JUSTUS-LIEBIG-UNIVERSITÄT GIESSEN

IFZ Interdisziplinäres Forschungszentrum Giessen Research Centre for BioSystems, Land Use and Nutrition

Restoration of flood meadows on the river Rhine – the importance of seed banks

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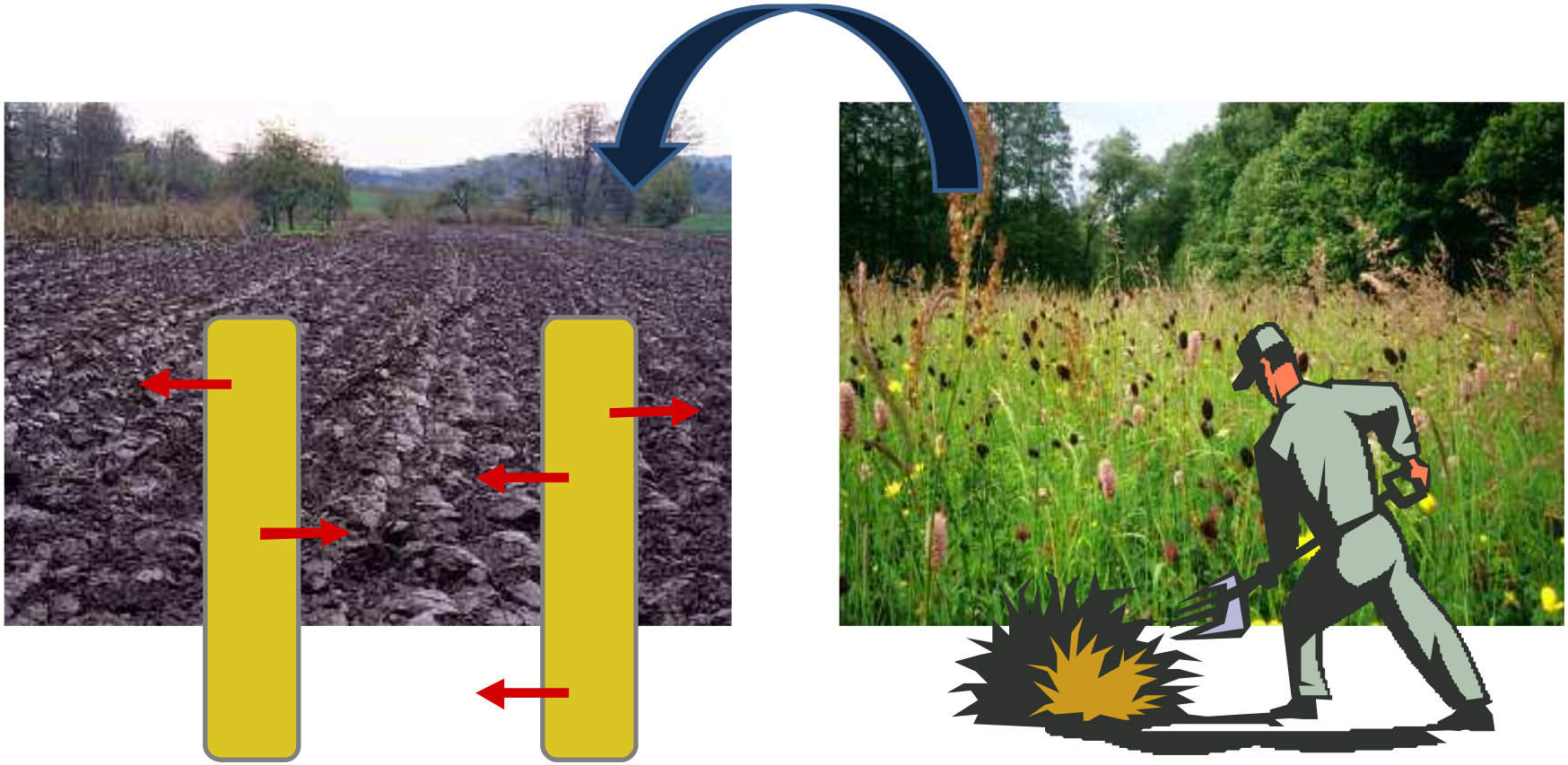
Outline

1. Study site
2. Background
3. Research agenda
4. Summary

Study site

- one of the last strongholds of many rare and endangered species
- agricultural land use predominant
- increase of flooding events, rising hay prices → hayfields more profitable than agriculture

Background



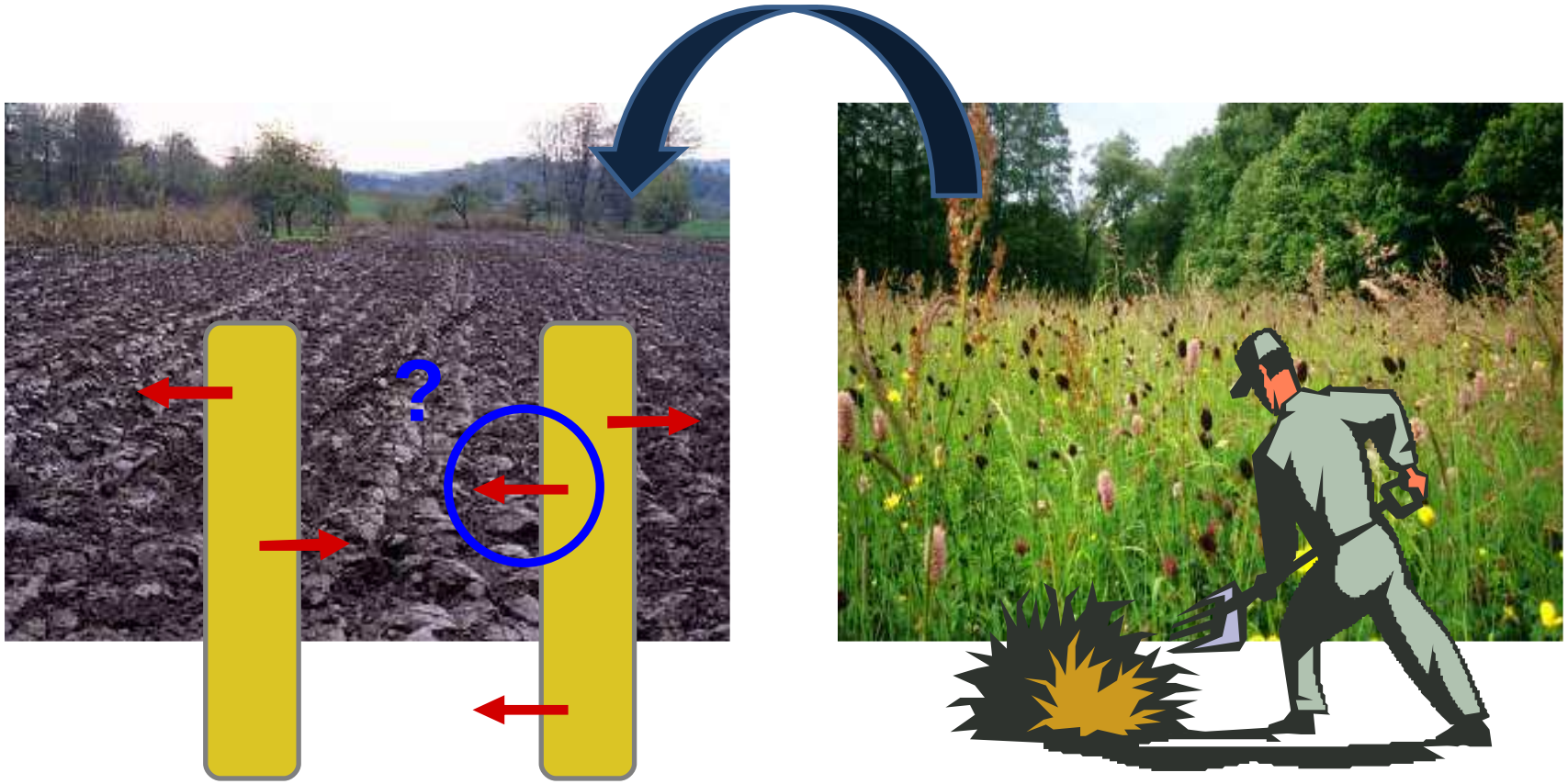
Research agenda

⇨ focus on seed bank formation and dynamics during grassland restoration:

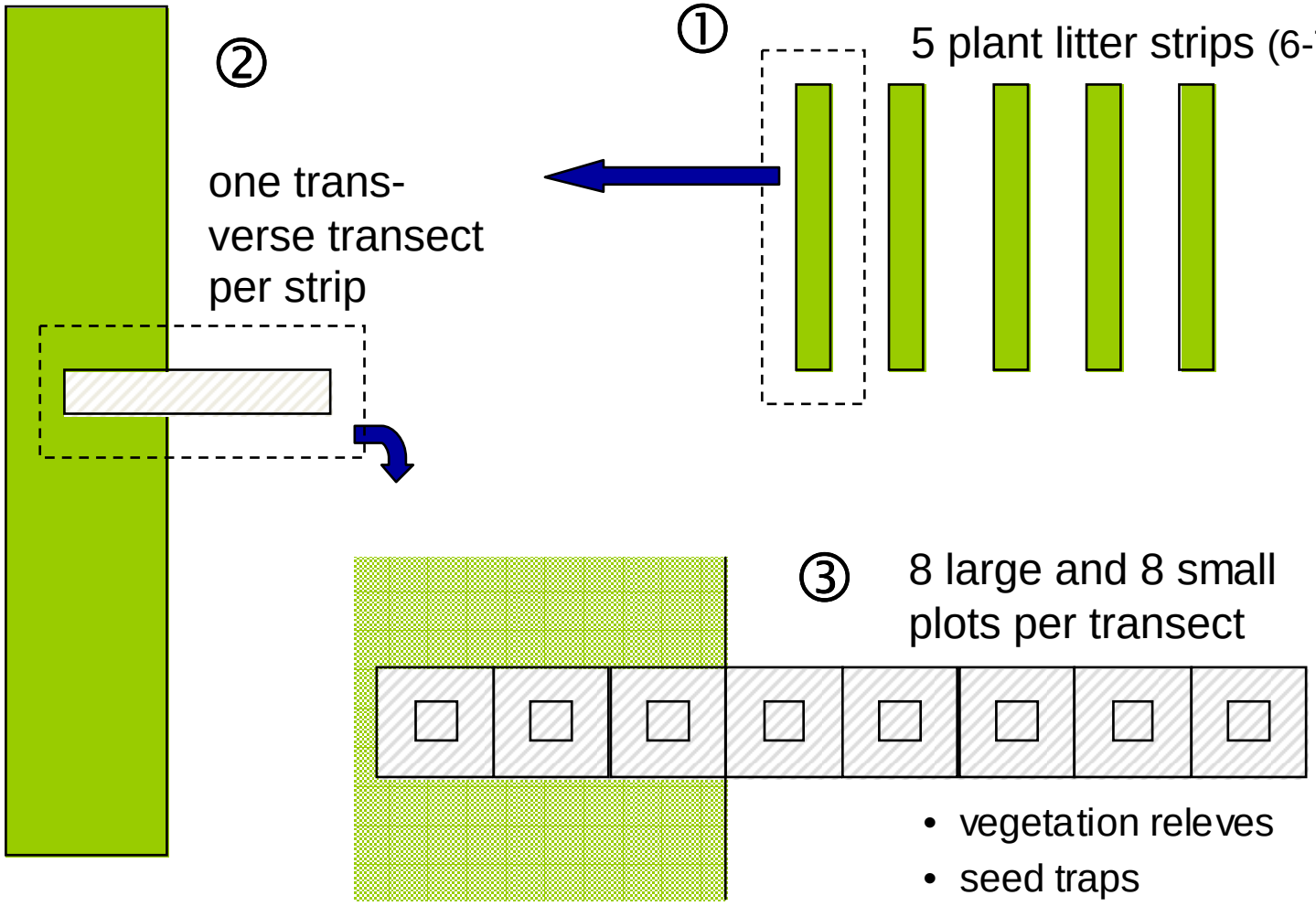
1. **plant litter strips** as source populations for target species
2. **desiccation cracks** as natural seed traps
3. small-scale **seed bank** heterogeneity and seed bank formation

Plant litter strips

Goals:



Plant litter strips



- vegetation releves
- seed traps
- seed bank samples

Desiccation cracks

Background:

- Loamy soils exhibit extensive cracks when they dry out
- Seeds might get trapped in these cracks
- Rising ground water might lead to resurfacing of the seeds

→ **Safe storage sites or death traps?**

Desiccation cracks

Methods:

1. Verification of presumed trap function ✓

document crack patterns on permanent plots	examine seed content via seed bank samples	trace seed dislocation with artificial seeds

↓

2. Analysis of seed fate

2-year-burial experiment in the field using different burial depths	greenhouse experiment analysing germination and emergence of seeds

Seed bank patterns

Goals:

- analyse small-scale seed bank heterogeneity, both vertically and horizontally
- follow seed bank formation after re-introduction via plant material transfer
- understand the patterns underlying these processes

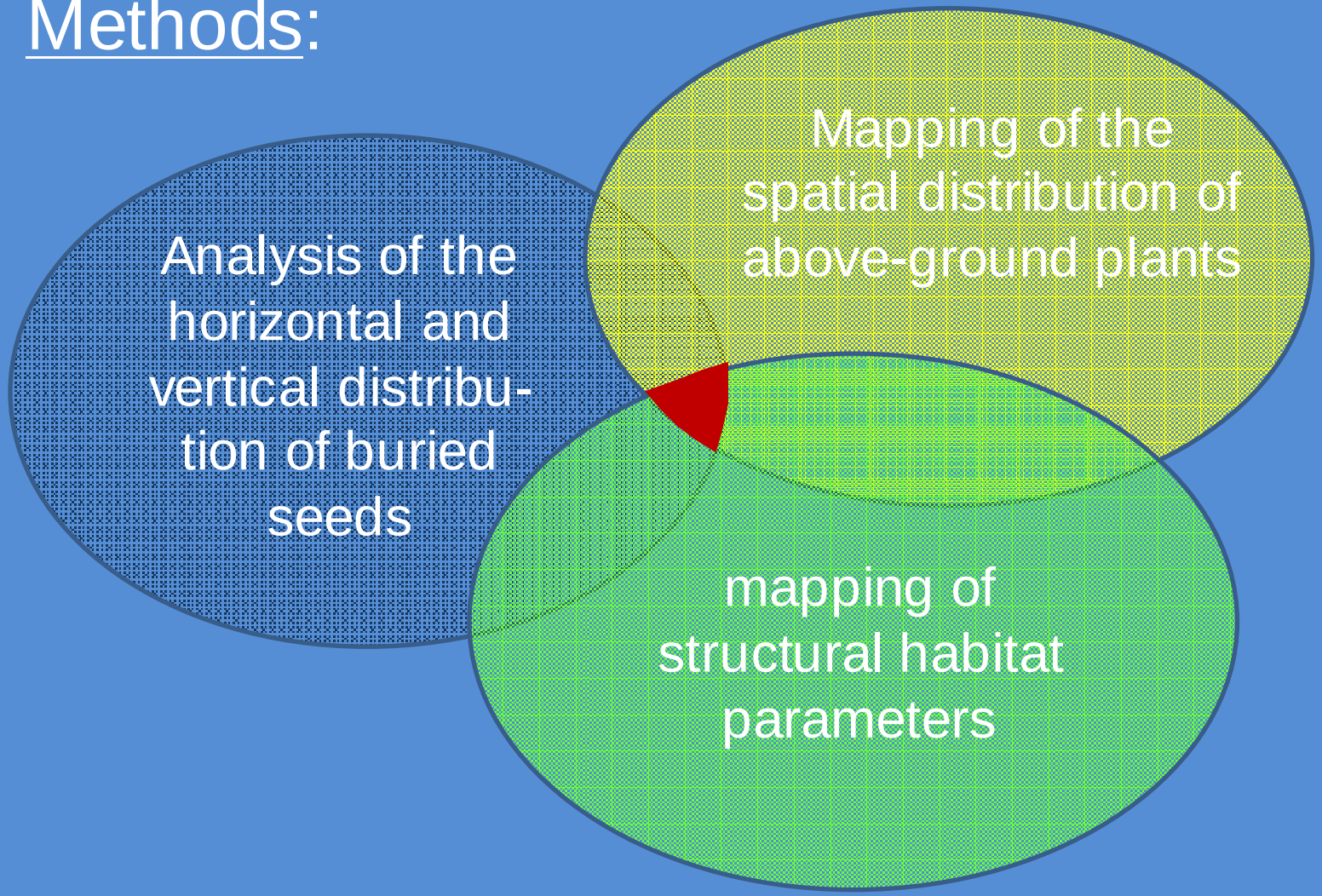
Seed bank patterns

Model species:
Arabis hirsuta

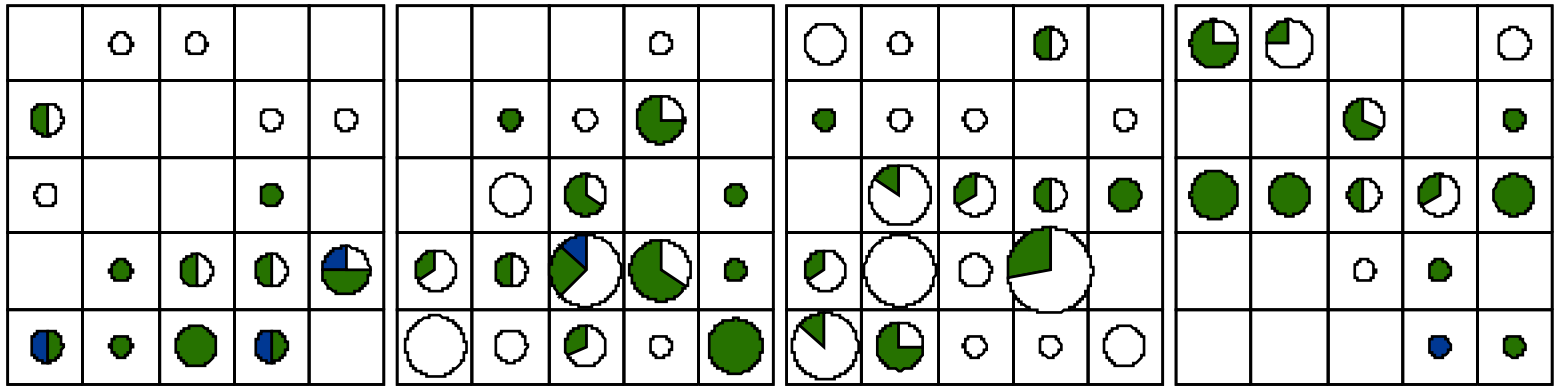
- biennial crucifer
- persistent seed bank
- large quantity of small seeds
- 5 populations:
  - → 3x old meadows
  - → 2x plant litter strips

Seed bank patterns

Methods:

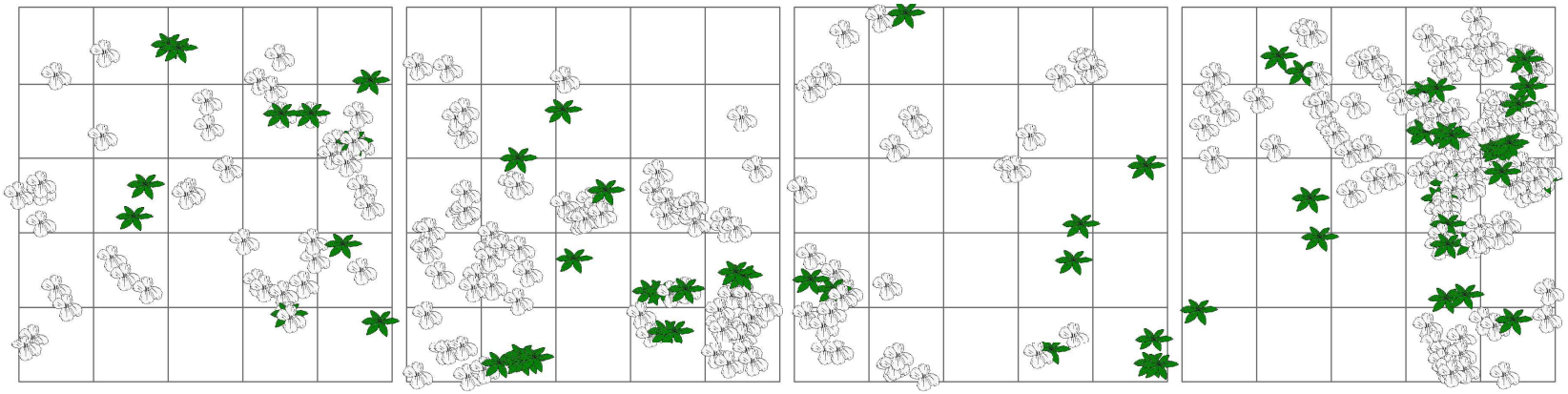


Seed bank patterns (20 x 20 cm grid)



white: 0-1 cm, green: 1-5 cm, blue: 5-10 cm

Above-ground vegetation (20 x 20 cm grid)



Summary

- large-scale restoration project seeking to restore species-rich flood meadows
- I focus on seed bank processes such as
  - → plant litter strips as source populations
  - → desiccation cracks as natural seed traps
  - → seed bank heterogeneity and formation
- results shall be used to further improve restoration measures

Thank you for your attention!