

# Sensitivity of Functional Traits to Environmental factors in a Karst Plant Community

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## Abstract

In this study, the plant communities at five succession stages (herbage, herbage-shrub, shrub, tree-shrub, and tree) in the Zhenning Karst Plateau area of Guizhou were examined. The changes of plant functional characteristics in different succession stages were analyzed, as was the relationship between functional traits and environmental factors. The main results include the following. (1) During the succession process, plant height, leaf dry matter mass, leaf area, leaf nitrogen content, and leaf phosphorus content gradually increased, whereas leaf thickness and specific leaf area decreased, and leaf C:P ratio and leaf N:P ratios did not change significantly. (2) Soil organic matter, soil total nitrogen, soil total phosphorus, soil C:N, soil C:P, and soil C:K increased at first and then decreased, reaching a peak at the tree-shrub stage. Soil total potassium fluctuated and soil bulk density gradually decreased and reached the lowest value at the tree-shrub stage. (3) Redundancy analysis (RDA) showed that the plant community shifted from a nutrient-poor soil environment to a nutrient-rich environment. Soil total phosphorus, soil C:K, soil organic matter, soil C:N, and soil bulk density were the key environmental factors affecting the change of functional traits. (4) Structural equation modeling suggests that specific leaf area and leaf nitrogen content had more sensitive responses to soil nutrient resources and environmental factors, respectively.

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