Abstract

Habitat conditions and distribution modeling of the invasive grass *Anthoxanthum aristatum* Boiss. in the area of the Nowotomyski Sander

Katarzyna Byczkowska-Gazi

Understanding the process of biological invasion is essential for taking action to protect against excessive spread of the species. One of them is the *A. aristatum* Boiss., native to the Atlantic-Mediterranean areas of Europe and north-west Africa and spreading throughout Europe on an increasingly large scale. This species shows genetic variability allowing it to adapt to other habitats, which, combined with its mass invasion into Poland, causes an increasing threat to crops. The aim of this study was to examine the habitat preferences and the probability of invasion of the *A. aristatum* Boiss. using both conventional methods of habitat studies and using predictive modeling of species distribution based on the maximum entropy theory. Data on the presence of the species together with layers of environmental variables based on multispectral satellite images were used for modeling. The study area was marked by the boundaries of two elementary catchments: Szarka from Jastrzębski Rów to the mouth and Rów Grabarski with an area of 132 km^2, where areas of mainly pine forests and not very fertile fields extend. The area was divided into basic fields with dimensions of 500 x 500 m. During 4 years (2016-2019) of field work, 323 basic fields were examined, where information on 233 locations of the *A. aristatum* was collected from 759 examined locations. 203 soil samples were also collected and pH and N, P, K and C content were examined. This study showed that in the area of the Sandr Nowotomyski, *A. aristaum* sites occur mainly on oligotrophic soils. Moreover, it was found that on the basis of available spectral data from Sentinel 2 satellite images, it is possible to determine with high accuracy the preferences and suitability of the habitat for *A. aristatum* in the selected area. The most important spectral channels for the model output were also determined: channels B02 (blue, spectral range 458–523 nm), B04 (red, 650–680 nm) and B11 (SWIR-Short Wave InfraRed, 1565–1655 nm), which have the greatest impact on its effectiveness and efficiency. It was found that the most effective models for *A. aristatum* are obtained using spectral data from the spring period. The modeling results indicate that in the secondary range area, the expansion of *A. aristatum* is also possible beyond oligotrophic segetal habitats. It should be emphasized that these are the first studies on the invasion of this species using the selected model and at a landscape scale.

Katarzyna Byczkowska-Gazi