

6.水土保持与生态修复

The Impact of Water Potential and Temperature on Native Species' Capability for Seed Germination in the Loess Plateau Region, China

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摘要: Global warming is increasing the frequency and intensity of heat waves and droughts. One important phase in the life cycle of plants is seed germination. To date, the association of the temperature and water potential thresholds of germination with seed traits has not been explored in much detail. Therefore, we set up different temperature gradients (5–35 °C), water potential gradients (–1.2–0 MPa), and temperature × water potential combinations for nine native plants in the Loess Plateau region to clarify the temperature and water combinations suitable for their germination. Meanwhile, we elucidated the temperature and water potential thresholds of the plants and their correlations with the mean seed mass and flatness index by using the thermal time and hydrottime models. According to our findings, the germination rate was positively correlated with the germination percentage and water potential, with the former rising and the latter decreasing as the temperature increased. Using the thermal time and hydrottime models, the seed germination thresholds could be predicted accurately, and the germination thresholds of the studied species varied with an increase in germination percentage. Moreover, temperature altered the impact of water potential on the germination rate. Overall, the base water potential for germination, but not the temperature threshold, was negatively correlated with mean seed mass and was lower for rounder seeds than for longer seeds. This study contributes to improving our understanding of the seed germination characteristics of typical plants and has important implications for the management and vegetation restoration of degraded grasslands.

关键词: seed germination; temperature; water potential; thermal time model; hydrottime model; Loess Plateau