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# Intraspecific trait variation in grassland plant communities along urban-rural gradients

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## Abstract

Trait-based approaches have been successfully used to demonstrate how the modified ecological conditions within urban areas filter plant species within plant communities. These approaches use functional trait databases, often based on trait measurements made outside urban areas and which therefore may not be relevant for urban studies. Over the past decade, there is growing evidence that trait measurement *in situ* may improve knowledge of the ecological mechanisms underlying such filtering processes. Taking into account intraspecific variability has improved research in natural or semi-natural contexts but has not been tried in urban environments. This study aimed to determine the relative contribution of inter- and intra-specific trait variations in explaining the influence of urban-rural gradients on grassland plant communities. Twenty-one stations were sampled along an urban-rural gradient in two French cities. Three functional traits (Specific Leaf Area, maximum height and phenology), chosen to represent general adaptive strategies of plants, were measured on the 26 most abundant grassland plant species. By decomposing the community-level variance of these traits into species turnover, intraspecific trait variability and covariation, we showed how important it may be to take field measurements into account when studying trait distributions in urban ecology. High intraspecific variability may reinforce trait selection effects, for example by favoring both taller species and populations of taller individuals in urban areas in comparison with rural contexts. Advanced phenology at community-level was influenced by early flowering for almost all urban populations of each species while Specific Leaf Area responses were inconsistent. Because trait distributions and ecosystem functions are closely linked, we suggest that it is now important to develop trait-based approaches at community-level, including both intra- and inter-specific trait variability, in order to improve our knowledge of ecological processes operating in urban areas.

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