

# Species richness drove selection of individuals within wetlands based on traits related to acquisition and utilization of light

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February 22, 2024

## Abstract

**Aim:** Selection within natural communities has mainly been studied along large abiotic gradient, while the selection of individuals within population should occur locally under the play of biotic filter. To better seize the role of the latter, we postulated that the hierarchical nature of environmental selection and the multiple dimension of species trait space needed to be accounted for. **Methods:** We replicated a natural species richness gradient (from 2 to 16 species) within four contrasted wetlands (bog, fen, meadow, marsh), sampling functional traits from random individuals in communities. Developing a hierarchical distributional modelling, we analyzed the variation of the mean and dispersion of functional trait space at the ecosystem, community and species levels. **Key results:** We found that the abiotic differences between wetlands, which shaped a plant productivity gradient, selected species in regards with their leaf nutrient conservation / acquisition strategy. Within ecosystems, plant species richness was a strong driver of trait variation among both communities and species. Among communities, it shaped the selection of individuals according to their space occupation and leaf adaptations to light conditions. Demographically, some species used intraspecific trait variation to maintain equally dense populations, while others used it to become dominant in favorable conditions. **Main Conclusions:** Within ecosystems, variation in biotic conditions selects individuals along functional dimensions that are independent to the ones selected across ecosystems. Because intraspecific variations of light-related traits are related to demographic responses, it offers a way to link the study of species richness and eco-evolutionary dynamics.

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