

WEST NILE AND USUTU VIRUSES: A NEW CHALLENGE FOR A ONE-HEALTH APPROACH DURING 4-YEAR SURVEILLANCE IN NORTH-WEST ITALY

Nogarol C.¹, Martelli W.², Accorsi A.³, Robetto S.⁴, Possidente R.², Mandola M.L.¹

¹Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta – SS Virologia Specialistica; ²Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta – SS Epidemiologia Sanità Animale; ³Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta – SC Liguria; ⁴Istituto Zooprofilattico Sperimentale del Piemonte, Liguria e Valle d'Aosta – SC Valle d'Aosta



INTRODUCTION & AIM

West Nile viruses (WNV) and Usutu virus (USUV) are mosquito-borne Flaviviruses that are now considered significant global health threats, adapting to a variety of ecological settings and spreading across continents. Epidemiological trends have shown a notable expansion in WNV's range, with increases in the incidence and severity of outbreaks, particularly in Europe and North America [1].

Climate change significantly influences vector-borne diseases: warmer temperatures and altered precipitation patterns can expand the geographical range and seasonal activity of mosquitoes, suggesting the potential for year-round transmission in some temperate areas, a shift that poses significant challenges to current control strategies [2,3]. Finally, the risk of virus transmission may also be increased by the arrival of migratory birds, reservoirs for these viruses. In the past 25 years, Italy has experienced numerous incursions of WNV and USUV, becoming the European country with the highest number of cases.

This study aims to present our findings during 4 years of wild bird surveillance (2022–2025) for WNV and USUV viruses in the three regions of North-West Italy (Piemonte, Liguria and Valle d'Aosta).



METHOD

Passive surveillance was conducted on wild birds found dead and through syndromic surveillance of neurological cases in equids.

Active surveillance involved culling wild birds of target species. For equids, blood samples and tissues from both live and dead subjects were analyzed. Viral RNA was extracted and purified and then assayed by RT-PCR to detect WNV Lineage 1 and 2 and USUV. All positive samples were sent to WOA and NRL lab for confirmation.

Table 1. Details of total samples analysed in the four-year surveillance

	2022	2023	2024	2025
Piemonte	717	1014	781	984
Liguria	118	174	143	146
Valle d'Aosta	191	119	71	54

CONCLUSION

Our results show that positive samples are increasingly detected in uncommon periods for these viruses.

Positivity in October and November highlights how warmer winter temperatures can influence WNV circulation levels. It is difficult to assess the impact of changing climate conditions, including alternating periods of drought, heavy rainfall, and consequent flooding, on the epidemiology of WNV and USUV infection. This is especially true when considering the **potential effect on bird migration, the abundance and dynamics of vectors and their replication within vectors.** This underscores the necessity for enhanced monitoring and surveillance programs [4] in a One Health perspective.

RESULTS & DISCUSSION

Across the three regions of competence, Piemonte, Liguria and Valle d'Aosta, the results are summarized in Table 1 and Table 2.

Most of total positive samples belong to species of synanthropic birds and/or target species such as *Corvidae*, *Columbidae*, *Passeridae*, *Ardeidae*, *Accipitridae*.

Table 2. Details of positive samples

	2022	2023	2024	2025
West Nile virus, Lineage 1	-	-	-	1
West Nile virus, Lineage 2	20	24	25	20
Usutu virus	1	5	-	-
co-infected WNVL2-USUV	-	5	-	-



REFERENCES

1. Erazo D, Grant L, Ghisbain G, Marini G, ColonGonzalez FJ, Wint W, et al. Contribution of climate change to the spatial expansion of West Nile virus in Europe. *Nat Commun.* 2024;15(1):1196. doi:10.1038/s41467-024-52036-8
2. de Freitas Costa E, Streng K, de Souza Santos A, et al. The effect of temperature on the boundary conditions of West Nile virus circulation in Europe. *PLoS Negl Trop Dis.* 2024;18(5):e0012162.
3. Shocket MS, Verwillow AB, Numazu MG, Slamani H, Cohen JM, El Moustaid F, Rohr J, Johnson LR, Mordecai EA. Transmission of West Nile and five other temperate mosquito-borne viruses peaks at temperatures between 23°C and 26°C. *Elife.* 2020 Sep 15;9:e58511. doi: 10.7554/eLife.58511. PMID: 32930091; PMCID: PMC7492091.
4. Simonin Y. Circulation of West Nile Virus and Usutu Virus in Europe: Overview and Challenges. *Viruses.* 2024 Apr 12;16(4):599. doi: 10.3390/v16040599. PMID: 38675940; PMCID: PMC11055060.