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Media release

Millennium Seed Bank Program



The Millennium Seed Bank Project (MSBP), conceived, developed and managed by the Seed Conservation Department at the Royal Botanic Gardens Kew, is a collaborative project aimed at safeguarding thousands of the world's plant species, principally dryland species, from extinction.

The Royal Botanic Gardens Melbourne is a partner in this significant international program, joining participants from many other countries including China, Chile, Egypt, Lebanon, Saudi Arabia, Mexico, USA and several African nations.

The central aims of the MSBP are to:

- carry out research to improve all aspects of seed conservation and understanding of seed biology
- make seeds available for research and species re-introduction into the wild
- encourage plant conservation throughout the world by facilitating access to, and transfer of, seed conservation technology
- maintain and promote public interest in plant conservation.

Through the partnership, RBG Kew has provided RBG Melbourne with \$731,000 to carry out the Millennium Seed Bank Project in Victoria and south-eastern Australia until 2010. The Department of Sustainability and Environment is supporting the project through annual contributions of \$20,000 and assistance from the Department's field staff.

What the Victorian focus is

Scientists from the National Herbarium of Victoria at RBG Melbourne are targeting those Victorian species for which seedbanking has been identified as a critical conservation action. After collecting and cleaning, the germination requirements of seeds will be assessed before they are placed in long-term storage. A duplicate seed batch will be created to be stored at the Millennium Seed Bank at RBG Kew's Wakehurst Place facility.

RBG Melbourne has committed to provide seed of 100 species per year until 2010. These species will be new to Kew's already large and growing seed collection. For each species at least 4,000 individual seeds will be collected, the number calculated by MSBP scientists to represent the minimum required for a 'working' collection. This allows initial testing for viability and subsequent tests to track the progress of seeds over time as well as sufficient numbers to create living plants for conservation and/or reintroduction to the wild.

Field officers from the Department of Sustainability and Environment are playing an important role in the project by collecting seed or assisting the Royal Botanic Gardens' team by supplying information on the whereabouts and ripening progress of targeted species in their regions.

Many of Victoria's target species are threatened species for which reintroduction into the wild has been recommended as a key component of recovery activities. Neville

Walsh, Senior Conservation Botanist at the National Herbarium of Victoria, has collaborated with Department of Sustainability and Environment workers in compiling recovery plans for many of the state's threatened plant species. Neville believes that the Millennium Seed Bank project in Victoria creates a critical link in the chain of skills needed for threatened plant conservation in the state.

Why a focus on seeds?

Seeds have been aptly described as travellers in space and time. Their journeys begin when they are dispersed from their parent plants, often covering great distances on the wind or attached to the fur of animals or carried by birds. In their ultimate location they wait for favourable conditions for germination, sometimes for decades. There are even examples of seeds that have germinated after lasting in a dried state for hundreds of years: an extraordinary example is the germination of a seed of the Sacred Lotus (*Nelumbo nucifera*), found in an ancient lakebed in China and radio-carbon-dated as being more than 1200 years old.

The rather haphazard natural dispersal process means that survival for some species might well be accidental. But a greater threat is in the impact of urban and rural development on the conditions necessary for seed germination, with increasing numbers of plant species now facing extinction. To meet these threats, seed banks are being established in many countries; most are concerned with conserving seeds of crop species, but there is now a widening interest in the *ex situ* storage of the seeds of wild species.

Inside the Millennium Seed Bank project at RBG Kew's Wakehurst Place

- Collectors in the field give tentative names to the species collected. They also collect a number of pressed specimens of it for later identification. One batch of pressed specimens (and seeds) is deposited in the country where it was collected and another arrives at the Millennium Seed Bank at Wakehurst Place. After unpacking and checking, the pressed specimens, if fully dry, are frozen. This helps eliminate insect pests. The specimens are then sent to the Kew Herbarium where they are identified by comparison with the seven million pressed samples held there. The final identification is recorded on the seed bank database.
- Once banked, a sub-sample is tested for viability. This takes the form of a germination test because ultimately the collections will need to be grown out. Leaving aside seeds that are empty, those that don't germinate within the sub-sample are either dead or dormant. Many of the species arriving at the Millennium Seed Bank have never before been germinated in a laboratory, so germination schemes have been developed for different plant families
- The majority of the world's seed-bearing species produce seed that can be dried and then frozen. Within certain conditions, both drying and freezing increase the longevity of such seed. To maximise longevity the seeds are dried using fairly cool conditions. To do this, the air within the drying facility or room must be chemically dried. Moisture is thus pulled out of the seed into the 'moisture-hungry' air (15-18°C and 11-15% relative humidity).

- Although drying out is lethal for most organisms including mature plants, many seeds are desiccation tolerant. When a seed dries out it enters a state of suspended animation in which the ageing process is slowed. But the seed does age and will die with time. Dried seeds can also withstand freezing and by placing them at sub-zero temperatures the ageing process is further slowed down.
- At the end of 2004, the Millennium Seed Bank held in its cold store 10,887 identified species, amounting to 22,009 collections made in 128 different countries. This is about 2.5% of the world's species, currently estimated to be 422,000.

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