

Effects of climate variability and soil environment on plant diversity drive ecosystem stability in intact natural forests

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Abstract

A substantial body of evidence sustains that biodiversity enhances ecological stability in changing environments, but the underlying mechanisms in intact natural forest ecosystems remain unresolved. Using data from seven permanent plots, we test the influence and driving factors of plant diversity on stability and variability of diameter at breast height (DBH). We show that species richness under different soils and climate variability indirectly increases stability by species asynchrony rather than a direct influence. Beta diversity (plant species composition dissimilarities over time) has a strong positive effect on stability and soils indirectly increase stability by beta diversity. Soils and climate variability cause a larger effect on variation in standard deviation of DBH by species richness, beta diversity and species asynchrony relative to mean DBH. The study provides a new insight into how plant species diversity affects the process of ecosystem stability under various soil conditions and climatic variability.

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