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Publication date:
2016

Document Version
Publisher's PDF, also known as Version of record

Link back to DTU Orbit

Citation (APA):
Cuellar, A. C., Skovgård, H., Nielsen, S. A., Stockmarr, A., Anderson, G., Lindström, A., ... Bødker, R. (2016). Spartial Distribution and Abundance of Culicodes Imicola and Obsoletus Group in Europe. Abstract from 3rd Conference on Neglected Vectors and Vector-Borne Diseases , Zaragoza, Spain.

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SPATIAL DISTRIBUTION AND ABUNDANCE OF *CULICOIDES IMICOLA* AND *OBSOLETUS* GROUP IN EUROPE

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Introduction

Biting midges (Diptera, Ceratopogonidae) of the genus *Culicoides* are important vectors of veterinary important pathogens causing large economic losses in many European countries. *Culicoides imicola* and the *Obsoletus* group are considered to be the main vectors of bluetongue virus in Europe that affects cattle and sheep. Spatial-temporal modelling of the vector distribution

and abundance allows to identify areas under risk of virus transmission and can help to apply effective surveillance and control measurements.

Materials and Methods:

For this purpose, presence-absence and abundance data of *Culicoides* were collated from 1005 sites across 9 countries (Spain, France, Denmark, Poland, Switzerland, Austria, Poland, Sweden, Norway) between the years 2007 and 2013. The dataset included information on the vector species abundance (number of specimens caught per night), GPS coordinates of each trap, start and end dates of trapping. A dataset of 120 environmental variables obtained from a Fourier transformed MODIS temporal series were used with the Random Forest machine learning algorithm in VecMap developed by AviaGIS to predict the overall species distribution and monthly abundance in Europe.

Results:

For every month of the year, maps were generated to visualize the abundance of *C. imicola* and *Obsoletus* group in Europe and a distribution map for each of both showing the probability of occurrence. Although the variance was large, the predicted abundance values for each site had a positive correlation with the observed abundance.

Spatial variation was found in abundance for *C. imicola* and the *Obsoletus* group. For *C. imicola* the highest abundance was foud in Spain as for the *Obsoletus* group the highest abundance was found in eastern France. Temporal variation was also observed with the highest abundance occurring during summer months and the lowest during winter months

Conclusion

We were able to model the spatial distribution in Europe for *C. imicola* and *Obsoletus* group in terms of abundance and suitability. The maps obtained showed a consistent pattern with the reported distribution for *C. imicola* and the *Obsoletus* group. The observed seasonal variation was also consistent with the reported by literature as *Culicoides* population dynamic depends on environmental factors such as temperature and rainfall. The outputs obtained here can be used as inputs for epidemiological models and can be helpful for determining areas under risk of transmission.