Seed traits shape seed survival of fire of varying intensity and season

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Biography:
Ryan Tangney, a PhD student at Curtin University and Kings Park Science, in the final months of his PhD examining how seed traits drive seed survival in fire. Interested in seed trait plasticity, trait evolution, fire ecology and invasion ecology.

Fires are increasing in severity and frequency around the globe. Prescribed burning, or hazard reduction burning, is a common practice to reduce the risk of high-severity fires that put people and infrastructure at risk. Appropriate fire management also considers biodiversity conservation while ensuring public safety. Within fire-prone systems, seed banks are critical for many plant species' regeneration, and seeds are typically adapted to survive and regenerate in response to cues associated with natural fire regimes. But how do seeds respond to altered fire regimes? Here we present a multifaceted approach to understanding seed survival during fire in different seasons. We consider seed survival of high temperatures in the context of seed moisture content, soil temperature, and seed depth in the soil profile. Through the identification of key seed traits associated with seed survival and seedling emergence depth, and examination of the interactions between seed traits, fuel dynamics and soil temperatures, we model how seeds will survive and seedlings emerge with a set of varying fuel bed loadings. Seed moisture content is the primary driver of lethal temperatures thresholds in seeds, and seed embryo type is a second influential trait. Larger seeds are able to emerge from deeper within the soil profile, but lower lethal temperature thresholds in larger seeds from some species will likely hinder emergence under heavier fuel loads.

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