

Tiemann LK, Grandy AS, Atkinson EE, Marin-Spiotta E, McDaniel MD

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#### Abstract

Biodiversity loss, an important consequence of agricultural intensification, can lead to reductions in agroecosystem functions and services. Increasing crop diversity through rotation may alleviate these negative consequences by restoring positive aboveground–belowground interactions. Positive impacts of aboveground biodiversity on belowground communities and processes have primarily been observed in natural systems. Here, we test for the effects of increased diversity in an agroecosystem, where plant diversity is increased over time through crop rotation. As crop diversity increased from one to five species, distinct soil microbial communities were related to increases in soil aggregation, organic carbon, total nitrogen, microbial activity and decreases in the carbon-to-nitrogen acquiring enzyme activity ratio. This study indicates positive biodiversity–function relationships in agroecosystems, driven by interactions between rotational and microbial diversity. By increasing the quantity, quality and chemical diversity of residues, high diversity rotations can sustain soil biological communities, with positive effects on soil organic matter and soil fertility.

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