

Effects of Substrate on Seed Dormancy and Germination of Edaphic Endemics

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As the climate changes suitable environmental conditions for species growth will move poleward and to higher elevations. It is unknown whether or not edaphic specialists will be able to grow on soil types outside of their current range, which could limit their migratory capability. This study used three species of *Leavenworthia*, winter annuals endemic to limestone cedar glades, to examine how germination rates differ among species and populations, if substrate influences germination, and if edaphic specialization limits distribution of *L. stylosa*. Germination was tested for each of the populations for all three species on filter paper, and select populations were tested on their home soil, filter paper, filter paper after being soaked in 500 ppm gibberellic acid for 21 hours, potting mix, a Missouri sandstone mix, and the *L. uniflora* home soil mixture. For *L. stylosa* and *L. torulosa*, there were significant ($P < 0.05$) differences in germination fractions among populations and germination fractions were greatest when seeds were treated with gibberellic acid, while germination fractions on calcareous soils were nearly twice as great than on sandstone. These results show that closely related species disperse seeds with different dormancy levels and that populations within species also disperse seeds with varying dormancy levels. Also, calcareous specialists are sensitive to substrate at the germination stage of their life cycle. Distribution limits can begin to form at the earliest life history stage. *Leavenworthia stylosa* appears to be able to germinate on calcareous soils outside its current distributional range, so while it is an edaphic specialist it might be able to occupy other soils, providing more climatic adaptability.