

摘 要

不同生活型植物的化学计量特征往往有所差别,且通常会随着季节更替而发生动态变化,但目前对于亚热带地区湿性常绿森林不同生活型植物的化学计量特征和养分利用策略较为匮乏,尤其对木质藤本和附生植物的养分适应策略仍不明晰。故本研究分析了云南哀牢山中湿性常绿阔叶林中生存的 15 个优势种植物,其分别对应 5 种典型的植物生活型:常绿草本(EGG)、常绿小乔木(EGD)、附生植物(EP)、常绿乔木(EGA)及木质藤本(WV),我们分析了其叶片的生态化学计量特征,旨在揭示哀牢山中山湿性常绿森林不同生活型植物的化学计量特征及其与生境适应性之间的联系。结果表明:化学计量特征反映了不同生活型植物的养分利用特征及其应对森林不同生境的适应策略。植物生长所必需的碳(C)、氮(N)、磷(P)、钾(K)、钙(Ca)、镁(Mg)、硫(S)和锰(Mn)元素含量在不同生活型植物中均具有显著差异($P < 0.05$)。其中 EP 和 WV 有较高的 P、K、Ca、Mg 含量,这反映了 EP 和 WV 对于冠层生境中低水分和高光照条件的适应;EGA 则有更高的 C 和 Mn 含量,这反映了它较高的光合能力;而 EGG 有较高的 N 和 S 含量,这反映了它较高的蛋白质需求。铁(Fe)和钠(Na)元素含量在不同生活型植物间并无显著差异。此外,在哀牢山湿性常绿森林阔叶林中,植物叶片的大量元素:C、N、P、K、Ca、Mg、S 受植物生活型的显著影响($P < 0.05$),但不受季节的影响;而微量元素 Mn、Na 对生活型和季节的交互作用有显著响应;C:N 主要受到生活型的影响;而 C:P 和 N:P 受植物生活型和季节的共同影响($P < 0.05$)。

关键词: 化学计量特征; 生活型; 适应性; 哀牢山; 中山湿性常绿阔叶林

Abstract

Different stoichiometric traits of plant life forms are different, and usually change with the seasons. However, there is little information about stoichiometric traits and nutrient utilization strategies of different plant life forms in moist evergreen forest in the subtropical area, especially these in woody vines and epiphytes. This study analyzed stoichiometric traits of fifteen dominant plant species in moist evergreen broad-leaved forest in the Ailao Mountain, which correspond five kinds of typical plant life forms: evergreen herb (EGG), evergreen dungarunga (EGD), epiphyte (EP), evergreen arbor (EGA) and woody vine (WV). We analyzed the ecological stoichiometric traits of plant leaves in order to reveal the relationship between stoichiometric characteristics of different plant life forms and their habitat adaptation. The results showed that the stoichiometric traits reflected the nutrient utilization characteristics of different plant life forms and their adaptation strategies to different forest habitats. The essential elements for plant growth: carbon (C), nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulfur (S) and manganese (Mn) were significantly different in the different life forms ($P < 0.05$). The P, K, Ca and Mg contents in EP and WV were higher, which reflected their adaptation to low moisture and high light in canopy habitats; EGA has higher C and Mn contents, which reflected its higher photosynthetic capacity; and EGG have higher N and S, which reflecting its higher protein requirements. However, there was no significant difference in iron (Fe) and sodium (Na) content among different life forms.

In addition, the essential macronutrient: C, N, P, K, Ca, Mg and S were significantly affected by plant life form ($P < 0.05$), but not by season. However, microelements: Mn and Na had significant responses to the interaction of life form and season. C: N ratio is mainly influenced by life form. However, C: P and N: P ratios were both influenced by life form and season ($P < 0.05$).

Keywords: Stoichiometric trait; Life form; adaptation; Ailao Mountain; Mid-montane humid evergreen broad-leaved forest

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