



Some calcareous grasslands plant species harbor higher reproductive performances in restored habitats compared to reference habitats

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Septembre 2012

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Context

Global context

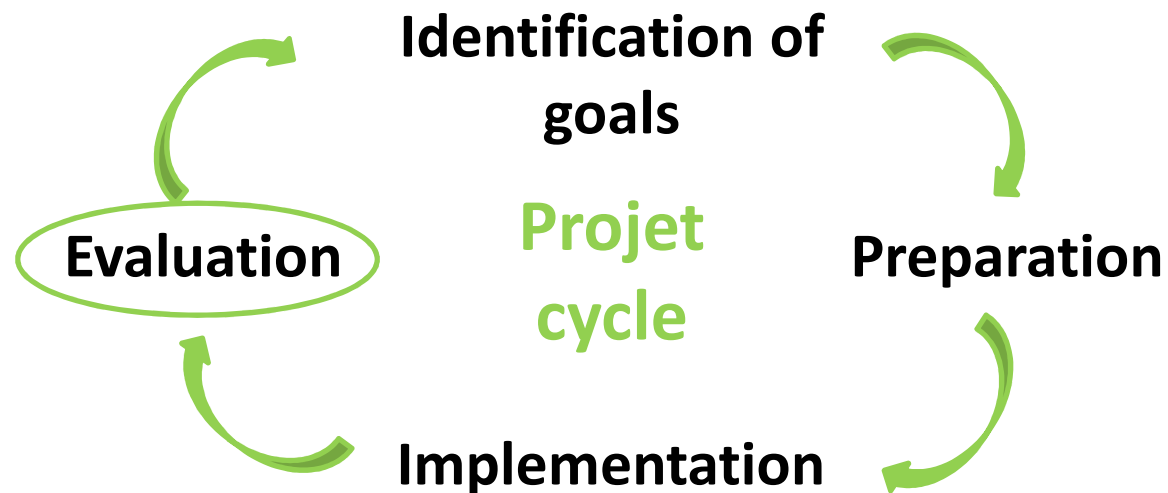


Biodiversity threats



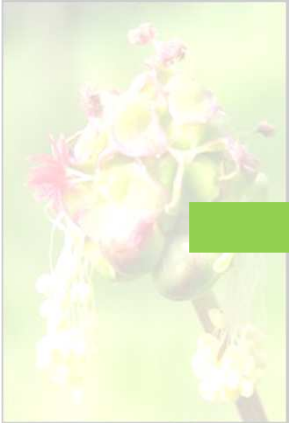
Global context

- Changes in land use :
 - Habitats destruction
 - Fragmentation
- Response = Ecological restoration
 - Restoration projects



Global context

- Goals of restoration projects and evaluation criteria are numerous
 - Species diversity
 - Vegetation structure
 - Ecosystem resilience
 - Ecosystem integration in the landscape
 - Sustainability of reproductive populations



Global context

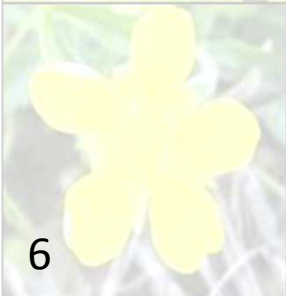


– Sustainability of reproductive populations

→ Successful restoration if populations are able to persist over the long term

Restored populations possess **attributes** necessary for :

- **Reproduction**
- **Migration**
- **Growth**
- **Adaptive evolutionary changes**



Indicators : Species performances



Objectives

Objectives



- To evaluate the success of restoration
- Population indicators
 - **(Re)Colonization**
 - **Reproductive success**
 - **Final fitness**
- Comparaison between **reference** and **restored** parcels



Methods

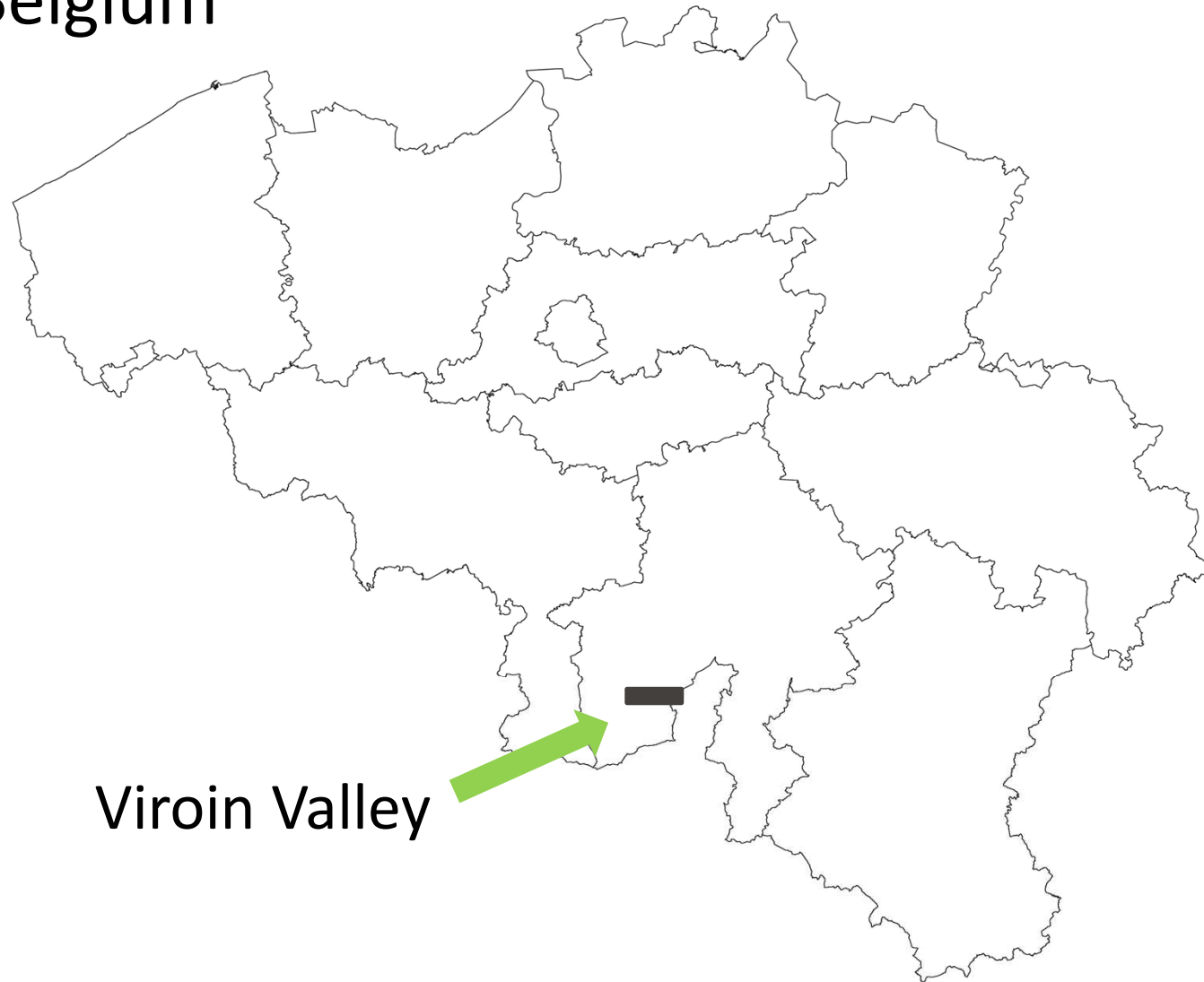
Focused habitat

Calcareous grasslands



Study area

Belgium

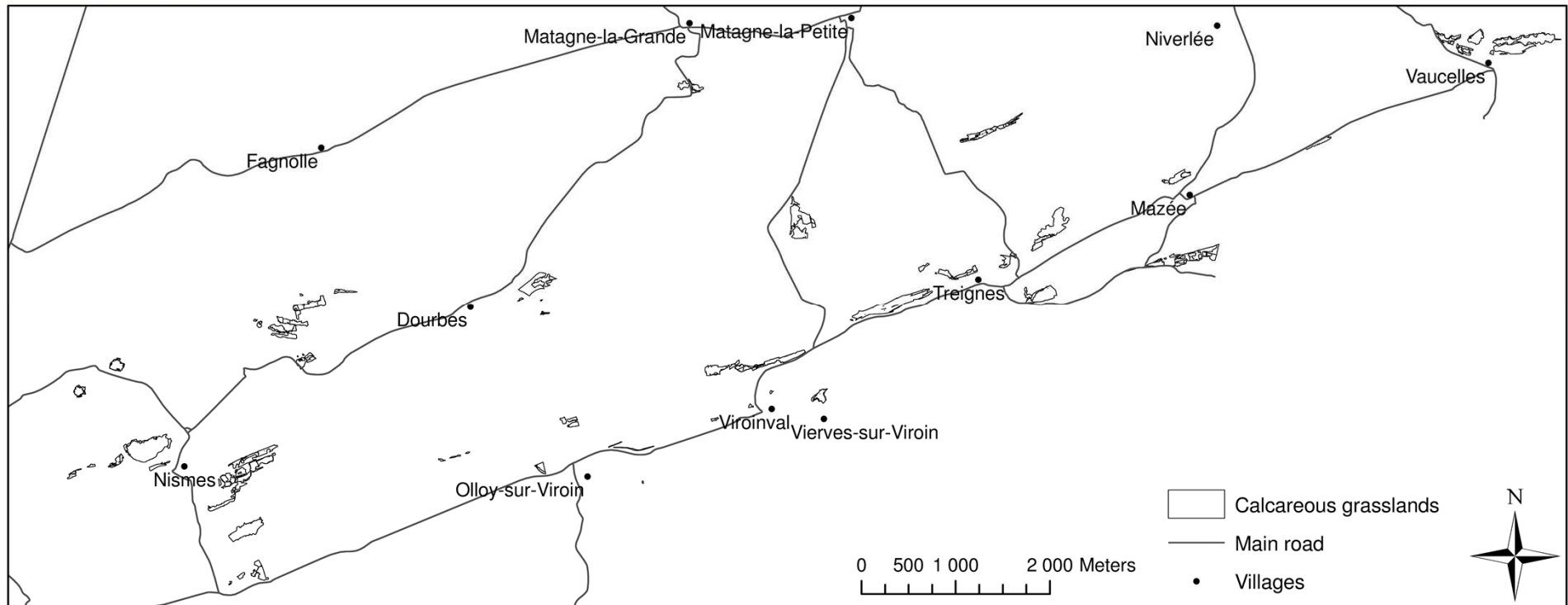


Viroin Valley



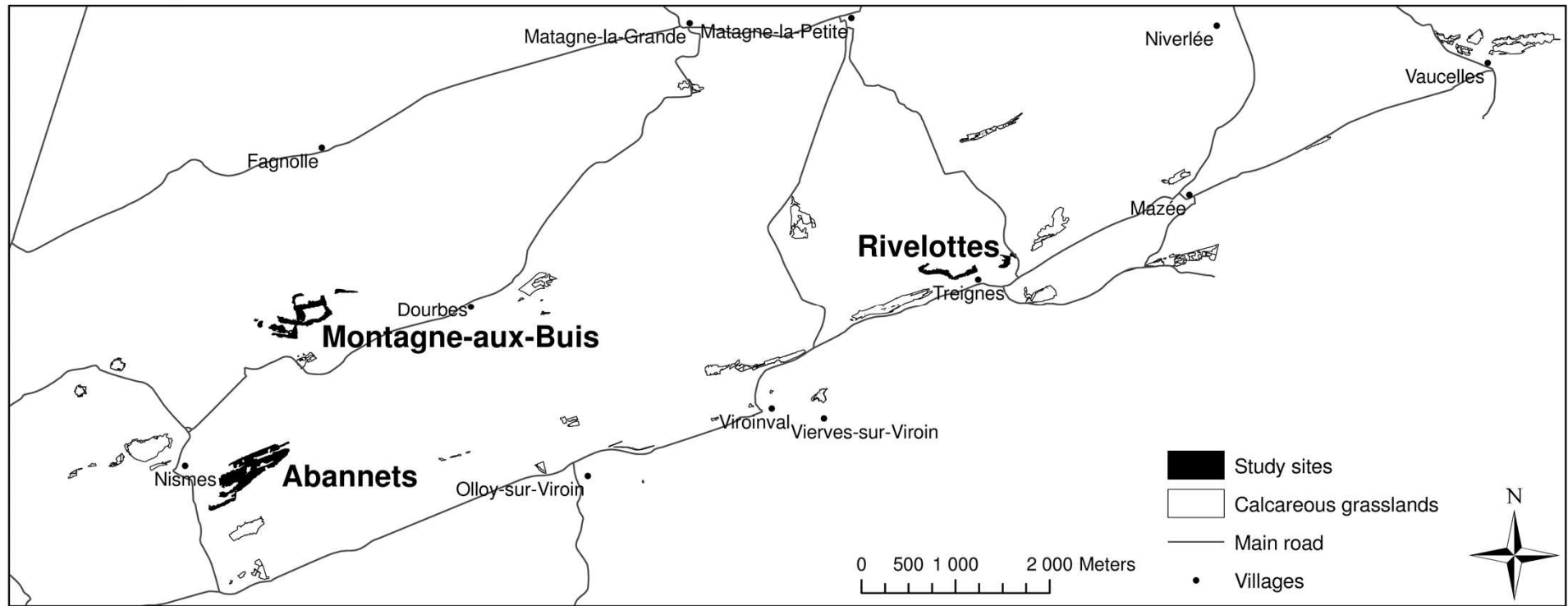
Study area

The Viroin Valley



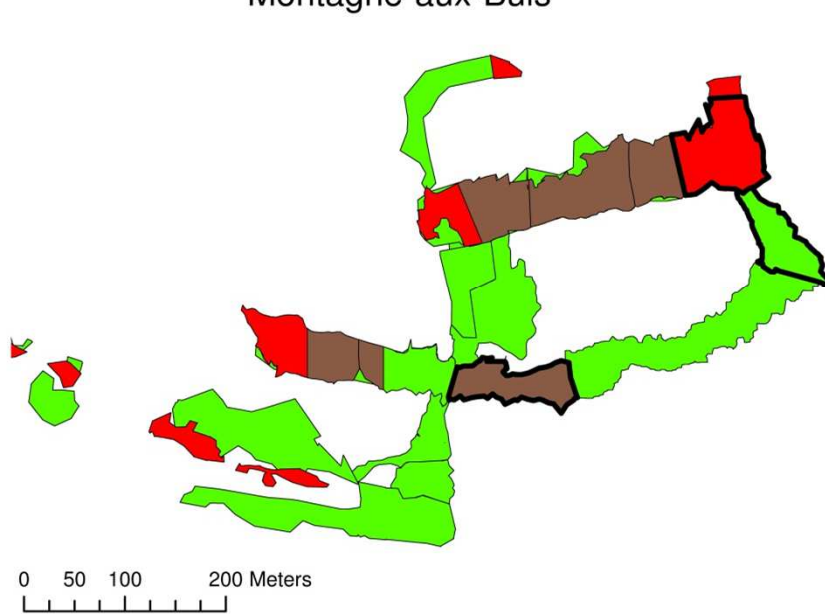
Study sites

The Viroin Valley

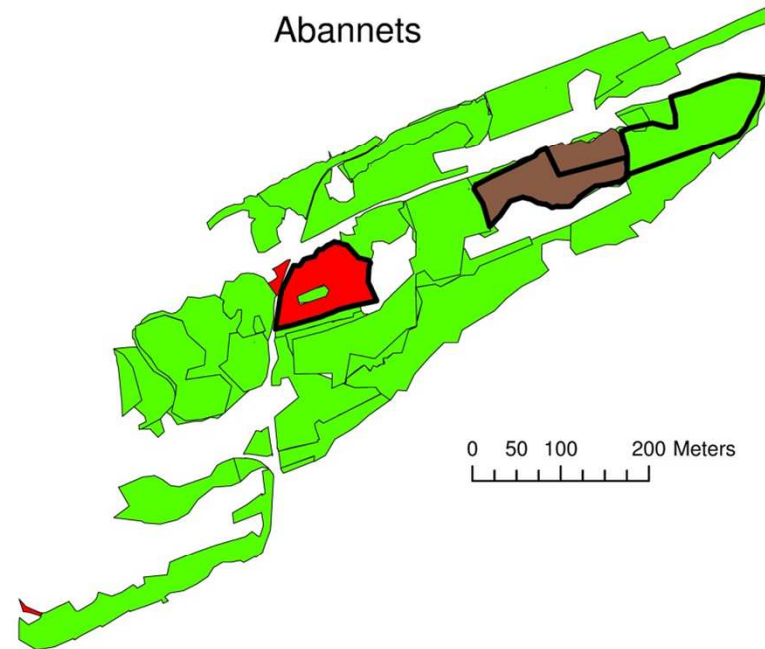


Study parcels

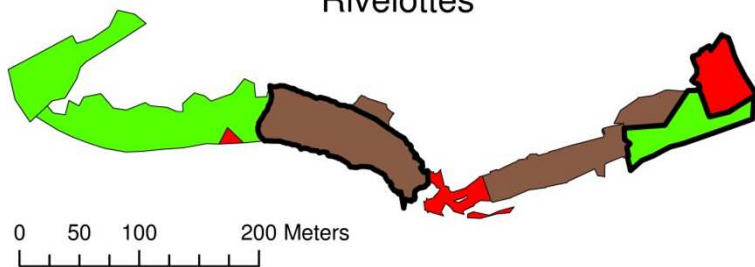
Montagne-aux-Buis







Abannets



Rivelottes



Legend

-  Reference
-  Old restoration (1990-2000)
-  Recent restoration (>2000)
-  Selected parcels



Study species



Hippocrepis comosa

Fabaceae



Sanguisorba minor

Rosaceae



Potentilla neumanniana

Rosaceae

Specialists
and
abundant

Recording method



Recording method

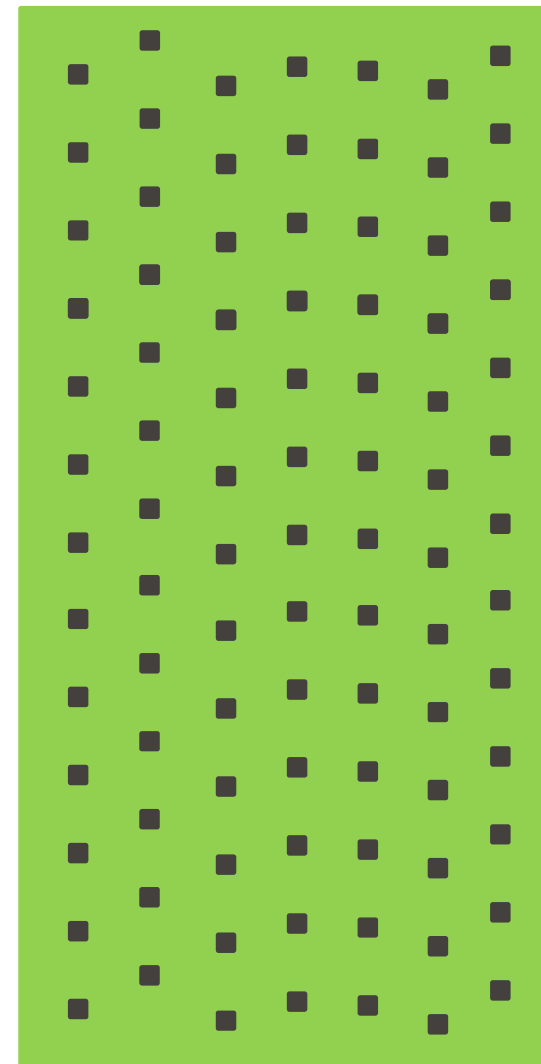
- **Species recolonisation**
→ occurrence (%)



Recording method

- **Species recolonisation**
→ occurrence (%)

Parcel

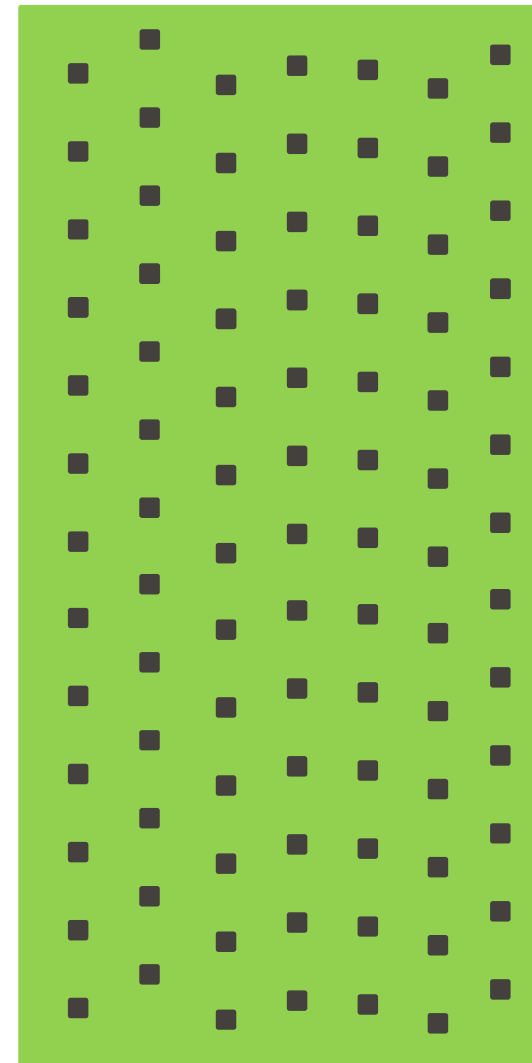


Recording method

- **Species recolonisation**
→ occurrence (%)

Site	Parcel	Nb of plots (1m ²)
Abannets	Reference	400
	1990-2000	225
	>2000	504
Montagne-aux-buis	Reference	334
	1990-2000	178
	>2000	208
Rivelottes	Reference	125
	1990-2000	206
	>2000	123

Parcel



Recording method

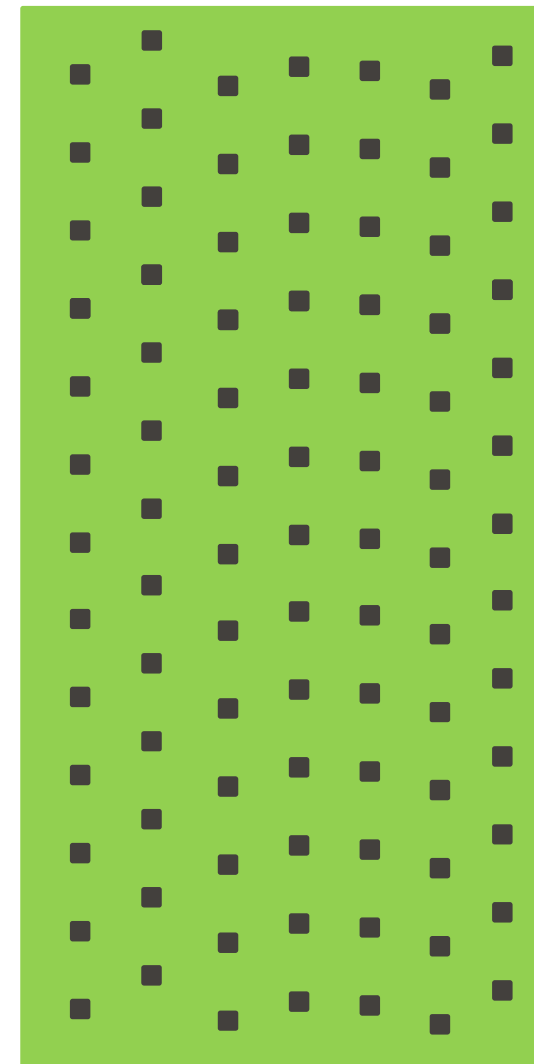


- **Species recolonisation**
→ occurrence (%)
- **Reproductive success**



20

Parcel



Recording method

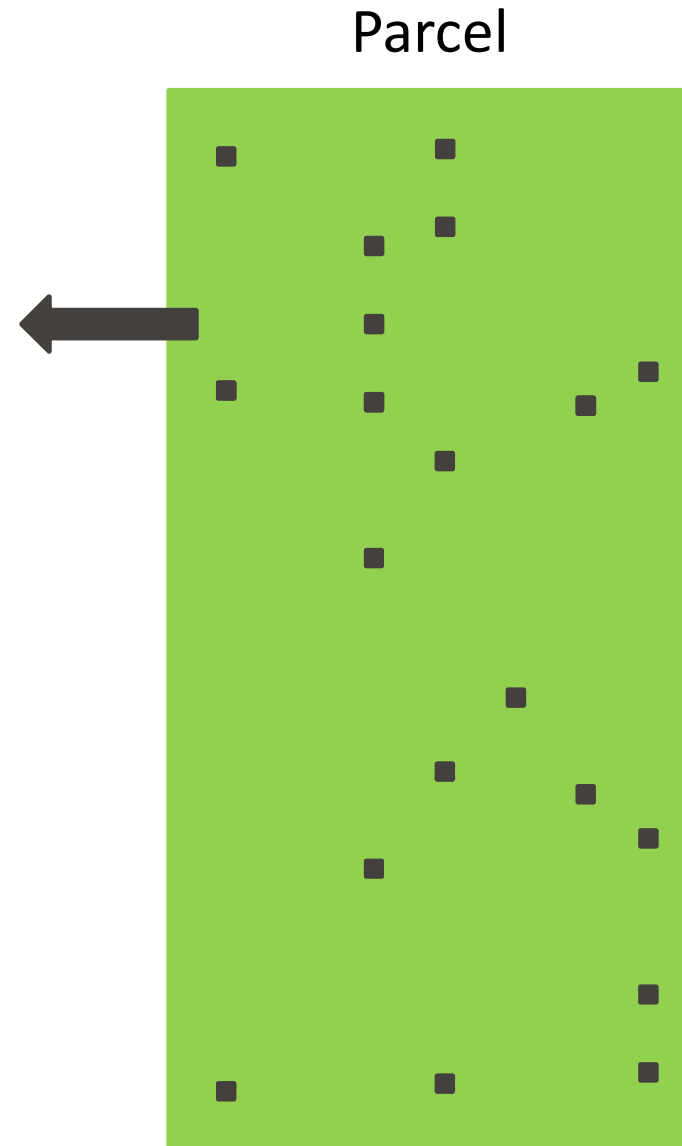


- **Species recolonisation**

→ occurrence (%)

- **Reproductive success**

20 plots randomly selected
On 2 sites (6 parcels) / species
One individual selected /plot



Recording method



- **Species recolonisation**

→ occurrence (%)

- **Reproductive success**

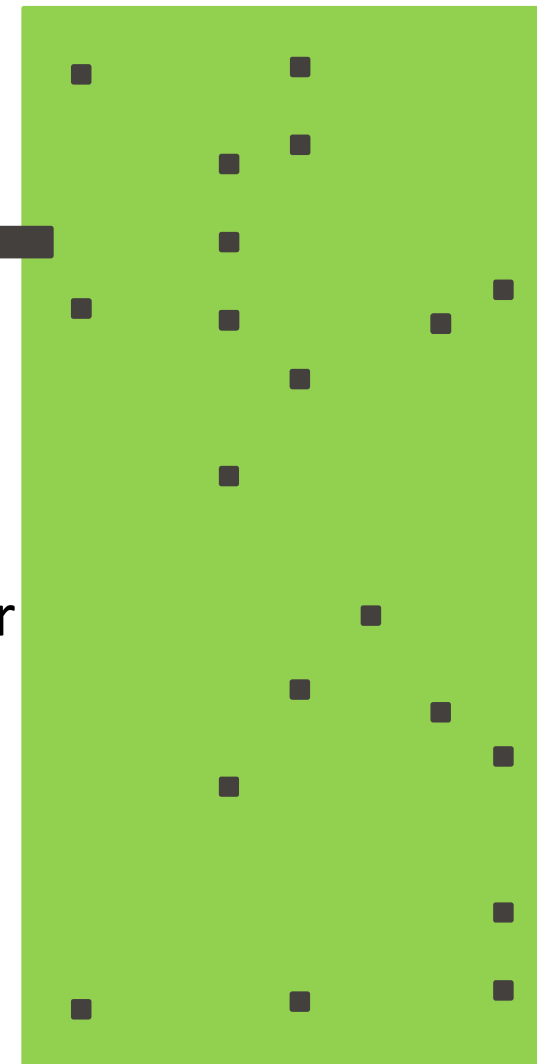
20 plots randomly selected
On 2 sites (6 parcels) / species
One individual selected /plot

→ Number of flowers (or
inflorescences) / indiv.

→ Number of seeds / fruit (or
inflorescences)



Parcel



Recording method



- **Species recolonisation**

→ occurrence (%)

- **Reproductive success**

20 plots randomly selected
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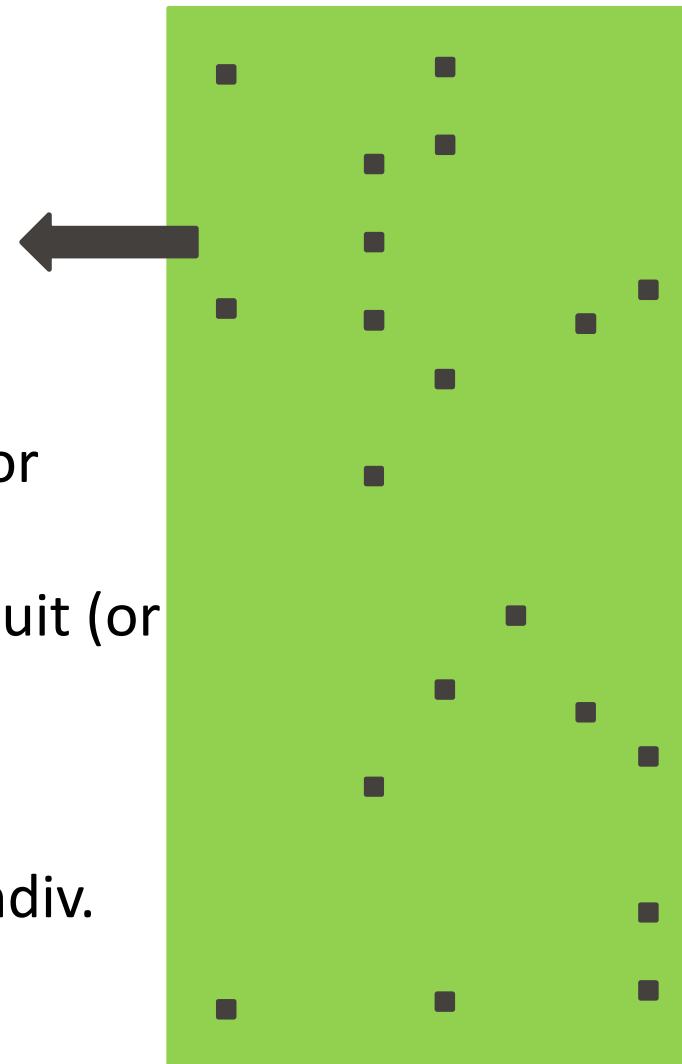
→ Number of flowers (or
inflorescences) / indiv.

→ Number of seeds / fruit (or
inflorescences)

- **Final fitness**

→ Number of seeds / indiv.

Parcel

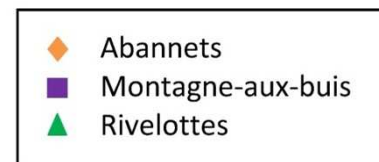
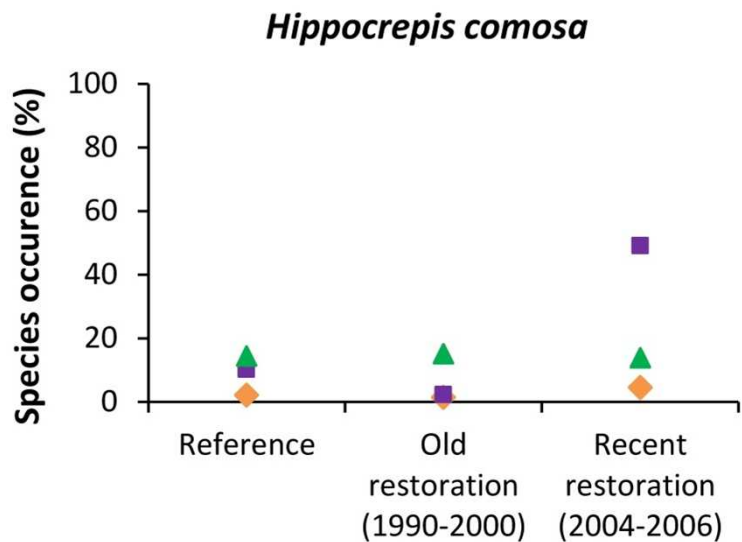
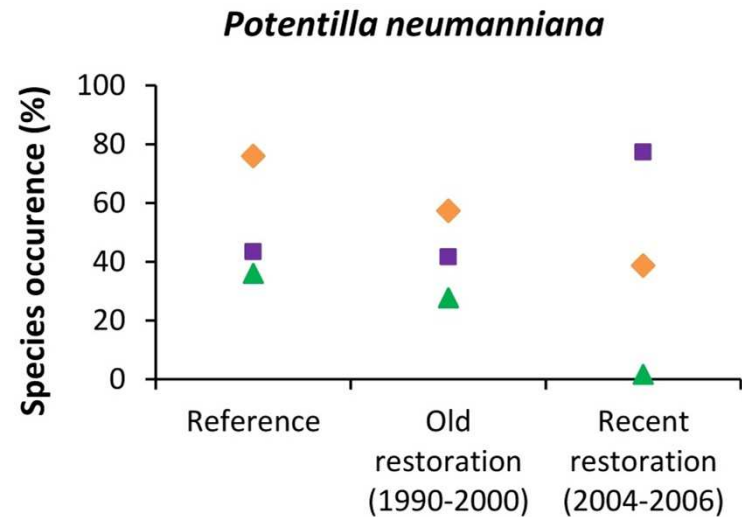
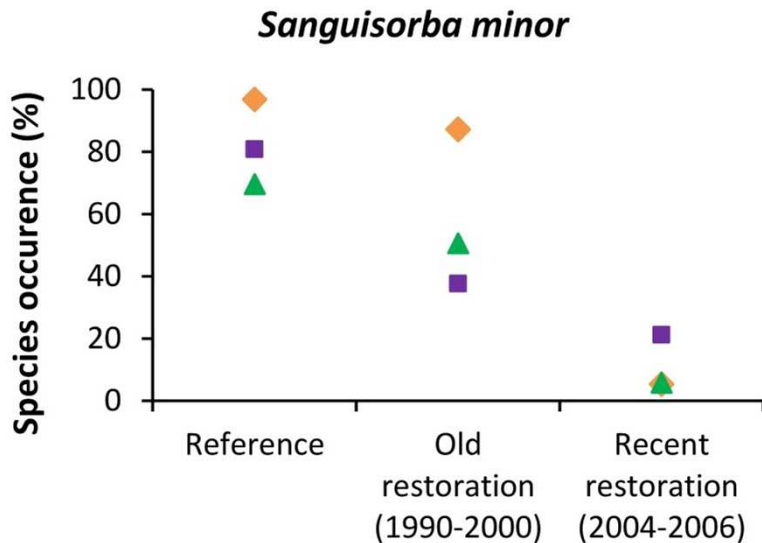




Main results

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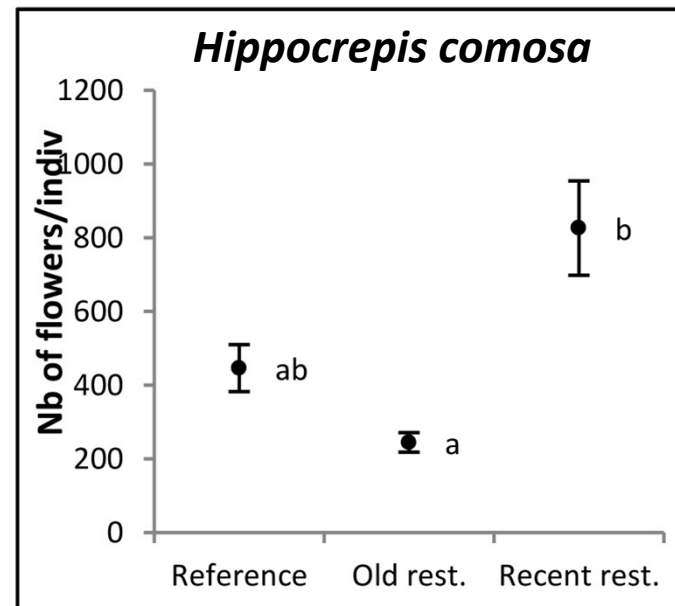
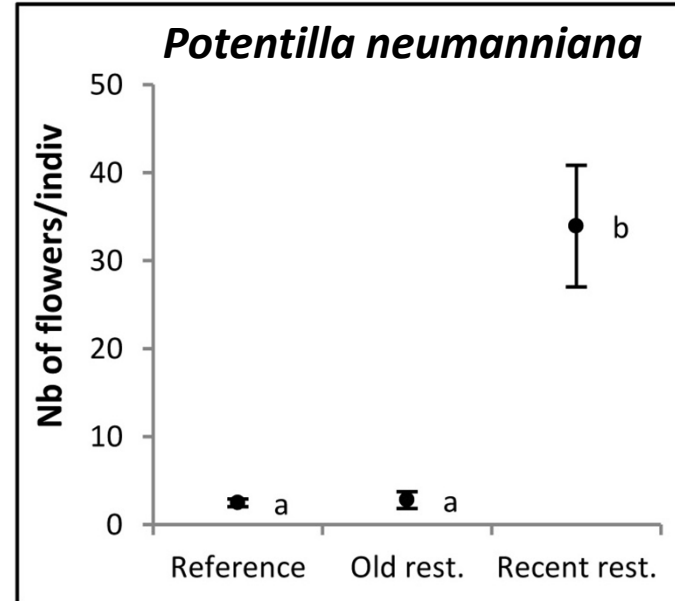
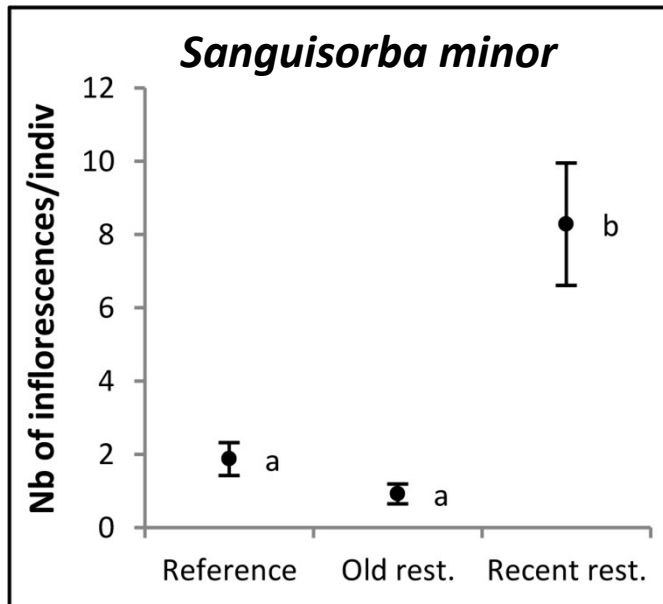
- Species occurrence (%)



Main results

- Reproductive success

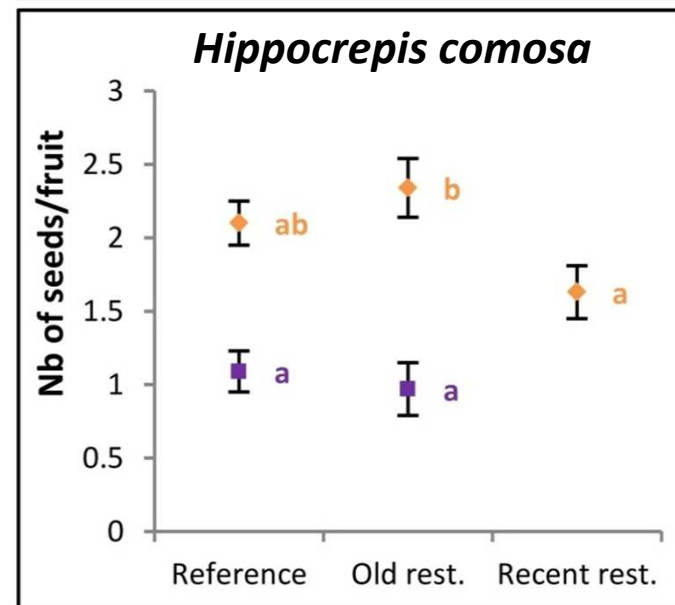
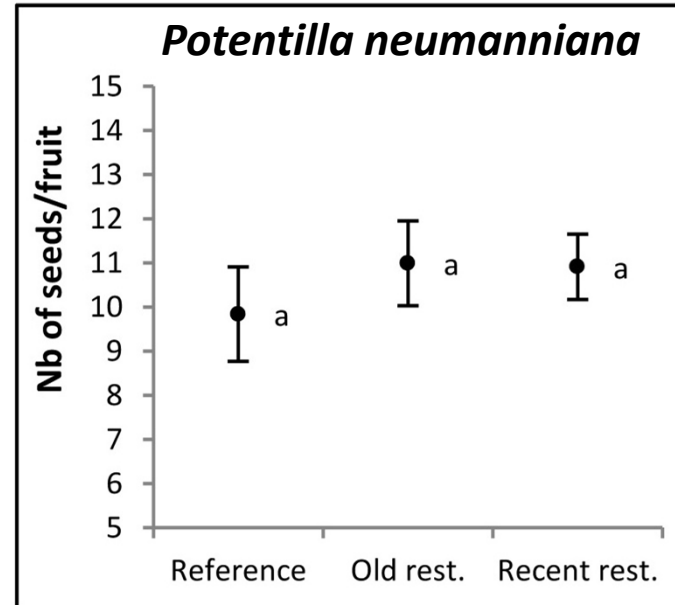
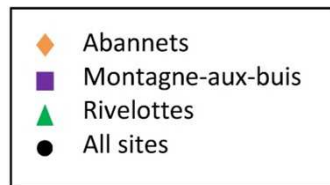
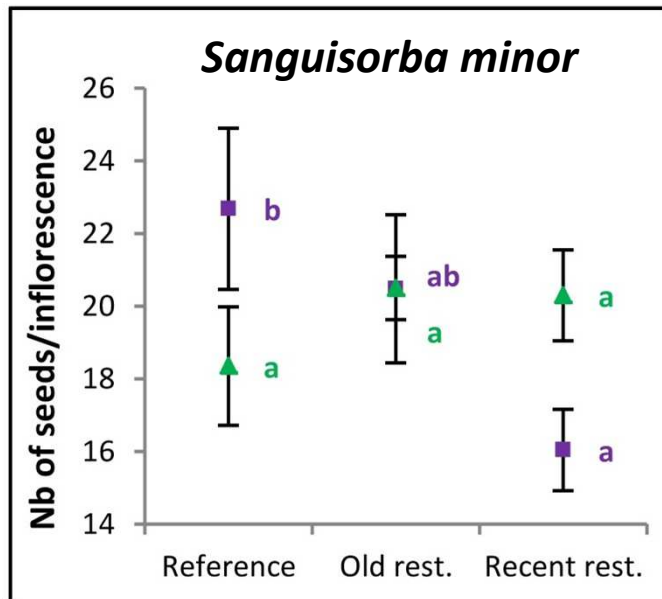
→ Number of flowers/indiv



Main results

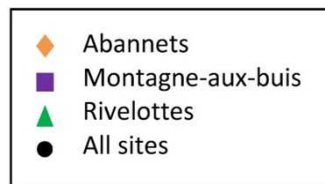
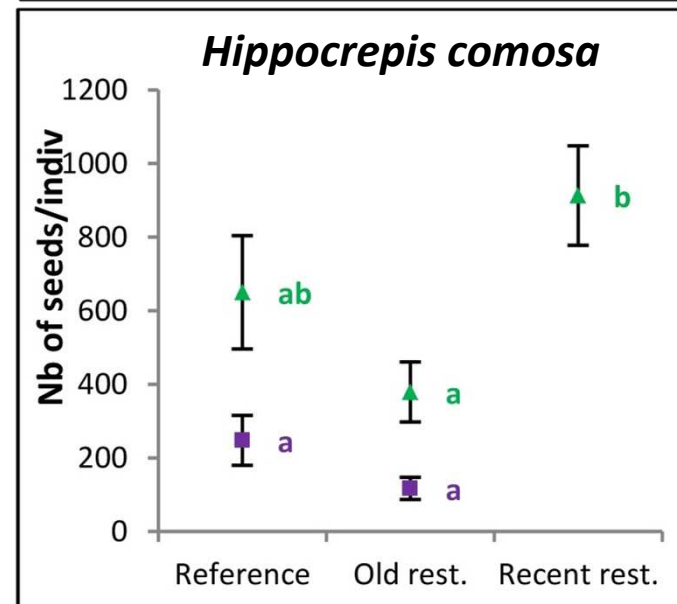
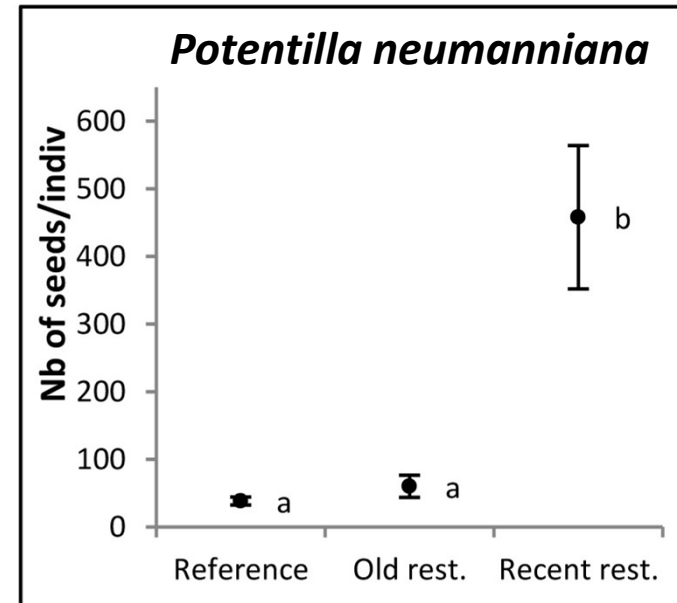
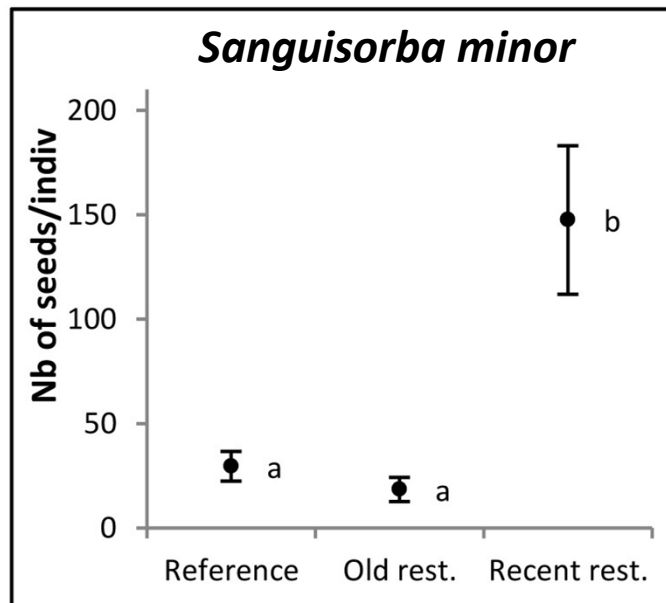
- Reproductive success

→ Number of seeds/fruit



Main results

- Final fitness





Discussion

Discussion

- **Restoration success:**

→ (Re)colonisation success

- Colonisation of restored parcels

- Species occurrence reference >> restoration

S. minor and P. neumanniana

H. comosa

- Soil seed bank

- ~~- Soil seed bank~~

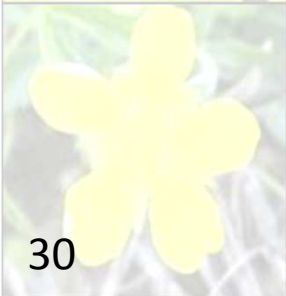
- Dispersion by wind

- ~~- Dispersion by wind~~

- Dispersion by sheep
and goats

- Dispersion by goats

NB : Study species = abundant



Discussion

- **Restoration success:**

→ Reproductive success and fitness

– Flowers and seeds production in recently restored grasslands >>>> reference

→ Hopeful concerning species persistence as higher fitness ↑ populations dynamic ↓ extinction risks

– Seeds/fruit : no clear differences

→ No lack of pollination





Conclusion

Conclusion



- Recently restored populations :
 - play an important role in supporting species persistence in fragmented grasslands
 - have a favorable effect on the dynamic of species evolving in manmade landscape



- Species occurrence : Reference >> Restoration
- Reproductive performance : Reference << Restoration

→ Importance of considering more than one attribute when evaluating restoration success





**Thank you for your
attention**