EVALUATING THE RISK WEST NILE VIRUS INTRODUCTION IN EASTERN PIEDMONT, NORTHERN ITALY

Donal Bisanzio (a,b,e), Luigi Bertolotti (a,b), Mario Giacobini (a,b), Nicoletta Vitale (d), Luca Balbo (c), Gonzalo M. Vazquez-Prokopec (e), Uriel Kitron (e), Andrea Mosca (c)
(a) Dipartimento di Produzioni Animali, Epidemiologia, Ecologia, Facoltà di Medicina Veterinaria, Università degli Studi di Torino, Grugliasco, Torino
(b) Centro di Biotecnologia Molecolare, Università degli Studi, Torino
(c) Istituto per le Piante da Legno e l'Ambiente, IPLA SpA, Casale Monferrato, Alessandria
(d) Istituto Zooprofilattico Sperimentale delPiemonte, Liguria e Valle d'Aosta, Torino
(e) Department of Environmental Studies, Emory University, Atlanta GA, USA

Introduction. In Italy, a first outbreak of West Nile Virus (WNV) in horses was reported in 1998 near the swamps of Padule di Fucecchio, Tuscany. No other cases have been identified in Italy during the following decade until Fall 2008, when four human cases were reported from rural towns near rivers and rice fields in Emilia-Romagna and Veneto. However, there is evidence of continued circulation of the virus in the country between the two outbreaks. The 2008? human cases brought increased attention from public health authorities to the role of migratory birds as long-distance dispersers of WNV and residential mosquitoes as vectors It is therefore important to identify areas where the environmental conditions are conducive for transmission.

Methods. The study area in the Eastern Piedmont around Casale includes many aquatic habitats, both rice fields and rivers, with environmental conditions suitable for both vectors and reservoirs. Mosquitoes were collected in 2000-2006 during spring and summer from 36 CO_2-baited traps distributed 1 km apart in a 6 km2 grid. A total of 546,789 *Ochlerotatus caspius*, 259,585 *Culex pipiens* and 199,515 *Culex modestus* (all potential WNV vectors) was collected. We analysed the spatial distribution of different mosquito species using point-pattern analysis (*Getis-Ord Gi*(d)*). We later incorporated remotely sensed data (Normalized Different Vegetation Index and Land-Surface Temperature) for each sampling location and time in a Generalized Linear Mixed Model (GLMM) model to evaluate the contribution of these risk factors to the potential distribution of WNV vectors in the study area. We evaluated the effectiveness of larvicide-based mosquito control in the study area.

Results. In all years, traps with high catch of *C. pipiens* were clustered in a zone between the river Po and surrounding rice fields, while low catches of *C. pipiens* were clustered on hills. *C. modestus* and *O. caspius* were each clustered only in two of the 7 years. Our GLMM model provided a good fit to the data. Application of anti-larval treatment was negatively correlated only with *O. caspius* abundance.

Conclusion. The abundance of the three potential WNV vector species is the higher in the agricultural area around Casale, consistent with the hypothesis that this area is suitable for the introduction and establishment of WNV in Piedmont. Vegetation cover and temperature were correlated with the abundance of all three potential WNV vectors. These findings can be used to help target and prioritize WNV surveillance and control activities in Piedmont.