Soil warming reduces seedling emergence in a Mediterranean-climate ecosystem

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Background/question/methods: Plants are heavily reliant on favourable environmental conditions for successful seed germination and seedling establishment. However, within a species, requirements for this phase of the life cycle can vary both spatially (i.e. along its geographical distribution) and temporally (e.g. under a changing climate). This variation in regeneration requirements can affect community composition and influence population persistence. We used a field-based climate manipulation to investigate seedling emergence patterns under altered climate conditions (water reduction and addition, and temperature increase). We sowed seeds from six populations of four Western Australian *Banksia* (Proteaceae) species collected from across a natural east-west climate gradient in the South West Australian Floristic Region. We hypothesised that tolerance to warmer, drier conditions would be retained (niche conservatism) across populations along the climatic gradient but that species' responses would differ.

Results/conclusions: Soil warming slowed germination across all species and reduced total seedling emergence in 3 out of 4 species, although seed response to watering treatments was inconclusive. Within species, populations differed significantly in response to the warming treatments, but contrary to expectations, these differences were not correlated with latitude, longitude or climate at the seed collection sites. The implications of these results will be discussed in the light of a warming, drying climate as predicted for the region, including addressing strategies for conservation and restoration of long-lived woody species in this and other Mediterranean-climate ecosystems.

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