

Spatial patterns of leaf $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of aquatic macrophytes in the arid zone of northwestern China

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Abstract

The analysis of stable isotope composition is an important tool in research on plant physiological ecology. However, large-scale patterns of leaf stable isotopes for aquatic macrophytes have received considerably less attention. In this study, we examined the spatial pattern of the leaf $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of macrophytes collected across the arid zone of northwestern China and tried to illustrate how they were affected by different environmental factors. Our results showed that the mean values of leaf $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ in the macrophytes sampled from the arid zone were -24.49 higher than the values of terrestrial plants. In addition, leaf $\delta^{13}\text{C}$ varied significantly among different life forms, possibly reflecting the complex photosynthetic fixation and adaptations of macrophytes. In addition to, our studies indicated that the foliar $\delta^{13}\text{C}$ values of all the aquatic macrophytes were only negatively associated with precipitation, but the foliar $\delta^{15}\text{N}$ values were mainly associated with temperature, precipitation and potential evapotranspiration. Therefore, we speculated that the determinant of the leaf $\delta^{13}\text{C}$ of macrophytes in the arid zone of northwestern China is water factors and the leaf $\delta^{15}\text{N}$ values is the complex combination of water and energy factors.

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