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# Diversity of grassland habitat islands: habitat and landscape filters of plant establishment in agricultural landscapes

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## Abstract

Landscape and habitat filters are major drivers of biodiversity on small terrestrial habitat islands by influencing species dispersal and extinction events. In our study we aimed to assess the effects of landscape and habitat filters on the species richness, abundance and trait composition of grassland specialist and generalist plants in small grassland islands embedded in agricultural landscapes. We studied traits related to functional spatial connectivity (dispersal ability by wind and animals) and temporal connectivity (clonality and seed bank persistence). We sampled herbaceous plants, landscape (local and regional isolation) and habitat filters (inclination, woody encroachment and disturbance) in 82 grassland islands in Hungary. The studied grassland islands were preserved by ancient burial mounds, which being sacred natural sites of the steppe region, can provide refuge for grassland habitats even in intensively used landscapes. We used model selection (Akaike's Information Criterion) and fitted GLMs for all possible combinations of the studied explanatory variables to assess the effect of the landscape and habitat filters on the species richness and the percentage cover of the studied functional groups. We found that isolation decreased the abundance of good disperser specialist plants due to the lack of directional vectors transferring seeds between suitable habitat patches. Clonality was proven to be an effective strategy, but persistent seed bank did not support the survival of specialist plants in isolated habitats. Generalist plants were unaffected by landscape filters due to their wide habitat breadth and high propagule availability. Clonal specialist plants could cope well with the increasing woody encroachment due to their high resistance against environmental changes; however, they could not cope with intensive disturbance. Steep slopes providing environmental heterogeneity had an overall positive effect on species richness. Specialist plants were influenced by the interplay of landscape filters influencing their abundance and habitat filters affecting species richness. Landscape filtering by isolation influenced the abundance of specialist plants by regulating seed dispersal. Habitat filters sorted species that could establish and persist at a site by influencing microsite availability and quality.

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