

# Unlocking THE SECRETS OF SEEDS

Australian rainforest at dawn

Rainforests cover less than half of one per cent of Australia's land mass, yet contain around 50 per cent of Australia's plant and animal diversity. While over 1,000 rainforest plant species are found in New South Wales, more than 100 of these are listed as threatened. Until recently, seed banking has not been considered to be an effective insurance to preserve the genetic diversity of rainforest plants, as large or oily seeds of many species are destroyed by traditional storage methods of drying and freezing.

Thanks to a recent scholarship from Foundation & Friends, Dr Karen Sommerville has just visited the National Centre for Genetic Resources Preservation in Fort Collins, Colorado to learn new methods for storing these difficult species. Her work, which is part of the Rainforest Conservation Project at the Australian PlantBank, aims to find how to preserve seeds of rainforest species and create a genetic back-up plan for worst-case scenarios. The importance of this work is critical, as it may determine the long-term survival of some species.

"Land clearing along the east coast of Australia has split large rainforest areas into small remnant pockets," says Karen. "These are much more susceptible to fire, weeds and disease, and the distance between them makes it difficult for some species to cross breed. Some plants could die out simply because they can no longer reproduce. I hope that we never need to access stored seeds to replace plants that have gone extinct in the wild but, if we do, it is essential that the seeds are viable and can be easily used to grow healthy plants."

Karen went to the US with seeds from 22 Australian rainforest species. Under the guidance of seed guru Dr Christina Walters she learned techniques for preparing seeds for the deep freeze by practising on silver maple (*Acer saccharinum*) and papaya (*Carica papaya*). She exposed the maple, papaya and Australian seeds to a range of tests to determine their lipid content, response to cooling and re-warming, and ability to be regrown after freezing. The difficulty of storing some rainforest seeds lies in their high moisture content, and embryos that are too big for rapid drying.

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Karen learned that carefully extracting the embryo from the seed coat and removing the cotyledons means the embryo can be dried more rapidly and evenly, and is better prepared for snap freezing in liquid nitrogen (at  $-196^{\circ}\text{C}$ ). Without cotyledons, the embryo no longer has a food source for germination, so embryos stored this way must be germinated in tissue culture with an artificial source of nutrients.

Dr Sommerville is back at PlantBank armed with a stack of results to analyse, and a whole new skill set for preparing seed embryos. Her findings will continue to support the vital seed banking and collecting work of the Australian Botanic Garden Mount Annan, and will contribute to the global mission to protect our precious rainforests.



Karen extracting papaya seeds



Rainforest seeds ready for testing



Putting seeds in the deep freeze