

Assessing invasiveness and invasibility in European grasslands

A. Thébault, D. Pasche, F. Gillet & A. Buttler

Laboratory of Ecological systems, ECOS, EPFL, CH-1015 Lausanne
aurelie.thebault@epfl.ch

Introduction

Although deeply studied, plant invasions research often concentrates on invasiveness of species. Resistance of community to invasive species (invasibility) has hardly been explored. To our knowledge, there is no study at the moment dealing with both invasiveness and invasibility. Therefore, a mixed experiment (greenhouse and natural community) is carrying out to differentiate species' ability to invade and community's ability to resist.

Background – Ecology of invasions

Different hypothesis have been build to explain biological invasions

- Enemy release hypothesis
 - Evolutionary increase of Competitive ability
 - Novel weapon hypothesis
- } **Invasiveness**
- Community structure and history
 - Fluctuating resource hypothesis
- } **Invasibility**

Experimental design

2 species:

- *C. maculosa* (native from Europe, invasive in North America)
- *S. inaequidens* (native from South Africa, invasive in Europe)

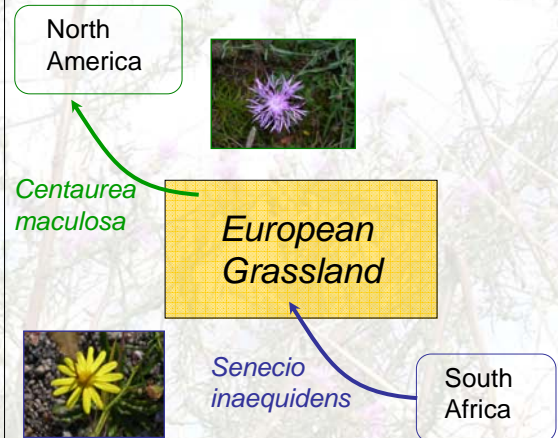
2 ranges : native and introduced

2 growing conditions:

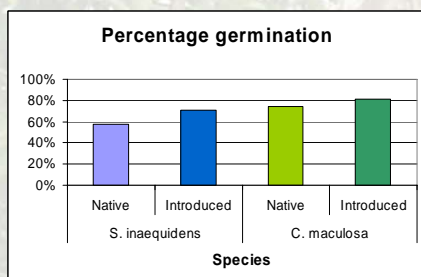
- pots in greenhouse (controlled conditions, no competition)
- natural european community (above and belowground competition)

Hypothesis

European grasslands are both source and sink of invasive species. Studying invasion processes in those communities will allow to compare community resistance to species introduction and species invasive potential



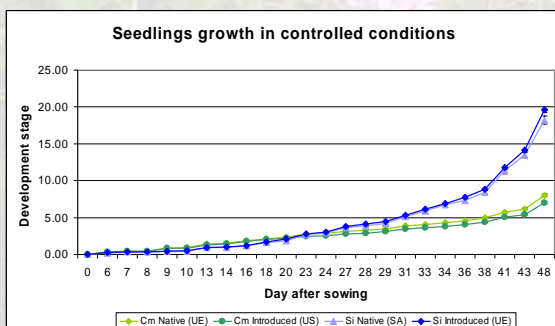
Germination and growth in controlled conditions



Chi square test on germination percentage in controlled conditions (greenhouse) for each species

Species	Source	N	df	K ²	Sig
<i>S. inaequidens</i>	Range	180	1	2.93	ns
	Range	180	1	0.80	ns

Chi square test on overall germination percentages in greenhouse (controlled conditions) shows that introduced genotypes germinate better than native ones. However, this difference is not significant when each species is tested separately.



Development stage is based on:

- seedling's first stages of growth (radicle emergence, cotyledons appearance)
- number of leaves
- ...
- *Senecio inaequidens* grows faster than *Centaurea maculosa*
- European genotypes tend to grow better than exotic ones
- After 48 days, it does not seem that introduced genotypes grow faster than native ones

Conclusions

- When grown in similar conditions without interspecific competition, introduced genotypes do not germinate or grow better than native ones.

=> Invasions of *C. maculosa* in North America and of *S. inaequidens* in Europe are not explained by a higher competitive ability compared to native genotypes.

- Under European climate, European genotypes seem to grow faster than exotic ones

=> Are environmental constraints more important in invasion success than species invasiveness?

Perspectives

A comparable study in natural european community will start in April 2006 to

- assess importance of edaphic and biotic constraints in invasion success
- compare them to species invasiveness