



Australian National
Botanic Gardens

Australian National Botanic Gardens: Research areas (for Honours, Masters or PhD projects)

The Australian National Botanic Gardens (ANBG) plays a national role in the conservation of Australia's native flora, with the Living Collection being a critical conservation tool.

The Living Collection is a biodiversity repository, comprising approximately 74,000 plants representing around 4,000 species, including more than 300 threatened and rare taxa. The Living Collection acts as a genetic insurance policy and provides material for research, ecological restoration and conservation translocation projects. Most plants are wild-sourced and supported by rigorous provenance data and herbarium specimens housed at the Australian National Herbarium, making the collection a powerful scientific and conservation resource.

Please contact the ANBG at ANBGadmin@dcceew.gov.au or the contacts below to discuss potential Honours, Masters, or PhD projects. Projects may involve more than one of the research areas/contacts listed below.

National Seed Bank (NSB)

The National Seed Bank safeguards plant species by securing seeds, spores, and plant tissue in long-term storage and by conducting research into their biology and ecology. By storing seeds, working out how to germinate them, and understanding plant lifecycles in the wild, the National Seed Bank plays a leading role in supporting restoration and conservation management across Commonwealth National Parks and beyond. The National Seed Bank has four priority research themes:

- **Drivers of native seed germination:** Research that develops germination protocols, drawing on ecological, biological, biochemical and physiological information to uncover germination strategies. Primary targets include understanding environmental cues (e.g. temperature, moisture, light, soil chemistry), fire ecology, and seed longevity in soil seed banks.
- **Improving seed banking practice:** Research to test the effectiveness of different collecting, processing and storage methods, with a focus on non-

orthodox species. Relevant techniques include tissue culture, inoculation with mycorrhizal fungi, embryo extraction and cryostorage, alongside genetic analyses to ensure representative collections.

- **Responses to environmental stress:** Research that predicts the effects of climate change. Field, laboratory, and glasshouse experiments will be used to examine the effects of different temperatures and moisture levels on seed set, viability, germinability, and establishment. Maternal effects (the influence of a parent plant's environment on offspring traits) will also be investigated.
- **Linking seed biology with plant ecology:** Research that supports a holistic understanding of plant lifecycles - from pollination and seed dispersal to establishment and flowering. Field data will yield key insights, and alongside genetic analyses can investigate plant breeding systems. Seed trait analysis can uncover ecological patterns, informing viability, species taxonomy and beyond.

The National Seed Bank actively collaborates with the Conservation Horticulture team to support holistic conservation research and outcomes.

Please contact the National Seed Bank at nsb@dcceew.gov.au if you are interested in potential research projects at the National Seed Bank.

Horticultural research and ex situ plant conservation

The ANBG Nursery team applies specialised horticultural expertise to investigate the propagation and growing requirements of native plants, and to establish translocation-ready plant collections. This is largely undertaken in collaboration with state government and other partners. The nursery holds several plants species for which effective conservation will require investigations of species biology, population genetic structure, breeding systems, selection through cultivation, and community ecology.

Management of living plant collections presents some unique challenges and opportunities for site-based research. For example, living collections provide an opportunity to investigate physiological tolerances and resilience of plant species in different microclimates and potential future climate scenarios. The ANBG living collection could be used as a common garden, a place where plants from contrasting environments coexist, to study plant acclimation and adaptation to environmental conditions.

Threatened and rare species are a priority at the ANBG. A formal species priority framework guides propagation and collection management, ensuring genetically representative stocks are maintained.

For some species, the collection holds the last remaining genetic diversity, including genotypes already lost from the wild. Working closely with the National Seed Bank, the

ANBG uses a holistic conservation approach to evaluate when plants can be returned to suitable habitats and establish self-sustaining populations.

- Plant conservation, cultivation and ecology, translocation, population genetics, plant collection management, use of living collections in conservation and in horticultural research – Veronica Briceno Rodriguez, veronica.bricenorodriguez@dcceew.gov.au.

Biodiversity informatics

The Biodiversity Informatics team supports the management of scientific collections by enabling the entry, curation, presentation and analysis of associated data.

Nationally this team partners with other botanic gardens and the Atlas of Living Australia to integrate biodiversity datasets, which are delivered internationally to the Global Biodiversity Information Facility and other data exchange partnerships for systematic biological and conservation-based research. Analysis of our extensive plant collection data could identify factors influencing plant persistence, collection composition (e.g. threatened or at risk taxa), succession planning and other aspects of living plant collection management. There is also scope to explore other areas such as our plant image collections, or to study taxonomy data management.

- Living collections data analysis – Anne Fuchs, Anne.Fuchs@environment.gov.au

Centre for Australian National Biodiversity Research (CANBR)

The CANBR is a successful long-term partnership between the ANBG and CSIRO. In this joint venture the ANBG cooperatively manages the Australian National Herbarium and conducts novel research into the taxonomy, systematics and conservation ecology of Australia's plant diversity.

- Threatened flora conservation; orchids. – Heidi Zimmer, Heidi.Zimmer@csiro.au
- Evolutionary ecology of plant-animal mutualisms; pollinator networks; ecological and evolutionary modelling, invasion ecology, population genetics, environmental DNA and biogeography – Francisco Encinas-Viso, Francisco.encinas-viso@csiro.au
- Molecular systematics and phylogenomics of fungi and lichens; soil crusts – Cécile Gueidan, cecile.gueidan@csiro.au
- Daisy systematics and phylogenomics; computer vision (AI) in identification and collection science – Dr Alexander Schmidt-Lebuhn, alexander.schmidt-lebuhn@csiro.au
- Taxonomy and nomenclature – Brendan Lepschi, Brendan.Lepschi@csiro.au

Other areas of interest to the ANBG include:

- Climate change risk to ex-situ Living Collections
- Plant Traditional Ecological Knowledge
- Understanding the biology of rare and threatened plant species including seed biology, cultivation and genetic aspects.
- Understanding the ecology of rare and threatened plant species including drivers of species occurrence, regeneration and the role of associated organisms such as pollinators, herbivores, dispersers and symbionts.