

The species richness-environment relationship for cherries (*Prunus* subgenus *Cerasus*) across the Northern Hemisphere

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Abstract

Understanding large-scale patterns of biodiversity and their drivers remains significant in biogeography. Cherries species (*Prunus* subgenus *Cerasus*, Rosaceae) are economically and ecologically important in ecosystems and human agricultural activities. However, the mechanisms underlying patterns of species richness-environment relationship in *Cerasus* remain poorly understood. We collected and filtered worldwide specimen data to map the species richness of *Cerasus* at the global scale. The map of *Cerasus* species richness was created using 21043 reliable recorded specimens. The center of *Cerasus* diversity was determined using spatial cluster analysis. Stepwise regression analysis was carried out using five groups of 21 environmental variables and an integrated model was included to assess the impact of the overall environment. We calibrated each of the four integrated models and used them to predict the global *Cerasus* species richness and that of the other continents. Our results revealed that *Cerasus* species have two centers of diversity (the southwest of China and Honshu Island in Japan) with differing environmental variables influencing the distribution patterns of these two centers. In the southwest of China, hydrothermal conditions are the main driving factor while in Japan, habitat heterogeneity is the main driving factor. The relationship between the abundance of the *Cerasus* and the various groups of factors generally supported both the productivity and the habitat heterogeneity hypothesis. However, these hypotheses did not fully explain the *Cerasus* species richness pattern, indicating that other factors such as historical environment, topography, and human activities likely played a role in pattern formation. The high level of habitat heterogeneity and better hydrothermal conditions may have played an important role in the establishment of its globally consistent richness-climate relationship. Our results can provide valuable information for the classification, and conservation of *Cerasus* natural resources, as well as contribute to furthering our understanding of biogeography at a global scale.

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