Intraspecific variability of functional traits along a local environmental gradient of water availability in calcareous grasslands

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Context

In the last few years, an increasing body of evidence has highlighted the role of **functional traits** as reliable predictors of species resistance to disturbance and response to environmental gradients. As intraspecific traits variability is a necessary condition for species to adapt to environmental changes, studying its variation along environmental gradients is a major issue in a context of **global change**.

Intraspecific trait variability across environmental gradients has, in the main, been disregarded and consequently less studied than interspecific variation.

In this context, **our aim** was **to evaluate the intraspecific variability of functional traits along an environmental gradient of water availability** at local scale for 4 calcareous grasslands species known to be present along the whole **gradient**.

Calcareous grasslands species are present along a xeric gradient from mesophilous to xerophilous grasslands. Changes of exposure (from north to south), slope and soil depth (from less than 2 cm to more than 13 cm) can lead to differences of water availability for plants along the gradient.

Materials and methods

- **3 study sites** in southwest Belgium (Montagne-aux-buis, Tienne Breumont, Sososye hill).
- **Calcareous grasslands** know to have existed for more than two century.
- Data collection:
  - About 180 plots (1m²) randomly marked along a gradient of xericity
  - Presence or absence of our 4 study species
  - About 90 individuals of each species (from 87-90 indiv.) randomly selected, except for *S. columbaria,* less present on 2 sites (48 and 22 indiv.).
- **Traits** : (measured on each selected individuals and 2 leaves by individual)
  - **MVH:** maximum vegetative height (shortest distance between the upper photosynthetic tissues and the ground level)
  - **SLA:** specific leaf area (one side area of a fresh leaf divided by its oven-dry mass in mm²/mg)
  - **LDMC:** leaf dry matter content (leaf oven-dry mass divided by its water-saturated fresh mass in mg/g).
- **Gradient**: Exposure, slope and **soil depth** measured in each selected plot.

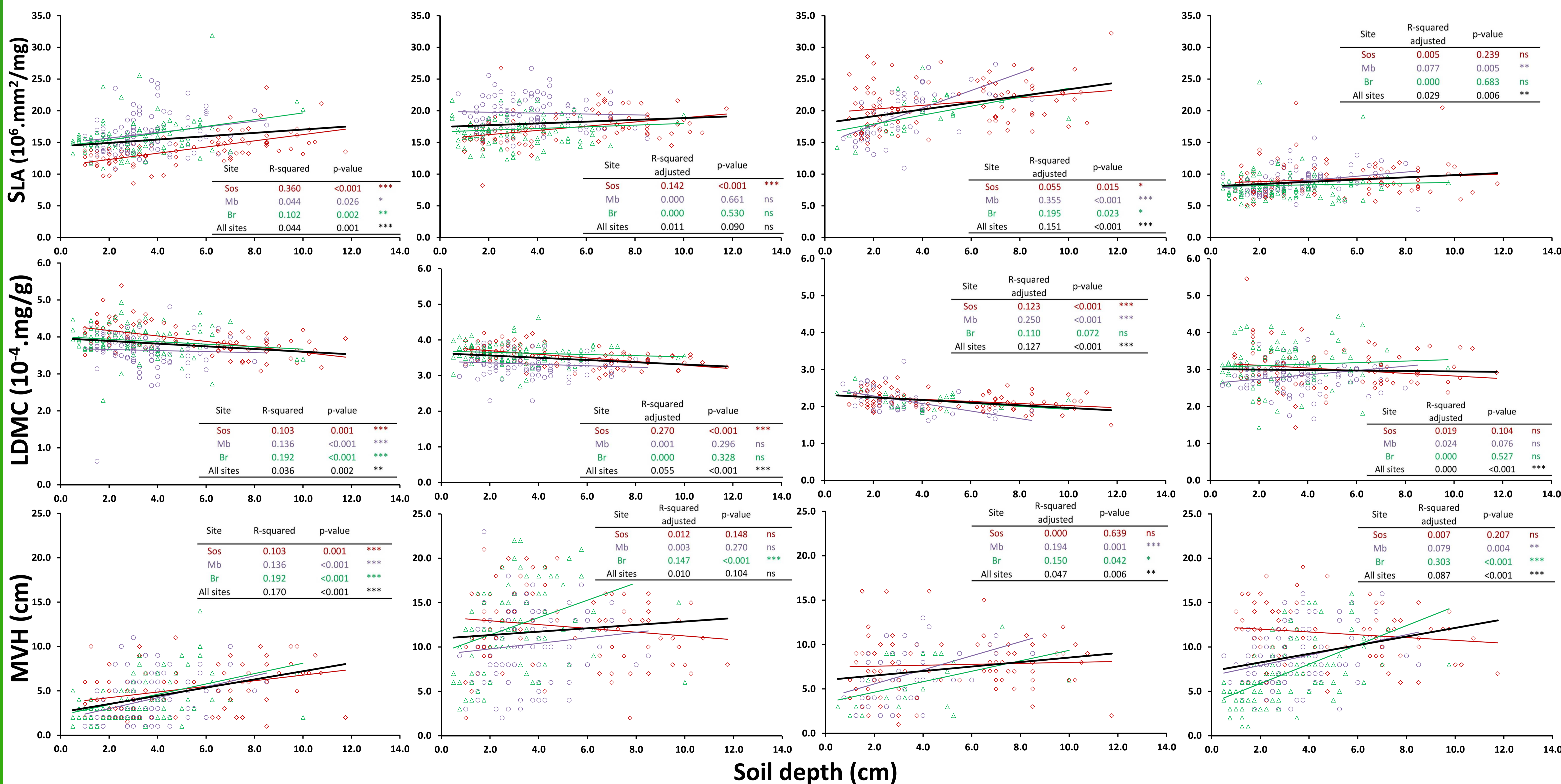## Preliminary results

Potentilla neumanniana

Sanguisorba minor

Scabiosa columbaria

Helianthemum nummularium

Linear regressions between traits (SLA, LDMC and MVH) and soil depth gradient for study species. Points and linear regression of each site are in color and the linear regression of all study sites together is in black. On each graph a table show the p-value and the adjusted R-squared of regressions.

Take home message

- Thanks to a multi-specific approach we highlighted the extent of intraspecific variability of plants functional traits (MVH, LDMC, SLA) along a local environmental gradient
- Intraspecific traits variability is a necessary condition for species to adapt to environmental changes and is a major issue in a context of global change
- Perspectives: to understand why some species respond in a different way to environmental gradient and determine what are the major source of observed intraspecific variability