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Wetlands are already affected by climate change in many parts of Europe. But conservation and restoration of wetlands are effective means for ecosystem based mitigation and adaptation while providing a range of co-benefits to society.

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Impacts of temperature and land use intensity on the floristic species diversity in grain field areas of Europe

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About 107 million hectares of the land area in Europe are arable land, representing 25.3% of the total land area. Over the course of the last ten thousand years arable land use has spread from areas in the East-Mediterranean across nearly the whole of Europe. Owing to this long history, agriculture creates a major habitat, and is of high significance, for biodiversity. This study analyses the impact of different climate conditions in the grain-growing regions of Europe, North Africa and Asia Minor (Fig. 1) on the floristic species diversity ('weeds'; labeled as 'segetal flora' in ecological terms) on arable land in relation to the land use intensity. Input data for the segetal flora modelling are datasets for climatic temperature downscaled with the regional climate model REMO forced by ERA-interim data (Jacob et al. 2007) and for the floristic data from European field investigations (Hoffmann et al. 2002, Glemnitz et al. 2006). The floristic data is based on several years of field studies on the segetal flora on arable fields in agricultural areas in Europe located within the climate range between 3.5 to 16.4°C. During the floristic field studies, the variants fallow fields, extensive (ecological) fields and intensive fields (with application of herbicides) were recorded separately. The results show that the floristic diversity in grain fields is essentially determined by the climate (Fig. 2, left), but currently more influenced by the kind and intensity of land use (Hoffmann et al. 2012). Exclusively intensive agricultural use leads to a strong reduction and simultaneously uniformity of floristic biodiversity in all of the grain-growing areas (Fig. 2, right). On the other hand, extensive (ecological) land use as well as parts of fallow fields are playing a substantial role for the conservation of species diversity (Hoffmann et al. 2013). If these types of land uses will not be recognized and integrated in a biodiversity preservation concept, Europe will loose a large part of its floristic species diversity in the agrar regions.

Figure 1: Modeled spatial distribution of the grain-growing regions differentiated into areas with similar temperature conditions within the range of 2°C to 19°C in Europe, North Africa and Asia Minor.
Figure 2: Modeled spatial distribution of the floristic species diversity in grain field areas of Europe, left: all forms of land use, right: only areas with intensive land use (application of herbicides) in Europe, North Africa and Asia Minor.

References:


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