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Aridity and High Salinity, Rather Than Soil Nutrients, Regulate Nitrogen and Phosphorus Stoichiometry in Desert Plants from the Individual to the Community Level

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摘要	The stoichiometric characteristics of plant nitrogen (N) and phosphorus (P) and their correlations with soil properties are regarded as key for exploring plant physiological and ecological processes and predicting ecosystem functions. However, quantitative studies on the relative contributions of water–salt gradients and nutrient gradients to plant stoichiometry are limited. In addition, previous studies have been conducted at the plant species and individual levels, meaning that how community-scale stoichiometry responds to soil properties is still unclear. Therefore, we selected typical sample strips from 13 sampling sites in arid regions to assess the leaf N and P levels of 23 species of desert plants and measure the corresponding soil water content, total salt content, total nitrogen content, and total phosphorus content. The aim was to elucidate the main soil properties that influence the stoichiometric characteristics of desert plants and compare the individual and community responses to those soil properties. Our results indicated that the growth of desert plants is mainly limited by nitrogen, with individual plant leaf nitrogen and phosphorus concentrations ranging from 4.08 to 31.39 mg g?1 and 0.48 to 3.78 mg g?1, respectively. Community stoichiometry was significantly lower than that of individual plants. A significant correlation was observed between the mean N concentration, P concentration, and N:P ratio of plant leaves. At the individual plant scale, aridity significantly reduced leaf N and P concentrations, while high salt content significantly increased leaf N concentrations. At the community scale, aridity had no significant effects on leaf nitrogen or phosphorus stoichiometry, while high salinity significantly increased the leaf N:P ratio and there were no significant interactions between the aridity and salinity conditions. No significant effects of soil nutrient gradients were observed on plant N and P stoichiometric characteristics at the individual or community levels. These results suggest that individual desert plants have lower leaf N and P concentrations to adapt to extreme drought and only adapt to salt stress through higher leaf N concentrations. The N and P stoichiometric characteristics of desert plant communities are not sensitive to variations in aridity and salinity in this extreme habitat. The results of this study could enhance our perceptions of plant adaptation mechanisms to extreme habitats within terrestrial ecosystems. View Full-Text
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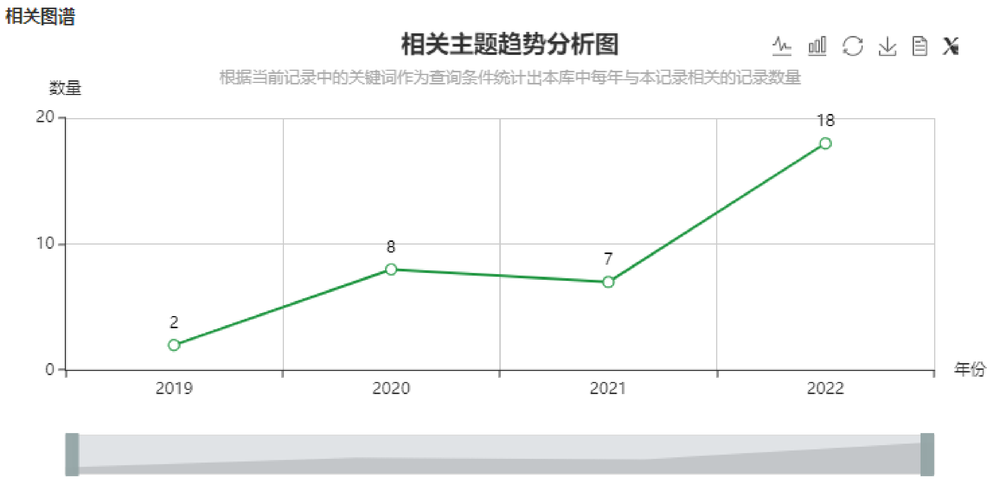

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