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From ecology to outbreaks: Integrating knowledge for effective vector management in Europe

Update on Surveillance Activities for the Invasive Mosquito Species *Aedes japonicus* and *Aedes koreicus* in the Emilia-Romagna Region

Annalisa Grisendi[1], Danilo Sgura[1], Mara Scremin[1], Mattia Calzolari[1], Rodolfo Veronesi[2], Arianna Puggioli[2], Mario Marinozzi[2], Paola Angelini[3], Michele Dottori[1], Giuseppe Merialdi[1]

1. Istituto Zooprofilattico della Lombardia e dell'Emilia-Romagna; 2. Centro Agricoltura Ambiente "G. Nicoli" Crevalcore

annalisa.grisendi@izsler.it

Introduction

Aedes koreicus and *Aedes japonicus* are invasive mosquito species native to East Asia that are well adapted to cooler climates; in Italy these mosquitoes are mainly distributed in hilly and pre-Alpine areas of northern Italy. *Ae. koreicus*, first detected in Italy in 2011, has progressively expanded throughout several northern regions and is commonly found in peri-urban environments and artificial breeding sites, whereas *Ae. japonicus* also inhabits forested environments. Both species share similar thermal requirements for larval development, with temperature and larval density playing key roles in shaping their development, survival, and distribution. Although *Ae. koreicus* and *Ae. japonicus* are currently considered less relevant to public health than *Ae. albopictus*, laboratory studies have demonstrated their potential competence for several arboviruses and other pathogens. However, field evidence supporting their role in pathogen transmission remains limited.

Objectives

Update the current distribution of the invasive *Aedes koreicus* e *Aedes japonicus* in Emilia-Romagna (Italy).



Fig.1: Aedes japonicus



Fig.2: Aedes koreicus

Methodology

Sampling was conducted between April 2025 and September 2026 in the hilly and mountainous areas of the western Emilia-Romagna provinces (Piacenza, Parma, Reggio Emilia and Modena). The study area is characterized by a heterogeneous landscape and a climate that varies with altitude, ranging from temperate continental conditions in the hills to cooler mountain climates at higher elevations. The surveillance was carried out by sampling mosquito larvae from water-holding containers in at least one site per municipality. Collected larvae were transported to the laboratory, reared under controlled climatic conditions, and subsequently identified using morphological keys.



Identification of breeding sites | Sampling | Rearing | Morphological identification

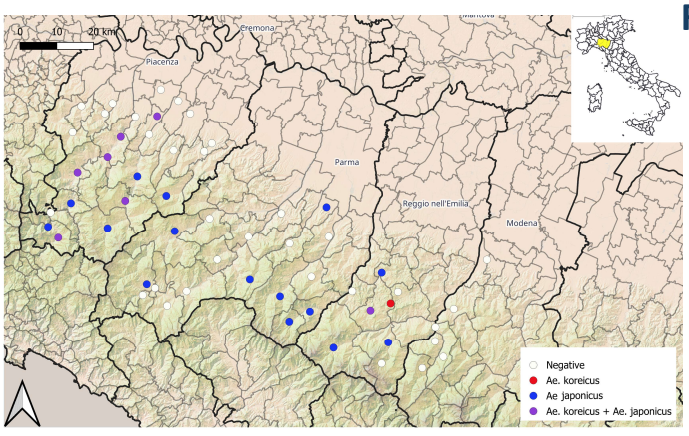


Fig.3: Map of Invasive Mosquitoes distribution

Results

843 mosquitoes were collected, comprising 308 *Aedes japonicus* (Fig.1) and 75 *Aedes koreicus* (Fig.2). These mosquitoes were found at an elevation range of 159 to 906 meters. The highest infestation levels were recorded in the western provinces of Emilia-Romagna, particularly in Piacenza, where 41% of surveyed municipalities tested positive for at least one of the two invasive species. The proportion of positive municipalities progressively declined eastward, decreasing to 39% in Parma, 22% in Reggio Emilia, and no detections in Modena (Fig.3).

This spatial gradient suggests a west-to-east expansion pattern, possibly originating from neighboring Liguria and subsequently spreading into adjacent provinces. The concentration of positive sites in western areas may reflect both geographic proximity to previously colonized territories and the presence of environmental conditions favorable to the establishment of these species.

Discussion and Conclusion

The distribution of *Aedes japonicus* and *Aedes koreicus* in Emilia-Romagna reveals an ongoing west-to-east expansion process, likely driven by a combination of passive dispersal through transportation networks, proximity to previously colonized areas, and favorable environmental conditions. Although the current findings may underestimate the true distribution because of uneven sampling effort, continued surveillance is essential to monitor the spread of these invasive species and assess their potential public health implications.