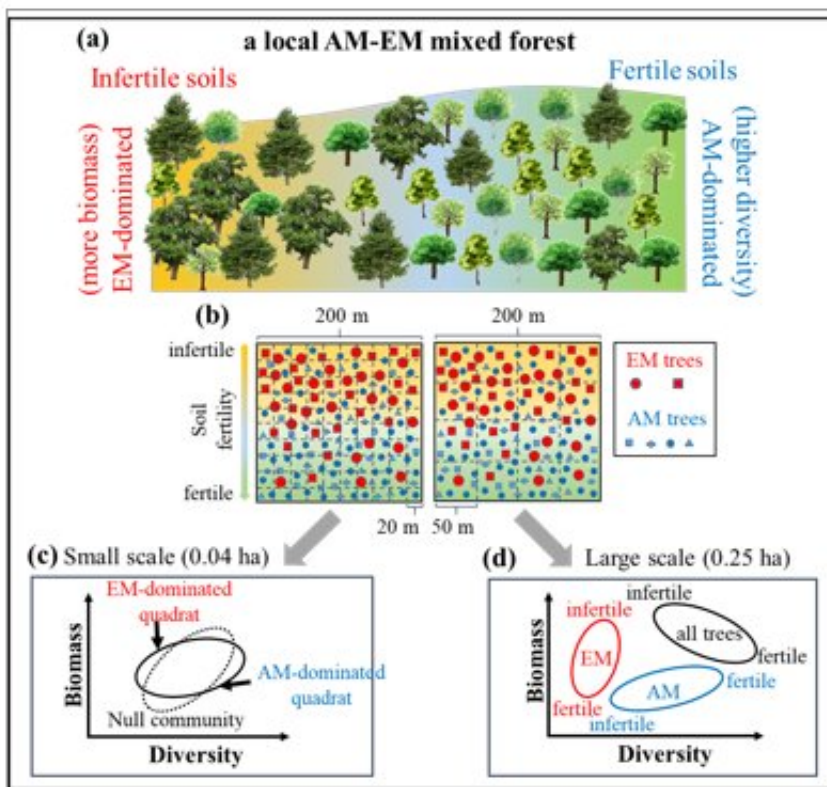


New mycorrhizal dominance mechanism drives scale-dependent biodiversity-ecosystem functioning relationships

March 1 2023, by Zhang Nannan



The mycorrhizal dominance mechanism explains the scale-dependent diversity-biomass relationships. Credit: Mao Zikun

The ecological impact of biodiversity ecosystem functioning (BEF) is currently one of the most vibrant research areas in ecology. In forest

ecosystems, however, BEF relationships tend to be spatially scale dependent. These scale-dependent BEF relationships challenge prevailing BEF theories, and the extent to which findings from BEF studies can be scaled up to inform natural forest management remains controversial.

In a recent study published in *Ecological Monographs*, researchers from the Institute of Applied Ecology of the Chinese Academy of Sciences (CAS) and their collaborators proposed a mycorrhizal dominance mechanism to address the scale-dependence issue in BEF studies.

They predicted that the scale-dependent relationships between [plant diversity](#) and biomass carbon content observed in natural forests were mainly driven by the distribution patterns of arbuscular- (AM) and ectomycorrhizal (EM) tree species, together with soil heterogeneity.

The researchers tested the above prediction in the Asian and North American regions by synthesizing a "tree species-soil-mycorrhizal traits" dataset in seven forest megaplots (16–50 ha). Overall, the positive-to-negative shifts in diversity-biomass relationships with increasing spatial scale were quite common in these AM- and EM- dominated forests.

Using spatial null models, they further verified that these positive-to-negative relationships were mainly driven by the changes in AM and EM tree dominance, as predicted by the mycorrhizal dominance mechanism.

Theoretically, although only one functional index (i.e., biomass carbon content) was used in this study, this mycorrhizal dominance mechanism may also provide insights into other [ecosystem functions](#) (e.g., biomass production, belowground functions), thus adding new theories to BEF studies.

In practice, this new mechanism suggests that forest managers should

pay more attention to the coupling effects of soil conditions and tree mycorrhizal associations in order to balance biodiversity and function-oriented conservation schemes, thus providing new insights into the "selection of suitable [tree species](#) for sites" in afforestation and forest management.

More information: Zikun Mao et al, Scale-dependent diversity–biomass relationships can be driven by tree mycorrhizal association and soil fertility, *Ecological Monographs* (2023). [DOI: 10.1002/ecm.1568](#)

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