

Tools to aid the conservation of rainforest seeds

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Abstract

Rainforest diversity around the world is declining under pressure from on-going logging and land clearing. This decline is leading to an increased need for ex situ conservation to provide both insurance against extinction and a source of material for restoring degraded habitats. Seed banking is the most efficient and cost-effective method for conserving seed-bearing species ex situ and protocols for conserving seed from relatively dry habitats have been well-honed over the past few decades. In contrast, the seed banking of rainforest species has been hindered by lack of knowledge as to which species are tolerant of the drying and freezing required for long-term storage. As part of the Rainforest Seed Conservation Project, we assessed 156 Australian rainforest species for seed banking suitability by comparing the germination of fresh seeds to that of seeds dried at 15% RH and stored at -20°C. We found 64% of species were tolerant of the drying required for standard seed banking and a further 10% were at least partially tolerant. As expected, tree species produced a significantly higher proportion of desiccation sensitive seeds (42%) than shrubs, vines and herbs ($\leq 17\%$; $P = 0.006$). Easily measured characteristics such as seed moisture content and dry weight were found to be useful in predicting the response to drying, leading to the development of a simple decision key that may be utilized to quickly assess the response of previously untested species. Of 107 species tested for response to freezing after drying, 24% were found to be short-lived in storage at the standard seed banking temperature of -20°C. These species may still be conserved by seed banking but require alternative storage temperatures that may be identified using differential scanning calorimetry. These tools have improved our capacity to conserve many more Australian rainforest species than was previously considered possible.