

Cryoconservation of South African plant genetic diversity

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Abstract South Africa has a rich flora which exhibits among the highest species density in the world, distributed across nine biomes that support an impressive diversity of animal life. However, a variety of human actions, invasion by alien species, natural disturbances and climate change collectively impact negatively on the great diversity of both plant and animal species. *In situ* conservation has long been practised, primarily in nature reserves, complemented by *ex situ* conservation in national botanic gardens, but *in vitro* plant conservation is not common. In the context of animal biodiversity conservation, the Wildlife Biological Resource Centre of the National Zoological Gardens utilises cryo-

banking as one of its major focuses and is now poised to expand as the repository for the cryoconservation of plant germplasm, particularly for indigenous recalcitrant-seeded and poor-seeding species. However, there are particular problems associated with successful germplasm cryostorage of such tropical and subtropical plants. As we see the science and application of cryobiology and cryoconservation as cross-cutting and transdisciplinary, we have entrained formal networking among scientists offering a range of specialisations aimed at a deeper understanding of common problems and practical outcomes to facilitate both plant and animal biobanking. The endeavours are aimed at elucidating the basis of both successes and failures in our efforts to attain optimal outcomes. With focus on best practices, standard operating procedures, validation and risk management for cryopreserved and cold-stored plant and animal material, our ultimate aim is to facilitate restoration by the safe reintroduction of indigenous species.

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Introduction

Aside from the low-lying coastal regions, much of the land area of South Africa is high plateau, with the country being flanked to the east by the Indian Ocean, warmed by the Mozambique or Agulhas current, and to the west by the Atlantic Ocean, cooled by the Benguela current originating in the Antarctic (www.southafrica.info). In combination, these geographic features, together with prevailing winds and topographical heterogeneity, have led to a range of distinctly differing ecosystems (Fig. 1) in a land area constituting only 2% of the global total.