

The Crimean-Congo haemorrhagic fever tick vector *Hyalomma marginatum* in south of France: Modelling its distribution and determination of factors influencing its establishment in a newly invaded area

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Abstract

For the first time we built a correlative model for predicting the distribution of *H. marginatum*, one of the main vector of Crimean-Congo Haemorrhagic fever virus (CCHFV), at high resolution in a recently colonized area, namely south of France. Field tick collections were conducted on horses from 2016 to 2021 in 14 French southern departments, which resulted in a first map of *H. marginatum* on the national territory. Such updated presence/absence data, as well as the mean number of *H. marginatum* per examined animal (mean parasitic load) as a proxy of the tick abundance, were correlated to multiple parameters that described the climate and habitats characterizing each collection site, as well as movements of horses as a possible source of tick diffusion and new establishment. Our model highlighted the importance of warm temperatures all along the year, as well as dry conditions during summer and moderate annual humidity for the establishment of *H. marginatum*. A predominance of open natural habitats in the environment was also identified as a supporting factor, in opposition to artificial and humid habitats that were determined as unsuitable. Based on this model, we predicted the current suitable areas for the establishment of the tick *H. marginatum* in South of France, with a relatively good accuracy using internal and external validation methods. Concerning tick abundance, some correlative relationships were similar than in the occurrence model but the type of horse movements were also pointed out as an important factor explaining the mean parasitic load, leading to differential exposure to ticks. The limitations of estimating and modelling *H. marginatum* abundance in a correlative model are discussed.

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[Bah] *Hyalomma marginatum* in France.docx available at <https://authorea.com/users/442378/articles/542665-the-crimean-congo-haemorrhagic-fever-tick-vector-hyalomma-marginatum-in-south-of-france-modelling-its-distribution-and-determination-of-factors-influencing-its-establishment-in-a-newly-invaded-area>