



Ranges of critical temperature and water potential values for the germination of species worldwide: Contribution to a seed trait database

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Mots-clés	Crops [5], Database [6], Germination [7], trees [8], Wild species [9]
Résumé en anglais	<p>Germination is the first essential stage in crop and food production, as well as for the establishment of trees and regeneration of wild species. Temperature and water potential are the primary environmental factors that control germination in all species, and affect both the rate and final percentage germination. A comprehensive description of intra- and inter-variations between groups of species (perennials and annuals, trees, grasses, crops and wild species) helps understand where these species are currently able to grow on earth and will be in the future. By collecting germination trait data on 243 species from the literature and unpublished data, we provide a wide spectrum of species' seed germination traits, in the form of a set of parameter values describing germination responses to variations in temperature and water potential. Major differences in germination traits were seen to depend on the climatic conditions where the species grow or originated, with species able to germinate on ice and others unable to germinate below 18 °C. By contrast, within the different plant groups, similar ranges of threshold values were found, linked to the species geo-climatic origin. Crops however germinate faster, their range of threshold temperatures and water potential values is wider, and some crops have higher optimum and maximum temperatures as well as lower water potential threshold values. This is likely the result of human selection for rapid germination and for species able to grow in the wide range of environmental conditions where agriculture was developed. Our analyses revealed correlation between traits: negative correlations appeared between germination speed and temperature thresholds, and between temperature and water potential thresholds. The collected data also form a valuable database, enabling plant establishment to be better taken into account in modeling and simulation studies of vegetation boundaries (wild or cultivated) under changing land-use and climate.</p>

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