Colonization and succession in restored wet grasslands: lessons from long-term experiments

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Case study I:

Monitoring of restoration management in wet meadows in NW-Germany over 20 years
Long-term trends over 20 years (floristic composition)

Long-term trends over 20 years
(Functional types)

Long-term trends over 20 years
(Strategy types)

Long-term trends over 20 years (Ellenberg indicator values)

Change in harvested N (mowing twice a year)

Change in harvested P (mowing twice a year)

Changes in species-richness (mowing twice a year)

Summary I:

- successful depletion of nutrient pools by hay making twice
- mesotrophic condition can be achieved within 20 years
- significant impact of mowing regimes on floristic composition
- decline in ruderals and competitors
- spread of stress-tolerant species
- slight increase of plot species-richness
- almost no immigration of new target species
- ongoing changes even after 20 years
Case study II: Topsoil removal and hay transfer
**Org. Subst.**

- A = former arable field
- B = 30 cm topsoil removal
- C = 50 cm topsoil removal
- D = Molinion donar sites
- E = Cnidion donar sites

Cnidion donar site
Molinion donar site
Hay transfer after topsoil removal
Restoration site in 1997
Same site in 2004
Species number 1998-2008
(Strip I-III)
Transferred target species:

- *Arabis nemorensis*
- *Gentiana pneumonanthe*
- *Viola elatior*
- *Iris spuria*
Trajectories in DCA-ordination (all strips)

- Wet strips
- Dry strips

Axes:
- Axis 1
- Axis 2

Environmental filter

Time
Topsoil removal
- 30 cm
- 50 cm
- Sample plots (Seedbank and soil)

Origin of hay
- Cnidion
- Molinio
- Zero plots

Flooding frequency
- High
- Low
- Never flooded
Trajectories in DCA-ordination (wet strips only)

- Molinion
- Cnidion
- Control

Floristic composition of transferred hay

Axis 1

Axis 2

Time
Summary II:

• topsoil removal in combination with hay transfer is extremely successful to overcome seed dispersal and micro-site limitation

• sorting of introduced species by environmental filters

• long-term footprint of hay origin on species composition

• ongoing successional processes even after 12 years

• need for long-term monitoring
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Change in harvested biomass (mowing twice a year)

former arable field
30 cm top soil removal
50 cm top soil removal
Molinion donor site
Cnidion donor site
Development of legumes

Cumulative cover

- **Genista tinctoria**
- **Securigera varia**
