## Soil multifunctionality is negatively related to microbial community stochasticity in restored grasslands

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## Abstract

It is generally assumed that there is a relationship between microbial diversity and multiple ecosystem functions. Although it is indisputable that microbial diversity is controlled by stochastic and deterministic ecological assembly processes, the relationship between these processes and soil multifunctionality (SMF) remains less clear. In this study, we examined how different grassland restoration treatments, namely harvest only, topsoil removal and topsoil removal plus propagule addition, affected i) soil bacterial and fungal community stochasticity, ii) SMF, and iii) the relationship between community stochasticity and SMF. Results showed that soil microbial community stochasticity decreased in all the three restoration treatments, while SMF increased. Soil multifunctionality was found to be significantly and negatively correlated with soil microbial community stochasticity. Plant diversity and plant C/N indirectly influenced SMF by regulating the microbial community stochasticity. Our findings provide empirical evidence that when deterministic community assembly processes dominate in soils, then higher microbial functioning is expected.

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