**Case study: Trait-environment relationships of the European naturalized flora in grasslands**

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**Introduction**

Naturalized species are present throughout the world. They can strongly modify ecosystems, especially if they become invasive. Given the large surface and diversity of grasslands present in Europe, it is tremendous to map how much grasslands and its characteristics affected by naturalized species. However, little is known about the environmental determinants of invasions in European grasslands. In particular, the relationships between the functional traits of naturalized plants in grasslands and their environmental determinants hasn’t been studied. Also, due to limitation in data availability these studies are generally conducted at large resolution (i.e. using large grain sizes) without referring to local communities.

**Aim**

Establishing trait-environment relationships for naturalized species in European grasslands for three main traits: plant height, specific leaf area (SLA), and seed mass. You should test to what extent these relationships differ between native, naturalized but not invasive, and invasive plant species. Compare single trait relationships to multi-traits relationship (functional diversity).

**Approach**

First, you will use open plot data on plant community data from the sPlot database. Then, you will match this to openly available trait data from the TRY database. You will work on a subset of grassland communities from sPlot vegetation plot data for which enough trait data (coming from TRY) is available (≥80% of the total abundances of species in a community in a given plot). Finally, you’ll use the Bioclim variables from the CHELSA environmental database, Human Footprint Index and its components to assess the effect of environment and human disturbances on the functional diversity of naturalized species.

Investigate how sensitive your results are to: (1) The aspects of functional diversity you’re assessing (richness, divergence, regularity), (2) Trait choice (which subsets of traits should be sensitive to what), (3) invasion status of the species (native, naturalized not invasive, invasive), (4) Aspect of human disturbance (integrated human footprint index, road density, population density, etc.), (5) Spatial-scale (continental vs. specific biomes with Europe).

Use your analyses to answer questions such as: Are there differences in trait-environment relationships across traits? Across groups of species of different naturalization status? Are naturalized species showing “intermediate” trait-environment relationships compared to native and invasive species? How are these relationships differing at continental scales compared to when you break them down at biome scale? When writing up your report, make sure that you clarify what the problems/questions/hypotheses are that you are addressing, and why this research is important/relevant.

**Data & Literature**

sPlot Open Community Data: <https://doi.org/10.1111/geb.13346>  
TRY Open Trait Data: <https://doi.org/10.1111/gcb.14904>  
Human Footprint Index: <https://doi.org/10.1038/sdata.2016.67>  
Trait-environment r: Milanović et al. 2020 <https://doi.org/10.3897/neobiota.58.51655>  
and Golivets et al. 2022 https://doi.org/10.1101/2022.06.06.494936