Ecological Indicator Values and Functional Traits

Methods

The analysis is based on vegetation survey data from Swiss grasslands (meadows and lawns), consisting of plot-wise species abundance data and corresponding header information. From the header data, only the landuse classification was used.

Community Means of Ecological Indicator Values

Ecological indicator values (EIVs) for Europe were obtained from Dengler et al. (2023) and matched to the species list of the vegetation data. Species that could not be matched directly were checked for taxonomic discrepancies and corrected when possible. Species without available EIVs or with uncertain identification at the species or genus level were excluded prior to analysis.

Community means of EIVs were calculated at the plot level without abundance weighting. Differences in community means between meadows and lawns were analyzed statistically and visualized with boxplots.

Community-Weighted Means of Functional Traits

Functional trait data, specifically canopy height, seed mass, and specific leaf area (SLA), were sourced from the LEDA trait database (Kleyer et al. 2008). Trait datasets were merged and inspected for skewness; values for canopy height and seed mass were log - transformed to approximate normal distributions. As with the EIVs, trait data were matched to the species list, and species lacking trait information or with uncertain identification were excluded.

Community-weighted means (CWMs) of the functional traits were calculated using the `functcomp` function from the FD package (Laliberté and Legendre 2010; Laliberté, Legendre, and Shipley 2014), weighting trait values by species abundances. Differences between meadows and lawns were statistically tested and visualized using boxplots.

All analyses were performed in R version 4.5.0 (R Core Team 2025).

Results

A significant difference in the community ecological indicator values (EIVs) was found for nitrogen between meadows and lawns, with meadows exhibiting higher mean nitrogen values (Figure 1). Temperature values tended to be higher in meadows as well, but the difference was not statistically significant.
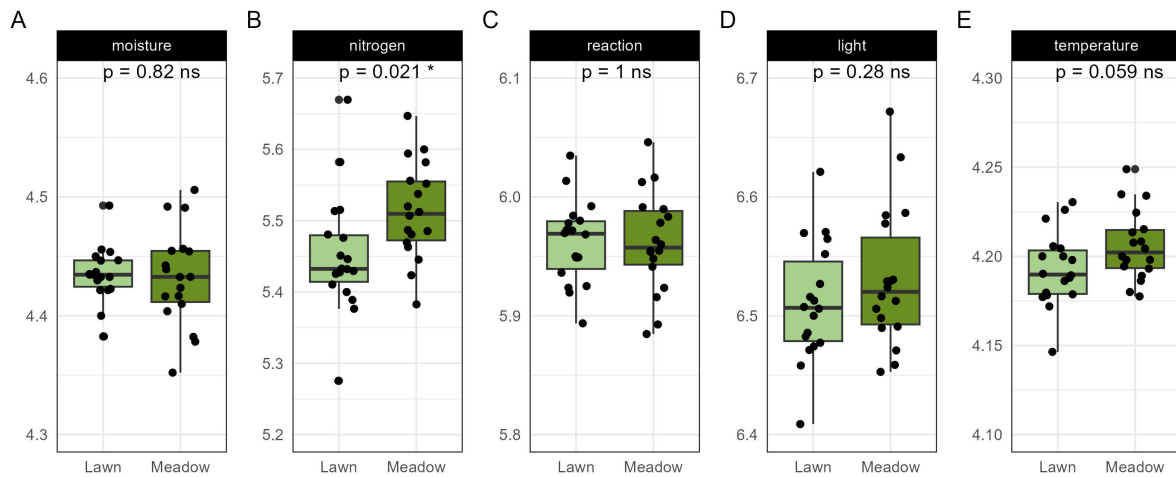
Figure 1: Boxplots showing differences in unweighted community means of ecological indicator values (EIVs) between meadows and lawns. A significant difference was observed for nitrogen values (B), with higher values in meadows. Temperature values tended to be higher in meadows but were not significantly different.

Regarding community-weighted means (CWMs) of functional traits, specific leaf area (SLA) was significantly higher in meadows compared to lawns (Figure 2). No significant differences were found for seed mass and canopy height between the two landuse types.
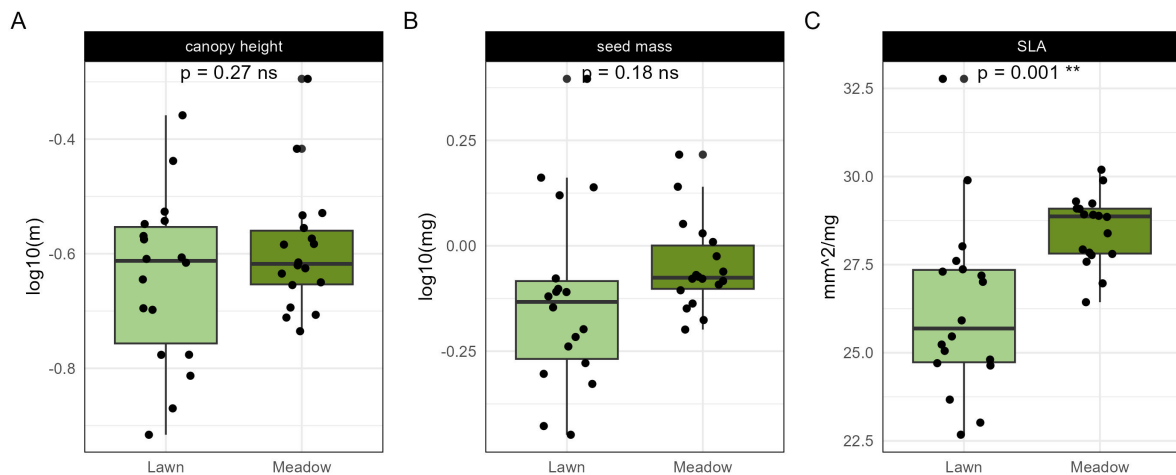

Figure 2: Boxplots illustrating differences in community-weighted means of functional traits ((A) canopy height, (B) seed mass, and (C) specific leaf area) between meadows and lawns. A significant difference was observed for SLA, with higher values in meadows. No significant differences were found for canopy height and seed mass.

References

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