

Testing the neutral theory of plant communities in subalpine meadow

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Introduction We tested the neutral theory of biodiversity within the Subalpine meadows on the eastern Tibetan Plateau in areas exhibiting comparatively complicated species composition. Our objective was to explain the species abundance distribution pattern and underlying mechanisms of biodiversity.

Materials and methods We fit the neutral model to random sampled data set obtained in three different types of habitats (north-facing slope, plain field and south-facing slope). Three methods used to test the fitness of the neutral model to the real community were the confidence interval method, the goodness of fit method, and the diversity index method.

Results The results showed that there was no difference ($P > 0.05$) between the neutral theory predictions and observed data of species abundance distributions in the three habitats according to the goodness of fit method. The observed data nearly completely falls into 95% confidence intervals of the neutral model predictions (only one out of 63 species in plain field communities and 2 out of 75 species in the north-facing slope communities deviate from 95% confidence interval). There was no significant difference between the neutral theory predictions and observed species abundance patterns, in which the fit of richness predictions was the best ($0.49 < P < 0.56$) and the fitness of evenness predictions were poor. However, for the three different habitats, the fitness of these three indices in north-facing slope communities was perfect, and the p-value varied between 0.49—0.70. However, the fitness in plain field communities were also relative poor (p-value of the Simpson diversity index is smaller than 0.1).

Discussion Although the test results of the neutral theory by three different test methods and habitats were somewhat different, the final conclusions were consistent. We concluded that the neutral model can commendably predict species abundance distribution pattern within these three different habitats of Subalpine meadow of the Tibetan Plateau.