Saving seed to save species

By Andrew Crawford

Western Australia has a rich and diverse flora comprising over 12,500 native plant species, most of which occur in the southwest region of the State. Unfortunately, there are a range of threatening processes putting many of these species at risk of extinction; currently there are over 400 species listed as threatened in WA, in addition to over 3,000 priority species requiring further survey to ascertain their true conservation status. In the southwest region of Western Australia, the high number of endemic species combined with high levels of land clearing, has led to the region being listed as a Biodiversity Hotspot, one of 36 areas in the world identified as most needing urgent conservation action.

Whilst conservation of plant species in the wild is the primary focus of threatened species management, seed collection and storage are used as a complementary strategy to help prevent plant extinction. DBCA runs a conservation seed bank, the Western Australian Seed Centre (WASC), which has a vault located in the Keiran McNamara Conservation Science Centre in Kensington containing seed of the State's conservation significant plant species.

The purpose of this centre is to collect and store genetically diverse, and representative samples of plant species of conservation significance under conditions that will prolong the longevity of the seed, allowing them to be stored for decades or even hundreds of years. The first step in this process is to make high quality collections.

*Seed of the critically endangered Wongan cactus (*Daviesia euphorbioides*). It's not a cactus, it's from the pea family and is naturally restricted to a small area between Wongan Hills to south of Dowerin. Seed collection has enabled a new population to be established by translocation. Photo – Andrew Crawford.*

Seed quality is determined by a number of factors which include:

- confirmed identification of the target species (by lodging a specimen with the Western Australian Herbarium)
- the seed is mature at the time of collection
- the collection is genetically representative of the population from which it has been collected
- detailed collection information for example where and when the collection was made, a description of the location including the habitat, soil and associated species, the number of plants in the population and how many plants from which seeds were collected.

Continued next page ...

After collection, seeds are cleaned to a high level of purity, and are then quantified to determine how much seed has been collected. The seeds are then prepared for long-term storage. The two main factors that affect how long seeds will survive are the amount of moisture in the seed, and the temperature at which the seeds are stored. Reducing both factors increases the life expectancy of most seed. A special room running at 15 percent relative humidity is used to dry seed to a level suitable for long-term storage.

Germination testing takes place to determine seed quality before seed is placed in long-term storage. After any required pre-treatments, counted seeds are put in agar and placed into cabinets where temperature and photoperiod can be controlled, and the final germination count assessed. Photo – Andrew Crawford.

Long-term seed storage is in a vault at -20°C allowing seeds to be stored for decades or even hundreds of years. Photo – Andrew Crawford.

The seed are then sealed into foil bags so that the low moisture content is maintained. These bags are then stored in a vault at -20°C, freezing the seed for future use.

For these collections to be of use, it is critical that the viability of the seed (how many are alive) is known when the seed go into storage, and this needs to be monitored through time to ensure that the viability is being maintained. Germination tests are used for this purpose as they not only provide seed viability information, but also produce seedlings that can be used for other purposes such as species recovery, research, or education. Initial tests are conducted when collections go into storage with the aim of testing the viability at ten-year intervals thereafter.

Technical Officer Simone Dudley cleaning and counting seed of Acacia leptoneura. This critically endangered Wheatbelt species is known from only two localities, approximately 1km apart, with only a single plant at each locality. Photo – Andrew Crawford.

The WASC has been collecting and storing seed for conservation for over thirty years. During that time seed from 80 percent of the State's threatened plant species have been preserved, in addition to over 20 percent of the priority species. Not only have these species been conserved as seed, but many of the collections have been used for translocation, establishing new populations in the wild in sites where the threatening processes affecting the species can be effectively managed. Over fifty species have benefitted from these seed-based translocations.

Contact

Andrew Crawford
DBCA
email andrew.crawford@dbca.wa.gov.au