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Based on DNA Barcode Sequences by the Process Shape Coexistence of Alpine Meadow Species

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Abstract

Plant community assemblages can be created concurrently by random and deterministic mechanisms. However, it is unknown how they affect the phylogeny and functional structure of herbaceous plants in alpine meadows, which makes it difficult to comprehend how species coexist and how variety is maintained in herbaceous communities. On the northeaster Qinghai-Tibet Plateau of China, we created a permanent research sample plot of 3.76 105 m2 in alpine meadows, looked into the flora, evaluated nine functional variables, examined inter- and intraspecific variation, and displayed phylogenetic signals. The outcomes demonstrate that the habitat filtering along an altitude gradient range from competitive exclusion to the phylogenetic structure based on DNA barcode sequences. With altitude, the interspecific functional structure changed, revealing various plant survival strategies. Contrarily, environmental screening procedures were associated with intraspecific trait variation. Increasing altitude enhances environmental filtration, which benefits species with conservative selection strategies, indicating that they are more influenced by environmental variety.

Keywords: Species coexistence; DNA barcode sequence; Inter- and intraspecific functional traits; Phylogeny; Qinghai-Tibetan Plateau

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Introduction

These findings imply that the primary mechanisms for species coexistence in alpine meadows may be deterministic processes. In order to lessen competition for resources, low altitude induces niche differentiation of coexisting species through competitive exclusion. As a result of habitat filtration, high altitude species promote the coexistence of species that function similarly [1]. Understanding the mechanisms that influence the composition and organisation of communities is the goal of community ecology [2]. The distribution of species in plant communities is shaped by a variety of ecological and evolutionary factors that interplay [3]. Although niche and neutral-based processes have typically been seen as the two most important ecological processes, it is still unclear how much of a role they play in community formation [4]. A focus on species diversity a reasonable place to start when studying biodiversity is with metrics of species diversity, although these alone are relatively information-poor [5]. In other words, measurements of species diversity treat every species as independent of one another in terms of ecology and evolution [6]. Alternative biodiversity axes, such phylogenetic and functional features, can demonstrate this no independence and greatly advance our comprehension of the processes underlying patterns in biodiversity [6]. From a conservation standpoint, phylogenies might show features of biodiversity that conventional measures of species diversity are unable to show [7]. Phylogenies aid in the integration of our knowledge of the ecological, evolutionary, and biogeographic factors that influence community composition by providing a historical context [8].

Discussion

Ecologists now frequently combine phylogenetic data with assessments of community patterns using the PHYLOMATIC tool [9]. The taxonomic resolution of PHYLOMATIC phylogenies, however, is often low or absent among closely related species [10]. The enhancements and revisions made in the resolution of the terminal branches of the tree are the main advantages of

creating community phylogenies from DNA barcode sequences. Because of how the phylogenies are constructed, the DNA barcode phylogenies are able to resolve the terminal branches of phylogenies and to offer precise branch length measurements. Based on the sequence information of individuals that represent the species in the community. Phylogenetic has coincidentally sparked a trend in plant functional ecology toward the identification of crucial functional features that serve as reliable indicators of ecological strategy. The study of functional features may reveal crucial elements of a species' ecophysiology, morphology, and life history strategy as well as provide a crucial connection between basic biological functions and community dynamics. In addition, changes in a plant's functional features following environmental adaptation can have a substantial impact on how well an ecosystem functions and tie the community's structure to its surroundings and ecosystem processes. The pattern of species distribution, community stability, and anti-interference capacity brought on by regional environmental changes can all be explained by the interspecific variance of functional attributes. Interspecific variation, however, disregarded any potential trade-offs. In the leaf level's strategic resource allocation. Recent research has shown that intraspecific variation of functional features might adjust plant traits associated to strategy through genetic variation and phenotypic plasticity in response to local selection pressure.

Conclusion

It can more accurately depict the plant population's capacity for trait variation when compared to an interspecific study that used the mean value of species traits. As a result, the interspecific and intraspecific variation together can more precisely reflect how a species responds to habitat change and resource competition in the development of communities and better comprehend the process of species maintenance. At the same time, Blomberg's K value method offers a more accurate viewpoint for examining the coexistence of species when used in conjunction with mathematical techniques to examine the phylogenetic signals of functional features. The ecological functional similarity between closely related or distantly related species can be estimated using the phylogenetic signals of functional traits. Strong signals indicate that closely related species should share similar functional characteristic values as a result of their shared ancestry. Altitudinal gradients serve as natural studies on how plant communities react to environmental change throughout time. The Qinghai-Tibetan Plateau, with its distinctive geological history, chilly temperature, and rich biodiversity, offers a fantastic chance to examine the pattern of community assembly in altitude gradient. The process of species cohabitation in the alpine meadow has been the subject of some research. The majority of research, however, use more traditional approaches or overlook the effect of intraspecific variation on the mechanism of species coexistence.

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Conflict of Interest

No conflict of interest

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