Prediction of potential distribution area of two parapatric distribution species in Triosteum under climate change

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Abstract

Climate change has a profoundly impact on global biodiversity and species geographical distribution, especially in alpine regions. Predicting the effects of climate change on the species' habitat could help to understand how do these species respond to the potential climate threats. Triosteum is a typical mountain plant with medicinal and ecological value. There are three species of this genus in East Asia. Triosteum Pinnatifidum and Triosteum himalayanum are mainly distributed in the Qinghai-Tibet Plateau and its surrounding areas, and they are sensitive to climate changes. Therefore, these species of Triosteum are excellent material for studying the response of herbaceous plants to climate change in Qinghai-Tibet Plateau and adjacent mountains. In this study, a MaxEnt model was used to predict the potential distribution of T. Pinnatifidum and T. himalayanum in present time and at four different time periods in future under two different Shared Socio-economic Pathways (SSPs). In the present study, accuracy of the model's prediction was verified, and the results indicate that temperature is the key factor that affects the distribution of these two species. Compared with the current distribution, the potential suitable area of T. Pinnatifidum will increase in the future under the two types of SSPs, but the potential suitable area of T. himalayanum will decrease significantly. In addition, the overlap of the potential suitable areas of these two species will also expand, potentially affecting their hybridization and interspecific competition. The centroids of T. Pinnatifidum will migrate to east, but the trajectory of centroids of T. himalayanum is complex. This study could infer the influence mechanism between herbaceous plants and climate, which could provide basic data for resource utilization and biogeography research of Triosteum. It also provides a useful tool for developing adaptive management strategies of conservation and sustainable use of mountain herbaceous plants under climate change.

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