Assessing mowing intensity: A new index incorporating frequency, type of machinery, and technique

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Background

Agricultural grasslands have undergone rapid change in recent years: Only a few decades ago, colorful, small-scale, heterogeneous, species-rich hay meadows or extensive pastures were common, and have often been replaced by species-poor, uniform, large-scale, multi-cut meadows. Technological advances and agricultural efficiency have increased at the expense of high levels of biodiversity in grasslands.

Methods

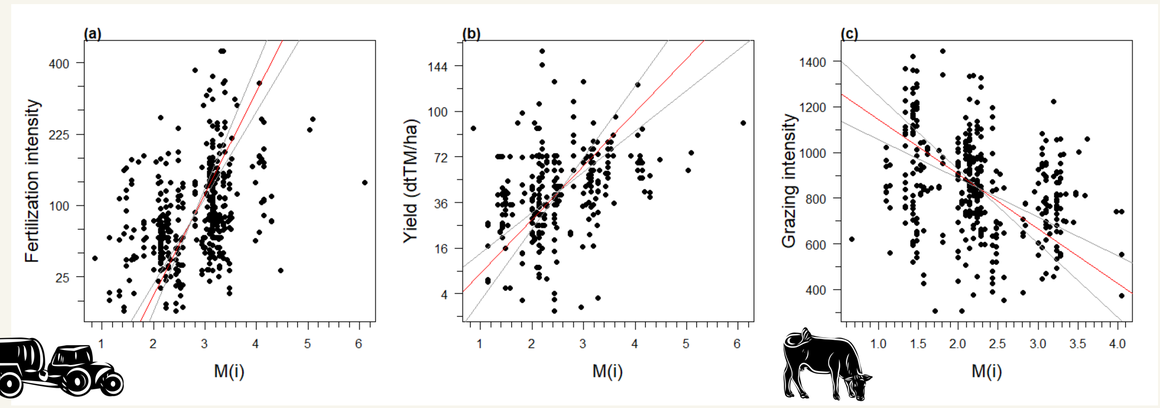
Within the Biodiversity Exploratories 150 grasslands plots in three regions in Germany (Schwäbische Alb, Hainich and Schorfheide-Chorin) were investigated. We provide an overview on mowing practices since 2006 and propose a new compound index for estimating the site-specific mowing intensity, in order to facilitate assessments of the impact of mowing intensity on biodiversity and ecosystem processes.

Aim

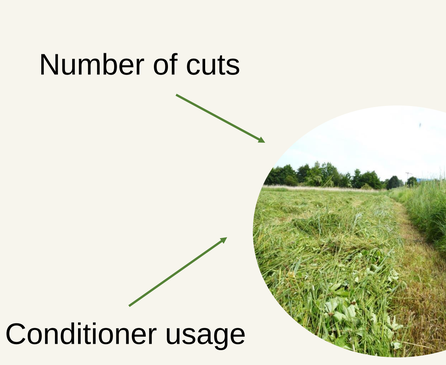
We want to present a mowing intensity index and its applications for calculating biodiversity impacts. This could be used as a measure to offer subsidies to farmers for using environmentally friendly mowing practices.

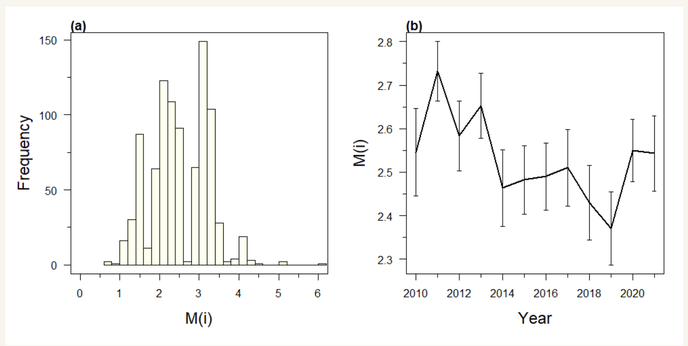
Results

Based on published studies, potential impacts of different mowing techniques on grassland species were considered. The mowing intensity index takes into account information on the farmer's mowing practices, such as mowing machine, mowing height, conditioner use, and as a base number of cuts per year. We found increased mowing intensity associated with higher fertilizer use and decreased mowing intensity associated with higher grazing intensity.



Fertilization intensity, yield, and grazing intensity correlated with the mowing intensity index

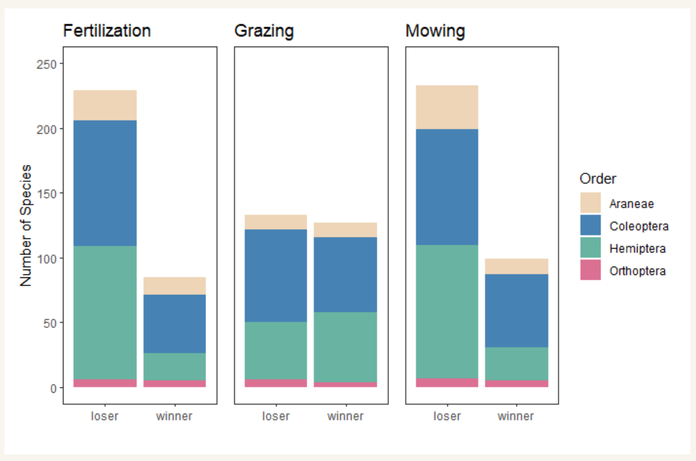




Distribution of the occurring values and the trends (with SE) over the years

Applications

In recent decades, grassland arthropods in particular have been confronted with more intensive land use and associated changes in conditions. Many species have been unable to cope, and a sharp decline in species richness and abundance has been observed. However, some species were found to be able to cope well with these conditions. In total, we analyzed 1352 species from four arthropod orders (Araneae, Coleoptera, Hemiptera and Orthoptera) to determine whether they emerged as winners or losers with the applied mowing intensity from 2008 to 2018.



Winners and losers of four arthropod orders with their management

The Project

The BioDivKultur project is being carried out as part of the FEdA “BMBF Research Initiative for the Conservation of Biological Diversity" on the topic of "Valuing and Safeguarding Biological Diversity in Politics, Business and Society". *BioDivKultur* stands for “Biodiversity Cultures in Urban and Rural Areas“. Here, biologists, linguists, philosophers and political scientists are working closely with practical partners. In this context, habitats for insects are to be studied and created.

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Publication: Hartlieb, Margarita, et al. "Assessing mowing intensity: A new index incorporating frequency, type of machinery, and technique." Grassland Research 3.3 (2024): 264-274.

Illustrations: Johanna Berger

GEFÖRDERT VOM

BMBF-Forschungsinitiative zum Erhalt der Artenvielfalt

Bundesministerium für Bildung und Forschung