

Multi-element network reveals the mystery of species adaptation and coexistence

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Abstract

Plant biochemical reactions are dependent on the combined action of multiple elements. However, it remains unclear how these elements co-vary to adapt to environmental change. Here, we propose a novel concept of the multi-element network (MEN) including the mutual effects between elements to more effectively explore the alterations in response to long-term nitrogen (N) deposition simulations. MENs were constructed with 18 elements and were species specific. Macroelements were more stable, but microelements were more susceptible to N deposition. Interestingly, higher MEN plasticity determined increased relative aboveground biomass (species importance) for different species in one functional group under simulated N deposition. Furthermore, the association between MEN plasticity and species importance was consistently verified along a dry-wet transect. In summary, MENs provide a novel approach for exploring the adaptation strategies of plants and to better predict community composition under altering nutrient availability or environmental stress associated with future global climate change.

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