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# Main insect vectors of *Xylella fastidiosa* in Italy and worldwide

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*Xylella fastidiosa* (Wells *et al.*, 1987) is a xylem-limited pathogenic bacterium, originating in America, that xylem sap-sucking insect vectors transmit. The bacterium infects more than 300 plant species belonging to 63 plant families (EFSA, 2015) causing different plant diseases, the most important being Pierce's disease of grapevine and citrus variegated chlorosis (Chang *et al.*, 1993). All *X. fastidiosa* insect vectors belong to Auchenorrhyncha (Hemiptera) and are distributed within the superfamilies Cercopoidea (spittlebugs and froghoppers), Cicadoidea (cicadas) and Membracoidea (Cicadellidae: Cicadellini). The insect vector acquires the bacterium as it feeds on infected plants and transmits it while feeding on another host plant. Transmission does not show a latent period, and it is neither transovarial nor transstadial. Once the bacterium is acquired, adult vectors can transmit it during their lifetime since *X. fastidiosa* can multiply and persist into their foregut (Almeida *et al.*, 2005). In Nearctic and Neotropical regions, there are many plant diseases caused by different *X. fastidiosa* genotypes. In the same areas, there are abundant xylem-sap feeding leafhoppers belonging to the subfamily Cicadellinae, which includes the main known vectors of *X. fastidiosa*. These insects are commonly named sharpshooters. In total, 39 species of Cicadellinae and 5 spittlebugs (Aphrophoridae) are vectors of *X. fastidiosa* in American region (Redak *et al.*, 2004). The transmission of *X. fastidiosa* is not specific, and all xylem sap-sucking insects are considered potential vectors. Furthermore, transmission efficiency varies depending on insect vector species, *X. fastidiosa* genotype and host plant (Redak *et al.*, 2004). The most important sharpshooter vectors of the bacterium in North America are *Graphocephala atropunctata* (Signoret) and *Homalodisca vitripennis* (Germar). They are responsible for the spread of Pierce's disease of grapevines. Whereas in South America the main vectors are: *Bucephalagonia xanthophis* (Berg), *Dilobopterus costalimai* Young, *Acrogonia citrina* (Marucci and Cavichioli) and *Oncomeopia facialis* (Signoret), *Macugonalia leucomelas* (Walker), all known vectors of citrus variegated chlorosis on citrus (Almeida *et al.*, 2005).

Recently, Saponari *et al.* (2013) and Cariddi *et al.* (2014) detected, isolated and confirmed the presence of *X. fastidiosa* in olive trees, oleander and almond in south-eastern Italy as the first record in the European Union. Pathogenetic tests confirmed the bacterium responsibility for a new disease: the olive quick decline syndrome (OQDS or CoDiRO) (Saponari *et al.*, 2016). The syndrome begins with severe leaf scorch and scattered twigs desiccation of the upper part of the canopy. Later, the symptoms expand on the plant until the host death (Martelli *et al.*, 2016). The disease is lethal, and knowledge of the candidate and actual *X. fastidiosa* vectors are crucial for a correct risk assessment of this threat. The xylem sap-sucking insect species present in Europe are seven sharpshooters (Cicadellidae, Cicadellinae), twenty-six spittlebugs (Aphrophoridae), seven Cercopidae, fifty-four cicadas (Cicadidae and Tibicinidae) (EFSA, 2013; Bosco, 2014). Of these, only two species were considered potential vectors of the bacterium in Europe, *Philaenus spumarius* (L.) and *Cicadella viridis* (L.) (Janse & Obradovic, 2010). Surveys over the infected or diseased olive groves found three homopteran species positive to *X. fastidiosa*. Namely, two species belonging to Aphrophoridae: *P. spumarius* and *Neophilaenus campestris* Fallén and one species of Cicadellidae: *Euscelis lineolatus* Brullé (Elbeaino *et al.*, 2014; Ben Moussa *et al.*, 2016). Transmission tests with insects collected in infected olive groves showed the ability of *P. spumarius* to acquire and transmit the bacterium among olive trees and other host plants

(Saponari *et al.*, 2014; Cornara *et al.*, 2016; Cornara *et al.*, 2017). By the time, *P. spumarius* is the only vector of *X. fastidiosa* in Europe. On-going studies will help understand the role of other candidate xylem-sap feeders vector species in the spread of the pathogenic bacterium.

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