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First record of the string cottony scale *Takahashia japonica* in Europe and its establishment in Northern Italy

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Abstract

The occurrence of the Asiatic string cottony scale *Takahashia japonica* Cockerell (Hemiptera, Coccomorpha, Coccidae) in Europe is reported. The string cottony scale was collected on branches of different trees (*Acer pseudoplatanus* L., *Albizia julibrissin* Durrazz, *Carpinus betulus* L., *Celtis australis* L., *Liquidambar styraciflua* L. and *Morus nigra* L.) growing in parks, parking lots and along tree-lined streets located in the provinces of Milano and Varese (Northern Italy).

Key words: soft scale insect, new hosts, distribution, invasive alien species.

Introduction

Scale insects (Hemiptera Coccomorpha) are among the most common invaders of new geographical areas and are the second largest group of alien insects in Europe (Pellizzari and Germain, 2010; Germain and Pellizzari, 2017). In Italy, alien scale insects linked to trees and ornamentals represent about 30% of the total scale insect fauna known so far from this country and the trade of ornamentals appears to be the commonest pathway of introduction (Mazzeo *et al.*, 2014; Pellizzari and Porcelli, 2014; Ülgentürk *et al.*, 2014). This process is still ongoing: in the last years two other invasive alien scales, namely *Toumeyella parvicornis* (Cockerell) (Coccidae) and *Crisicoccus pini* (Kuwana) (Pseudococcidae) have been detected on ornamental pines in parks and avenues respectively in southern and northern Italy (Garonna *et al.*, 2015; Boselli and Pellizzari, 2016).

In this paper, we report the first European record and the establishment of the string cottony scale *Takahashia japonica* Cockerell in Northern Italy.

Information on *T. japonica* is scarce. This oriental species was described from Japan (Tokyo) on *Morus* sp. It is presently recorded also in China (Hunan, Shanxi) and South Korea; the known host plants are broad-leaved trees and shrubs of the Betulaceae (*Alnus japonica* (Thunb.) Steud.), Ebenaceae (*Diospyros kaki* L.f.), Fabaceae (*Lespedeza* sp., *Sophora japonica* L.), Juglandaceae (*Juglans regia* L.), Magnoliaceae (*Magnolia obovata* Thunb.), Moraceae (*Morus* sp., *M. alba* L.), Rosaceae (*Cydonia oblonga* Mill., *Prunus cerasifera* Ehrh. v. *atropurpurea*, *P. salicina* Lindl.), Rutaceae (*Citrus* sp.), Salicaceae (*Salix chaenomeloides* Kimura), Ulmaceae (*Celtis sinensis* Pers., *Zelkova serrata* (Thunb.) Mak.) and Vitaceae (*Parthenocissus tricuspidata* (Siebold et Zucc.) Planch) (Shiraka, 1952; Tang, 1991; Xie *et al.*, 2006; García *et al.*, 2017).

Figure 1. Eggsacs of *T. japonica* on the trunk of *L. styraciflua* (photo D. Sacchetti).

Methods

In order to collect the different instars of the scale, ascertain its life cycle and the overwintering stage, some infested trees in Cerro Maggiore, Rescaldina and Legnano (Milano province) were regularly monitored from the beginning of July to October 2017. Further investigations were carried out from May onwards in parks, parking lots, and along tree-lined streets located around the first recorded infestation site to detect other possible infested places. The specimens were preserved in 70% alcohol and then stained and mounted according to the protocol described by Ben-Dov and Hodgson (1997).

T. japonica slide mounted adult females and nymphs are deposited in the Scale Insect Collection, Scientific Museum of the University of Padova (Italy), DAFNAE Department. Slide numbers: 1897/1-17; 1898/1-3; 1906/1-5.

Results

In May 2017, an outbreak of an unknown soft scale species was first observed on the trunk and branches of *Morus nigra* L. trees growing in the communal park located in Cerro Maggiore (Milano province). The infestation became apparent when the females secreted their long, white, waxy eggsacs which were seen on the trunk and hanging from the small tree branches (figure 1).

Figure 2. Empty eggsacs of *T. japonica* hanging from a branch during winter (photo E. Rossi).

Figure 3. Nymphs of *T. japonica* on the leaf lower surface of *M. nigra* (photo D. Sacchetti).

According to the redescription and drawings by De Lotto (1968) and Hodgson (1994), the soft scale was identified as *Takahashia japonica* Cockerell, an Asiatic species not yet recorded in Europe. The presence of scale-infested trees was ascertained in a wider area including the following municipalities: Cerro Maggiore, Legnano, Rescaldina, San Giorgio su Legnano, and Canegrate (Milano province), Castellanza and Busto Arsizio (Varese province) and covering an area of about 42 square kilometers. Additional recent records come from Saronno (Varese province) and Monza (Monza e Brianza province).

T. japonica was collected on the following host plants: *Acer pseudoplatanus* L. (Aceraceae), *Albizia julibrissin* Durrazz (Fabaceae), *Carpinus betulus* L. (Betulaceae), *Celtis australis* L. (Ulmaceae), *Liquidambar styraciflua* L. (Altingiaceae) and *Morus nigra* L. (Moraceae). Of these, the first four plants are the new hosts of *T. japonica*. In several cases, the infestation was very high, with branches and twigs covered by eggsacs (figure 2).

According to the first biological observations, in June, after egg-hatching, the crawlers move from branches and trunks to the leaf lower surface and settle along the veins (figure 3). In October, the nymphs move back from the leaves to the branches, where they overwinter.

The wide distribution of the species in the territory and the present high level of infestation indicate that *T. japonica* was very probably introduced some years before its detection, probably with new tree plantings. Further investigation should clarify the phenology of this species, the female fecundity, the presence of males, predators and parasitoids, including the impact of *Harmonia axyridis* (Pallas) on this newly established scale insect.

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