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Detection of *Aedes koreicus* and *Aedes japonicus japonicus* in Emilia-Romagna (2025)

Background

Aedes koreicus and *Aedes japonicus japonicus* are two invasive mosquito species that have recently spread to several European countries, including Italy, where they were detected in various northern regions such as Trentino Alto Adige, Veneto, Lombardy, Piedmont, and Liguria. *Ae. koreicus* and *Ae. japonicus* coexist in parts of their original habitat, particularly in regions of East Asia. They share similar larval habitats, such as artificial containers, tree holes, and rock pools, especially in temperate and mountainous regions. Since the first reports in 2011 and 2015 their expansion has been very rapid.

Materials and methods

Sampling was conducted between April and September 2025 in mountainous and hilly areas of the western provinces of Emilia-Romagna (Piacenza, Parma, and Reggio Emilia). The territorial composition of the region is approximately 48% flat areas, 27% hills, and 25% mountains. A total of 49 sampling sites were selected across 34 municipalities: 23 in the province of Piacenza, 5 in Parma, and 6 in Reggio Emilia (ranging from 80 to 900 m a.s.l.). Direct sampling of larvae and pupae was performed in water-holding containers of various types and sizes, including plant saucers, barrels, and catch basins, located in both rural and urban environments. Morphological identification was carried out using dichotomous keys described by Becker et al. [1] and Tanaka et al. [2]. Molecular confirmation was subsequently performed through sequencing of the mitochondrial cytochrome c oxidase subunit I (COI or COXI) gene.

Results

Aedes koreicus and *Aedes japonicus* larvae and adults were detected and subsequently identified by morphological analysis. Molecular analysis of the mitochondrial COI gene confirmed all morphological identifications.

Ae. koreicus (Fig. 1) was recorded in the province of Piacenza in four municipalities and in the province of Reggio Emilia in a single municipality. *Ae. japonicus* (Fig. 2) was detected in a wider area, occurring in eleven municipalities within the province of Piacenza and in one municipality in the province of Parma (Fig. 4). Co-occurrence of *Ae. koreicus* and *Ae. japonicus* was observed at four sampling sites. Species cohabitation, defined as the simultaneous detection of two or more mosquito species within the same sampling event, was recorded in nearly all collections. This phenomenon was particularly frequent for *Ae. japonicus*, which was often found in association with *Culex hortensis* (Fig. 3).



Fig.1: *Ae. koreicus* adult female



Fig.2: *Ae. japonicus* adult female

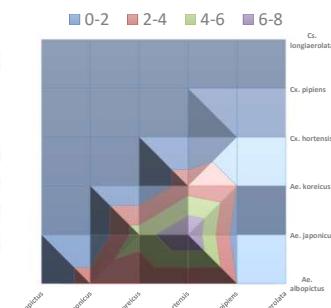


Fig.3: Co-occurrence of sampled mosquito

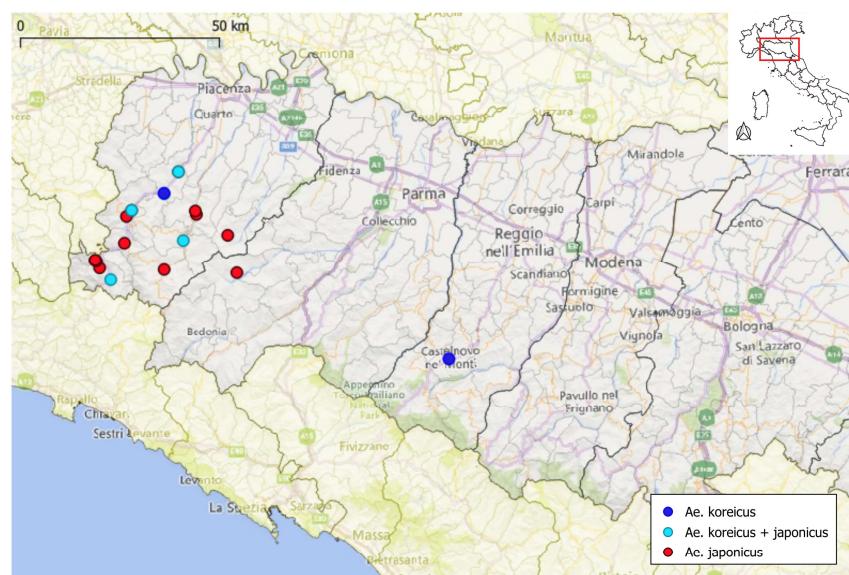


Fig.4: Positive sites for *Aedes japonicus* and *Aedes koreicus*

Discussion and conclusions

The distribution range of *Aedes koreicus* and *Aedes japonicus* is rapidly expanding from Alpine areas towards the Apennines, where these species appear to be exploiting previously unoccupied and easily colonisable ecological niches. The co-occurrence of these invasive mosquitoes with other native and invasive species has also been reported in several other Italian regions [3–5].

Large portions of the Italian territory, particularly hilly and low-mountain areas, provide suitable environmental conditions for the establishment of *Ae. koreicus* and *Ae. japonicus*. In this context, the observed expansion into Apennine areas is of particular concern, as it indicates a progressive adaptation to a wide range of climatic and ecological conditions.

Continuous and intensive entomological surveillance is therefore essential to monitor the further spread of *Ae. koreicus* and *Ae. japonicus* and to assess their potential role in pathogen transmission and public health risk.