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Tree species identity surpasses richness in affecting soil microbial richness and community composition in subtropical forests

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Plant interactions and feedbacks with soil microorganisms play an important role in sustaining the functions and stability of terrestrial ecosystems, yet the effects of tree species diversity on soil microbial community in forest ecosystems are still not well understood.
Here, we examined the effects of tree species richness (1-12 species) and the presence of certain influential tree species (sampling effect) on soil bacterial and fungal communities in Chinese subtropical forests, using high-throughput Illumina sequencing for microbial identification. We observed that beta rather than alpha diversities of tree species and soil microorganisms were strong coupled. Multivariate regression and redundancy analyses revealed that the effects of tree species identity dominated over tree species richness on the diversity and composition of bacterial and fungal communities in both organic and top mineral soil horizons. Soil pH, nutrients and topography were always identified as significant predictors in the best multivariate models. Tree species have stronger effect on fungi than bacteria in organic soil, and on ectomycorrhizal fungi than saprotrophic fungi in mineral topsoil.
Concluding, tree species identity, along with abiotic soil and topographical conditions, were more important factors determining the soil microbial communities in subtropical forests than tree diversity per se.