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

Italian network for invasive mosquito surveillance and control at Points of Entry (PoEs): preliminary results from the Province of Trento (Italy)

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Introduction

The global expansion of arthropod vectors and vector-borne pathogens poses a severe public health threat. Based on WHO guidelines, member states must implement standardized entomological surveillance at Points of Entry (PoEs; i.e., designated geographic locations where vectors can cross a legal border via international trade or travel) to facilitate early detection of invasive alien species (IAS) and their transmitted pathogens. Given the endemic circulation of West Nile virus and autochthonous outbreaks of dengue and chikungunya in Italy, a national integrated surveillance initiative was launched in 2025 by the Experimental Zooprophylactic Institutes (IIZZSS) and the Fondazione Edmund Mach.





Objectives

- ✓ This project standardizes mosquito surveillance across 117 PoEs in Italy, including ports, airports, service stations, and logistics hubs.
- ✓ This study summarise the preliminary results obtained to date from the Province of Trento, located in the Italian Alps.

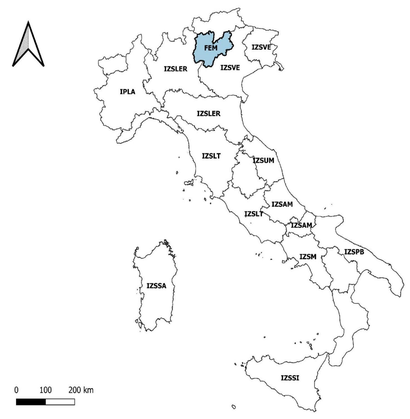

Figure 1. Maps of the Italian regions where sampling is carried out and partner Institutions

Methodology

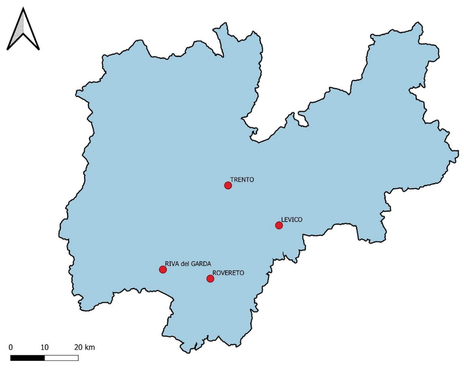

Figure 2. Maps of the PoE's monitored in the Province of Trento

Since 2025, entomological sampling was conducted biweekly from June to October across four selected PoEs in the Province of Trento. Each location was monitored using one BG-Sentinel trap and three ovitraps. Collected eggs and adult mosquitoes were identified to the species level via morphological analyses. Adult specimens collected in 2025 were subsequently screened for *Orthoflavivirus* detection, by reverse transcriptase real-time PCR.



Results

Mosquitoes sampling carried out in 2025 and 2026 yielded 8.877 specimens comprising five species: *Aedes albopictus* (n = 7.928), *Culex pipiens* (n = 925), *Aedes koreicus* (n = 14), *Anopheles plumbeus* (n = 2), and *Culex hortensis* (n = 5).

All adult female mosquitoes collected in 2025 were screened and were all negative for *Orthoflavivirus* occurrence.

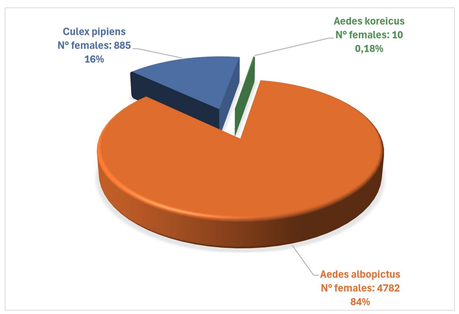

Figure 3. Proportion of Ae.albopictus, Ae.koreicus and Cx pipiens females collected in PoE's of the Province of Trento in 2025 and 2026



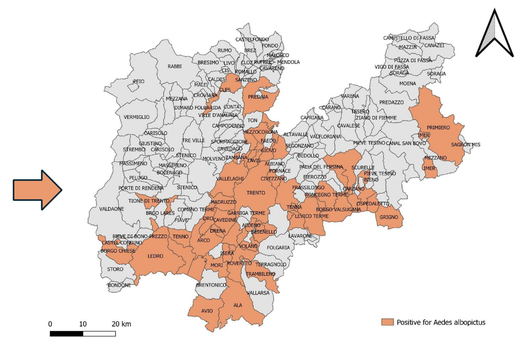

Figure 6. Current distribution of *Aedes albopictus* in the Province of Trento

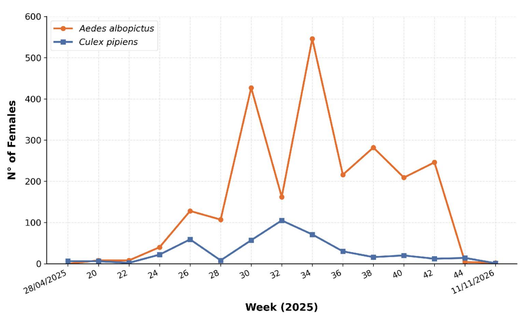

Figure 4. Seasonal variation in *Ae albopictus* and *Cx pipiens* adult females collected in 2025

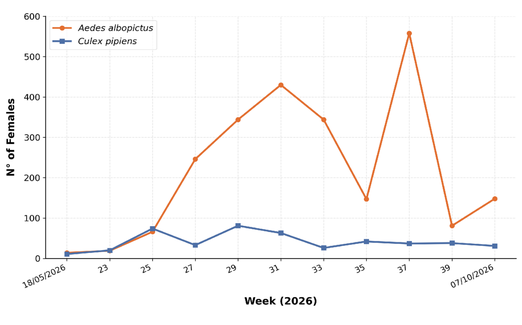

Figure 5. Seasonal variation in *Ae albopictus* and *Cx pipiens* adult females collected in 2026



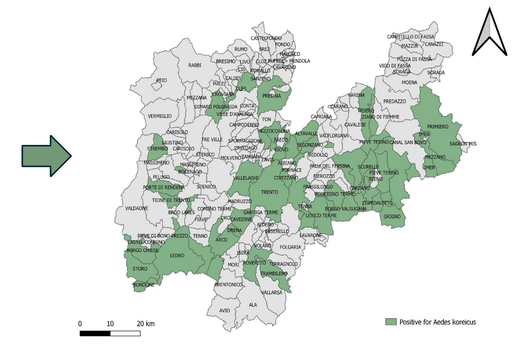

Figure 7. Current distribution of *Aedes koreicus* in the Province of Trento

Discussion

Located on Italy's northern border, Trento Province is a key monitoring area for invasive alien mosquito species. High influxes of domestic and international tourists, combined with heavy commercial road traffic, present significant pathways for vector introduction and dispersal. Additionally, the region's climatic gradient, from sub-Mediterranean to continental in the inner valleys, creates favorable environmental conditions for *Aedes* vector establishment, as confirmed by continuous range expansions documented for *Ae. albopictus*, *Ae. koreicus*, and recently also for *Ae. japonicus* in this province. The higher abundace of *Ae. albopictus* sampled across PoEs in Trentino reflects the relative proportion of this species compared to the other species recorded in the region.

Conclusions

These findings provide critical information on the importance of PoEs for mosquitoes and pathogens surveillance other than providing new spatio-temporal ecological and epidemiological data essential for the development of risk models at various spatial scales.

Acknowledgements

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