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Title:

Land use legacy on functional trait diversity across trophic levels

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Functional trait diversity within and across trophic levels determines the strength and the diversity of biotic interactions, and supports multiple ecosystem services. Land use intensification threatens biodiversity globally *via* the direct destruction of key habitats in the landscape and the modifications of local disturbance and eutrophication rates. Understanding how land use intensification alters functional trait diversity is challenging as land use impacts community assembly processes at multiple temporal and spatial scales. We explore how land use intensification at the local and the landscape scales impacts the functional trait diversity across five trophic levels (i.e., plants, herbivores, pollinators, predators and top predators). We use a large dataset of 85 grasslands, situated in an intensively managed agricultural system, where landscape composition and past land use history have been quantified since 20 years. We show that land use intensification impacts negatively functional trait diversity and redundancy across all trophic levels. Low trophic levels are much more affected by land use intensification at the local scale while higher trophic levels, with high dispersal abilities, are more impacted by landscape factors. Importantly, our study shows that past land use history is a major driver of functional trait diversity in agricultural landscapes today. Agricultural systems could potentially host high functional trait diversity, however the persistence of functional diverse communities is predicted to decline with time since conversion into intensive crop, thus threatening the future provision and stability of important ecosystem services.