Seed banks of Central-European grasslands (overview)

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Introduction

Soil seed bank is formed by seeds which reach the soil surface after the maturation and dispersal. These viable seeds can germinate almost immediately and begin the next vegetative cycle or can remain in dormant state and germinate months or years later, forming persistent seed banks. Grasslands are biodiversity hotspots in Central-Europe but their species richness is declining due to different human activities. Studies on grasslands’ seed bank may help in prediction of grasslands ecosystems response to dynamic landscape-scale changes and help in evaluating degradation and regeneration processes.

Methods

Our aim was to review the seed bank studies conducted between 1990-2015 in Central-European grasslands available online in Thomson’s Web of Science using keywords „seed bank” AND „grassland OR meadow OR field”.

Results

We found 32 studies from: Austria (1), Switzerland (1), Czech Republic (5), Germany (8), Hungary (8) and Poland (9).

Calcareous grasslands (Karlik & Poschlod 2014)

- lowest species richness was detected in youngest and oldest grasslands
- ancient grasslands had high proportion of typical dry grassland species
- no linear relationship was detected between the age of grassland and species number of seed banks
- seeds of rare or endangered species (Kuckia spuri, Neslia paniculata, Phleum nodosum, Silene noctiflora, Stachys annua) were present in the seed bank


- seed bank was dominated by few species
- grazing increased species richness, seed density and similarity with vegetation
- abandonment changed the dominance structure of species in expense of low statured species
- frequent species were annuals and short-lived perennial dicots
- few graminoids built up dense seed bank
- annuals had higher seed density in closed patches
- grasses preferred vegetative spreading

Alkali grasslands (Valkó et al. 2014)

- more species were present in seed bank than in vegetation
- small-scale elevation changes results changes in species composition of grassland
- Juncus compressus dominated the soil seed bank
- lowest seed density was detected in places with highest soil salt content

Loess grasslands (Tóth & Húse 2014)

- low similarity between the seed banks and vegetation
- graminoids and forbs generally build up low-density seed bank
- degradation had positive effect on soil seed bank density and richness

Conclusions

- highest seed density was in fen-meadows (35,304- 94,034 seed / m²), lowest in dry calcareous grassland (2,523-5,457 seed / m²)
- generally low to medium similarity was between seed bank and vegetation (Jaccard: 0.16-0.48 and Sørensen: 0.13-0.76)
- spontaneous recovery is possible if little time passed since disturbance
- seed bank alone had minor role in the restoration
- sensitive species disappeared in the first stages of succession
- spontaneous succession possible if neighbouring areas are in good condition and vontain target species
- human intervention: traditional mowing or grazing, sowing of seed mixtures

References


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