasts demonstrated to be right.

C. ceriferus (Fabricius) is the fifth species belonging to the genus *Ceroplastes* actually recorded in the Mediterranean area, together with *Ceroplastes rusci* (Linnaeus), *C. sinensis* Del Guercio, *C. floridensis* Comstock and *C. japonicus* Green (Pellizzari & Camporese, 1994).

DISTRIBUTION

Ceroplastes ceriferus, probably is native of Asia (Gimpel *et al.*, 1974), is distributed almost world-wide. It was recorded from China, Taiwan, Japan and other Far East countries (Thailand, Vietnam, Indonesia, Malaysia, Philippines, India, Sri Lanka) (Ben-Dov, 1993). In USA the scale was recorded since 1936: actually it is recorded in the south-eastern States as injurious on ornamental plants, while it does not seems to survive outdoors in the northern areas of Virginia and Maryland (Kosztarab, 1996). The pest also invaded Australia (Qin & Gullan, 1994), Cook Islands, Fiji, New Caledonia, Tonga and Vanuatu, New Zealand (Williams & Watson, 1990; Hodgson & Henderson, 2000) Mexico and some other countries in Central and South America (Panama, Jamaica, Puerto Rico, Brazil, Chile) (Ben-Dov *et al.*, 2000).

Host-plant range

Ceroplastes ceriferus is a polyphagous scale. In Table 1 are listed the botanical families on which host plants of this scale were recorded. The host plants on which we collected *C. ceriferus* in Italy were: *Acer palmatum*, *Cornus sanguinea*, *C. alba*, *Desmodium penduliflorum*, *Deutzia gracilis*, *Laurus nobilis*, *Magnolia stellata*, *Malus*

Table 1 - Botanical families from which host plants of *C. ceriferus* were recorded

BOTANICAL FAMILIES WITH HOSTS FOR <i>C. CERIFERUS</i>		
Aceraceae	Dennstaedtiaceae	Platanaceae
Amaranthaceae	Ebenaceae	Podocarpaceae
Anacardiaceae	Epacridaceae	Polygonaceae
Apocynaceae	Ericaceae	Polypodiaceae
Aquifoliaceae	Icacinaceae	Rhamnaceae
Araliaceae	Lauraceae	Rosaceae
Asclepiadaceae	Leguminosae	Rubiaceae
Berberidaceae	Lytraceae	Rutaceae
Betulaceae	Magnoliaceae	Salicaceae
Bignoniaceae	Malvaceae	Sapindaceae
Burseraceae	Melastomataceae	Sapotaceae
Buxaceae	Moraceae	Tamaricaceae
Caprifoliaceae	Myrtaceae	Theaceae
Casuarinaceae	Ochnaceae	Ulmaceae
Celestraceae	Philadelphaceae	Urticaceae
Combretaceae	Pinaceae	Verbenaceae
Compositae	Piperaceae	
Cucurbitaceae	Pittosporaceae	

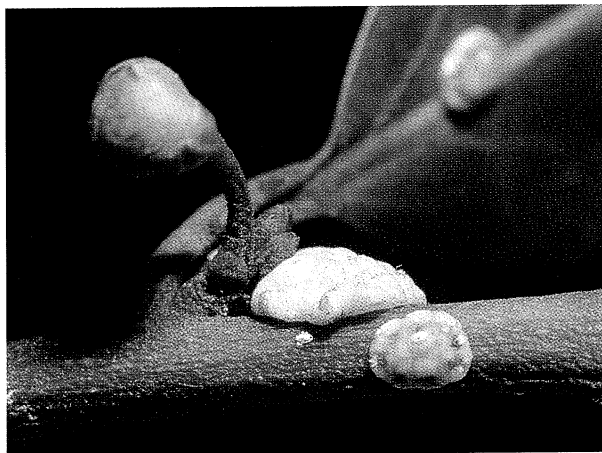


Fig. - 1
Comparison between adult female of *Ceroplastes ceriferus* (left) and *C. japonicus* (right)

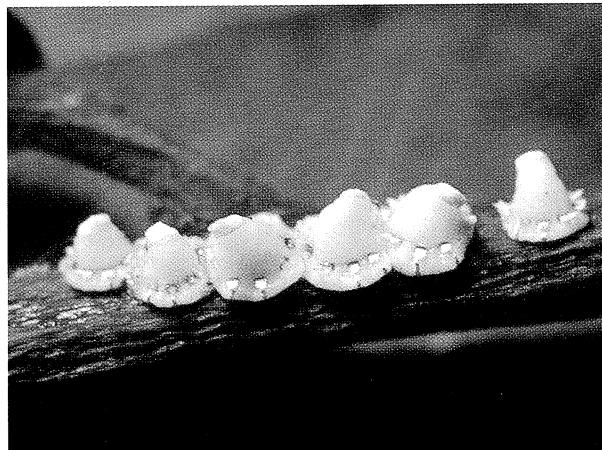


Fig. - 2
Young females of *Ceroplastes ceriferus*.
Note the projecting wax horn

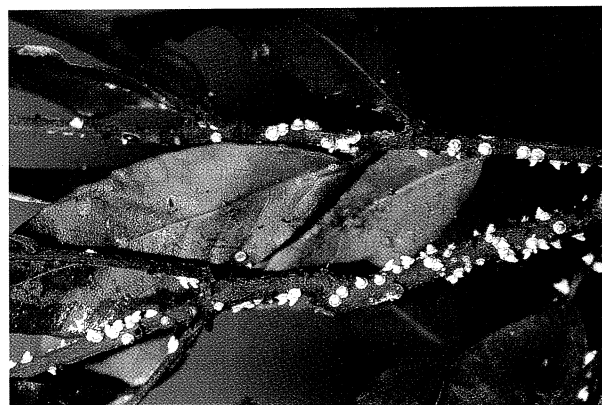


Fig. - 3
Laurus nobilis infested by *Ceroplastes ceriferus*

domestica, *Spiraea japonica*, *Viburnum dentatum*. Some *Laurus* spp. plants were also injured by *C. japonicus*: the latter species is actually widespread in North and Central Italy. It is possible to distinguish these two species because of their different size and wax coloration (Fig. 1)

Key to the Ceroplastes sp. recorded in Italy

C. ceriferus is macroscopically distinct from the other invasive *Ceroplastes* spp. by its larger size and by the thick layer of white amorphous wax that covers it. The adult female could reach 12 mm in length and 10 mm in width, besides the young females have a well visible forward projecting wax horn (Fig. 2), that subsequently disappears. The scales are found only on stems and branches, but not on leaves. Good microscopic descriptions of adult females are available on the following works: Williams & Kosztarab, 1972; Gimpel *et al.*, 1974; Hamon & Williams, 1984; Williams & Watson, 1990; Tang, 1990; Kosztarab, 1996; Hodgson & Henderson, 2000. Complete descriptions of each instar and of the wax covers were given by Kawai & Tamaki, 1967 (under *C. pseudoceriferus* Green).

An identification key of *Ceroplastes* recorded in Italy, based on morphological characters easy to detect, is presented. *C. floridensis* is included in the key, even if its presence in Italy is still dubious.

- | | |
|---|-----------------------|
| 1) antennae 7-segmented; tibio-tarsal sclerosis present | <i>C. sinensis</i> |
| – antennae 6-segmented; tibio-tarsal sclerosis absent | 2 |
| 2) stigmatic setae bullet-shaped | <i>C. rusci</i> |
| – stigmatic setae lanceolate, with pointed apices | 3 |
| 3) Stigmatic setae distributed in 5-6 irregular rows near each stigmatic cleft where they form a sub- triangular group | <i>C. ceriferus</i> |
| – Stigmatic setae distributed in 3 irregular rows near each stigmatic cleft and extended in a single row on body margin | 4 |
| 4) Stigmatic setae of anterior and posterior cleft form an uninterrupted row on body margin | <i>C. japonicus</i> |
| – Stigmatic setae of anterior and posterior cleft are separated by 7-12 marginal hair like setae on the body margin | <i>C. floridensis</i> |

Biology and damages

The life cycle of *C. ceriferus* was studied in the USA, China and Japan. *C. ceriferus* completes one generation per year and overwinters as adult female. It starts laying eggs from June: about 1.000 eggs per female. The nymphs hatched after 2-3 weeks and they attached themselves on branches. At the end of the summer, early autumn, the overwintering females occur (Williams & Kosztarab, 1972; Kosztarab, 1996). In

the Guizhou district (China) the first instar nymphs apparently overwinter (Lai, 1993). Detailed records on fecundity, mortality, nymphs, attachment sites are reported in the papers of Ohgushi & Nishino (1975) and Itioka & Inoue (1991). India, China and Japan are the main countries where *C. ceriferus* was reported as dangerous to crops (especially Citrus and other tropical crops) and to many ornamental plants including *Cedrus deodara* (Wu et al., 1999). In USA the species is well known for its injury to ornamental plantings, caused by high production of honeydew and sooty mould development. *Ilex*, *Magnolia* and *Camellia* spp. are often damaged (Kosztarab, 1996).

Natural enemies

Natural enemies of *C. ceriferus* are known in Asia, including some parasitic wasps (*Anicetus beneficus* Ishii & Yasumatsu, *A. rarisetus* Xu & He, *A. zhejiangensis* Xu & Li) and the coccinellid *Chilocorus kuwanae* Silvestri. *Coccophagus lycimnia* (Walker) and *Scutellista coerulea* (Fonscolombe) recorded by Kosztarab for the USA (1996) are present in Italy also.

Current status in Italy

Presently, *C. ceriferus* has been recorded outdoors in gardens and nurseries in two regions of northern Italy: Veneto region, district of Verona and Lombardy region, district of Bergamo. First observation carried out in the district of Verona demonstrate that overwintering was carried out by adult females and that there is one generation/year, but these data need to be confirmed with further observations. Observations carried out in several infested localities, in urban and suburban environments, demonstrate that this species is spreading (Fig. 3). We did not notice damage to the plants until now, probably because of its recent introduction, but in September 2001 plants appeared more infested with respect to winter 2001. Unfortunately, the high fecundity of this species, the wide host-range and the already known ability to overwinter outdoors, made us to believe that, in absence of any control, this new pest will further spread, threatening several ornamental species.

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